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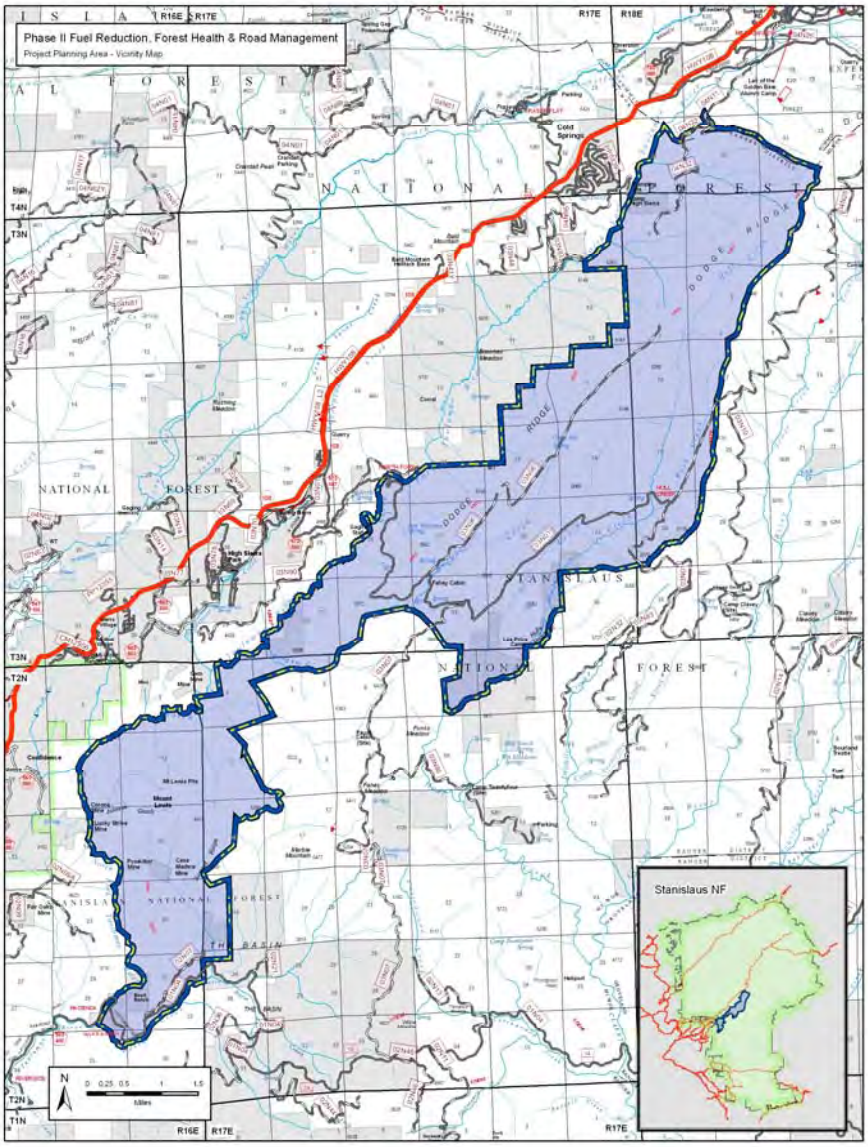
Phase II Fuel Reduction, Forest Health and Road Management (23684)

Environmental Assessment

Stanislaus National Forest
Mi-Wok Ranger District
Tuolumne County, CA



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Stanislaus National Forest
Mi-Wok Ranger District
Tuolumne County, California

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Abstract

The Phase II Fuel Reduction, Forest Health and Road Management project is located on the Mi-Wok Ranger District of the Stanislaus National Forest, roughly between the North Fork of the Tuolumne River and the first prominent ridge east of Dodge Ridge, encompassing portions of the Wrights Creek, Hull Creek and Rush Creek drainages. The project area stretches from the District boundary to the north, and is bounded by Basin Creek to the south. The project lies entirely within Tuolumne County. The legal description of the project area is: Sections 12, 13, 24, 25, 35-36, T2N, R 16E; Sections 2, 4-5, 7-8, 17, 18, 30, T2N, R17E; Sections 13, 21-28, 32-35, T3N, R17E; Sections 4-8, 17-20, 30, T3N R18E; and Sections 31-33, T4N, R18E. Within this area, treatment units encompass a variety of land allocations that include wildland urban intermix (WUI) defense zone, WUI threat zone, California spotted owl home range core areas (HRCAs), California spotted owl protected activity centers (PACs), old forest emphasis area, general forest, as well as combinations of two or more of the aforementioned designations. Vegetation structure/composition includes multi-aged mature forest, even-aged plantations, chaparral, and lava cap associations. Treatment activities are proposed on approximately 5,600 acres within the 17,700-acre planning area. This includes ~1,950 acres of plantation. Eighty percent (80%) of all proposed treatment activities (~4,900 acres) are located within the WUI defense and threat zones. Activities proposed include the use of mechanical/hand thinning, biomassing, shredding, prescribed fire, pile burning, or any combination of these tools, as well as road maintenance and reconstruction in support of the treatments. This project would also restore two headcuts located within the treatment units, and close or decommission ~9 miles of unauthorized routes/roads that were determined unnecessary in order to protect forest resource. The Forest Service evaluated the environmental effects of the proposed action, an action alternative based on scoping input and the no action alternative.

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CHAPTER 1: PURPOSE AND NEED

1.1. Background

In June 2002, the Stanislaus National Forest completed and released the Central Stanislaus Watershed Analysis[1] (CSWA). One of the determinations made in that analysis was that there was a high risk of fire occurrence in the wildland urban intermix (WUI) zone surrounding the communities of Cold Springs, Peter Pam, Long Barn, Sierra Village, Mi-Wuk Village, Sugar Pine, Confidence and Ponderosa Hills. Suppression effectiveness could be compromised in these areas by potentially high flame lengths and rates of spread and increased potential for spotting and crown fire development (CSWA, pg 80). Most of this area was identified as having been substantially altered from the natural (historical) range of vegetation characteristics, fuel composition, and fire frequency, severity and pattern. On June 10, 2005, Forest Supervisor Tom Quinn signed the Decision Notice and Finding of No Significant Impact for the South 108 Fuel Reduction, Forest Health and Road Management Project (#1694). That decision authorized a variety of treatments, including various combinations of mechanical and hand thinning, mastication, prescribed burning, and goat browsing on approximately 4,840 acres along the Highway 108 corridor adjacent to the Phase II planning area. That project is currently being implemented.

In August of 2005, the Stanislaus National Forest held the Stewardship and Fireshed Assessment[2] (SFA) Collaborative Workshop. The outcome of this process was the designation of units across the landscape, scheduled over a 5-year period, for the planning of vegetation management treatments on the Forest. Units contain site-specific strategically placed landscape area treatments (SPLATs) designed to interrupt fire spread on the landscape level. This landscape level treatment (based on the work of Dr. Mark Finney) is the foundation for the fire management strategy as outlined in the Sierra Nevada Forest Plan Amendment Supplemental EIS 2004 Record of Decision[3] (pp. 34-35) here after referred to as the SNFPA ROD. Greater detail on this SFA process can be found at http://www.fs.fed.us/r5/stanislaus/projects/veg-plan.pdf.

The SFA process identified the Phase II planning area (comprised of the Provo, Fahey, Wrights, and Sierra scheduling units) for treatment. This area is located within areas identified as very high or high priority for treatment during the SFA process. The planning area boundary and SPLATs were then refined after further reconnaissance by the District Fuels Officer and the District Planning Forester. Treatment units were based on existing fuels, road locations, and topography of the land as well as locations determined to provide safe, effective, and logistically feasible fuel treatments. Additional plantations within the planning area were also incorporated.

The Phase II Fuel Reduction, Forest Health and Road Management project is located on the Mi-Wok Ranger District of the Stanislaus National Forest, roughly between the North Fork of the Tuolumne River and the first prominent ridge east of Dodge Ridge, encompassing portions of the Wrights Creek, Hull Creek and Rush Creek drainages. The project area stretches from the District boundary to the north, and is bounded by Basin Creek to the south. Where as the South 108 project focused primarily on the WUI defense zone (bound to the east by the North Fork of the Tuolumne River), the Phase II project focuses primarily on the WUI threat zone, picking up where the South 108 project left off.

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[1] USDA 2002. Central Stanislaus Watershed Assessment. August 2002. Forest Service, Stanislaus National Forest, Sonora, CA.
[2] USDA Forest Service 2005. Stewardship and Fire Shed Assessment, Stanislaus NF – Five year Integrated Vegetation Management Program of Work (2007-2011). Stanislaus National Forest, Sonora, CA. (http://www.fs.fed.us/r5/stanislaus/projects/veg-plan.pdf)
[3] USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment. Final Supplemental Environmental Impact Statement, Record of Decision. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

1.2. Purpose and Need for Action

The purpose of this project is to protect lives, property and resources (including habitat) from catastrophic wildfire, and improve forest health within the planning area by: 1) reducing the spread and intensity of fire burning on the landscape, 2) decreasing stand densities, 3) moving species composition and stand structure toward those that were thought to be present prior to logging and fire suppression, and 4) closing roads/routes that are determined to be unnecessary or are causing unacceptable resource damage. This purpose stems from the gap between desired conditions outlined in the Stanislaus NF Forest Plan Direction (2005) and current conditions within the Phase II planning area. Those desired conditions are:

1. Under "high" (typically late summer, 90th percentile) fire weather conditions, wildland fire behavior in treated areas within the threat zone is characterized as follows: flame lengths at the head of the fire are less than 4 feet; the rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels; hazards to firefighters are reduced by managing snag levels in locations likely to be used for control of prescribed fire and fire suppression consistent with safe practices guidelines; production rates for fire line construction are doubled from pre-treatment levels; and; tree density has been reduced to a level consistent with the site's ability to sustain forest health during drought conditions.
2. Forest structure and function generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition and structure. Individual groups range from less than 0.5 to 5 acres or more in size. Tree sizes range from seedlings to very large diameter trees.
3. Forest roads are maintained to standards appropriate for their intended uses, considering safety, total transportation costs and impacts on land and resources; Roads not needed for continuing management are closed or decommissioned in order to protect resources and restore resource production (Forest Plan direction, June 2004, pages 54-59 and 62);
4. OHV activities are managed to meet the intent of Executive Orders 11644 and 11989, which require that OHV areas and trails be located so as to minimize damage to soil, watershed, vegetation and other resources of the public's land (MVTMP, pages 2 and 23).

Within the Phase II planning area there is approximately 2,700 acres of plantation. These areas were planted in an effort to restock the area following large fires (most notably the Wrights Creek and Flora fires, 1950 and 1960 respectively), clear cuts, and group selection thinning. Many of the older plantations (planted 30-60 years ago) that were thinned during the 1990s are beginning to close in, creating an even, continuous canopy. Diameters in these plantations average ~13 inches (~17 in the codominant and dominant trees) with ~152 square feet of basal area (BA) and an average Stand Density Index (SDI) of 247. These plantations (almost entirely ponderosa and Jeffrey pine) lack diversity, both in structure and species composition and are at stand densities near or above thresholds associated with increased drought- and insect related mortality[4]. Where plantations were thinned more heavily, such as for fuel breaks, crown spacing sufficient to minimize competition; however, many areas contain tall dense brush which would most likely result in flame lengths and fireline intensity outside our desired conditions for the area.

Most of the natural stands have missed several fire return intervals characteristic of those forest types. Lack of fire, along with past logging activities (most notably railroad logging at the turn of the century and insect salvage and sanitation harvests in the later part of the last century) have shifted vegetation away from a more open, pine dominated forest type to a denser, less fire resistant/resilient forest with

[4] USDA Forest Service. 2008. Phase II Silviculture/Forest Health Report. USDA Forest Service, Pacific Southwest Region, Stanislaus N.F., Mi-Wok Ranger District, Mi-Wuk Village, CA.

higher proportions of shade tolerant species. Many of these stands are near or above the threshold for increased drought- and insect-related mortality. Additionally, heavy surface fuel loads and the presence of dense thickets of small fir and incense cedar put much of these areas at risk of stand replacing fire. A large part of the area has been designated as Northern goshawk and/or California spotted owl protected activity centers (PACs), or spotted owl home range core areas (HRCAs), which also provides habitat for many other species dependent on mature forest. Fire behavior within these stands is predicted to be primarily high severity (i.e., stand replacing). The current surface fuelbed in combination with brush and conifer reproduction can create a fuel ladder that has the potential to carry fire into the crowns of overstory trees under the 90th percentile weather conditions. Within the project area, approximately ¾ of the area within a given stand (30-100%) is likely to experience torching. Potential mortality in basal area is between 14% - 100% (Fire and Fuels Report). Embers lofted by torching of single trees, or groups of trees, referred to as passive crown fire, can ignite new fires, making containment more difficult and resulting in larger fire size (Scott and Reinhardt 2001). The fuel loading, high density of trees per acre, and predicted flame lengths, combine to create a high resistance to control when suppressing wildfires. Currently, 91% of the Phase II Planning area is classified as being highly departed from historic fire regime. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns.[5]

Finally, there is also a need to stop or reduce resource damage occurring due to the use of some roads and off highway vehicle (OHV) trails. The Stanislaus National Forest is currently in the process of designating roads and trails open for motorized use. That process, however, does not provide the site-specific analysis necessary to physically close and decommission roads and routes. For those roads and trails not covered under that process, this project would serve to close routes and roads considered unnecessary and /or causing resource damage.

The management direction for achieving these desired conditions (Forest Plan, p. 35) includes standards and guidelines to "[s]trategically place area fuels treatments across the landscape to interrupt fire spread and achieve conditions that: (1) reduce the size and severity of wildfire and (2) result in stand densities necessary for healthy forests during drought conditions." This is to be done by creating defensible space near communities, providing a safe and effective area for suppressing fires, and designing economically efficient treatments (Forest Plan, p.35). The management intent is to "protect communities from wildfire and prevent the loss of life and property". The Forest Plan also provides direction to maintain the transportation system and off-highway-vehicle (OHV) routes in conditions that provide adequate access for both public and administrative uses without causing unacceptable damage to other resources. The Stanislaus National Forest is currently going through the Travel Management process. While this multi-year route designation process is being completed, road, trail and route management activities may continue to take place as a part of other project planning, such as the Phase II project, and when conditions warrant, action to adequately manage and protect Forest resources may be implemented.

To move towards the desired conditions described above, the Phase II Fuel Reduction and Forest Health, and Road Management project was proposed, with the following project objectives:

1. To meet fuel reduction desired conditions over a period of ten years:
    1. Create defensible space near communities, and provide safe and effective areas for suppressing fire, such as fuelbreaks;
    2. Reduce ladder so that crown fire initiation is highly unlikely under 90th percentile fire weather conditions;

[5] Safford, Hugh and Schmidt, Dave. 2006. Fire Regime Condition Class (Version 1), Stanislaus National Forest. Regional Ecology Program, USDA Forest Service Pacific Southwest Region and the Nature Conservancy, California Chapter.

3. Reduce crown fuels so that sustained crown fire is highly unlikely under 90th percentile fire weather conditions;
4. Reduce canopy cover to minimize overlapping crowns in locations likely to be used for control in prescribed fire and fire suppression, i.e., fuelbreaks, to allow for effective penetration of aerial fire retardant;
5. Eliminate snags and large down woody debris in locations likely to be used for control in prescribed fire and fire suppression, i.e., fuelbreaks and areas adjacent to high concentrations of private homes, consistent with safe practices guidelines;
6. Reduce flame lengths at the head of potential wildfires to less than 4 feet to allow for safe and effective fire suppression activities under 90th percentile fire weather conditions;
7. Remove surface and ladder fuels as needed to meet design criteria of less than 20 percent mortality in dominant and co-dominant trees under 90th percentile fire weather conditions;
8. Conduct treatments that would reduce the risk of losing key ecosystem components and allow fire to mimic natural conditions; and,
9. Conduct treatments in "…a cost-efficient manner to maximize program effectiveness…. Revenues from the sale of commercial forest products may be obtainedfrom some fuel treatments. This increases the likelihood of likelihood of accomplishing the projected acres of treatment, an essential first step in achieving the desired reduction in acres burned"[6]

2. To meet forest health desired conditions[7] over a period of 20 years:

    1. Reduce Stand Density Index in forested stands that are predominantly pine strata to 230 (; and
    2. Reduce Stand Density Index in forested stands that are predominantly mixed conifer to 300-333.

3. To meet road management desired conditions:

    1. Conduct road maintenance or reconstruction treatments to meet standards commensurate with use levels; and,
    2. Decommission or close roads and OHV routes that are causing unacceptable damage to other resources and are unnecessary for public access.

The fuels treatments are to be designed to be effective for a period of ten years, per the direction in the SNFPA 2004 ROD (p. 50). For the forest health objectives, the direction from the Regional Forester for the USDA Forest Service Pacific Southwest Region is to conduct treatments that are effective for 20 years.

1.3. Proposed Action

Who: *The US Forest Service, Mi-Wok Ranger District (Stanislaus NF)…*

What / How: *… is proposing to conduct fuels and fire hazard reduction treatments, and improve forest health on approximately 5,600 acres of National Forest System land in the wildland-urban intermix (WUI) and adjacent areas. In addition, some roads and unauthorized off-highway-vehicle (OHV) trails in the planning area are being proposed for closure or decommissioning due to resource damage. Restoration of 2 headcuts within treatment units is also being proposed. All proposals are consistent with the Stanislaus National Forest's Travel Management Plan's current proposed action except as noted in the summary of activities. All proposed road/route closing or decommissioning would not occur until after the Travel Management Record of Decision has been signed and implemented. Actual treatments implemented would be consistent with that decision.*

Fuel reduction and forest health improvement objectives would be accomplished through the use of mechanical thinning and/or biomassing; hand thinning and pruning, shredding, fuelbreak establishment

[6] Forest Plan Direction (2005), p. 11-12
[7] CSWA, Chapter IV, p. 28; Chapter V.3 p. 22-23; Chapter V.4, p. 20)

and/or maintenance; and prescribed burning. No herbicide use is proposed. Treatments will reduce surface, ladder and canopy fuels so that the potential for sustained crown fire is highly unlikely, and the potential for successful suppression greatly increased. Prescriptions will also focus on forest health by decreasing stand densities to levels likely to resist mortality due to competition, insects and disease under drought conditions. In plantations, prescriptions are also designed to increase heterogeneity and accelerate the development of structure and composition associated with "old forests". Of the ~5,600 acres proposed for treatment, 80% (~4,900 acres) are located within the WUI defense and threat zones. Approximately 1,950 acres of treatment are within plantations. Descriptions of the proposed treatments are as follows:

1. Thin commercial sized timber on up to 2,,192 acres of naturally forested land;
2. Thin smaller commercial sized timber on up to 1,851 acres of plantations;
3. Thin commercial sized timber up to 12 inches DBH on up to 90 acres of California spotted owl PACs in the WUI Defense Zone (note: material may be biomassed or shredded instead of removed as sawlogs);
4. Biomass removal (including PAC units) on up to 3,815 acres of forested stands;
5. Shred brush and small trees (as follow-up to commercial thinning, including PAC units) on up to 4,026 acres of forested and non-forested (brush) National Forest System land;
6. Shred brush and small trees as primary treatment on up to 831 acres (including ~10 acres of CA spotted owl PAC) of forested and non-forested (brush) National Forest System land;
7. Hand cut, pile and burn material on up to 393 acres (includes mature stands, plantations and brushy sections of fuelbreak)—which includes follow up to shredding (up to 357 acres), follow up to commercial thin without biomass removal (34 acres) and as primary treatment (2 acres);
8. Prescribed burn as primary treatment on up to 601 acres (including ~75 acres in California spotted owl or goshawk PAC);
9. Prescribed burn (follow-up) on up to 5,013 acres (including ~100 acres of CA spotted owl PAC);
10. Establish and or maintain 21.1 miles of shaded fuelbreaks, at an average width of 300 feet by thinning commercial-sized trees, removing snags, biomassing small trees and shredding brush, logging slash, small trees and existing dead and down woody material (acreage incorporated into treatments listed above);
11. Reconstruct ~31miles of road (~29 miles tied directly to timber harvest operations);
12. Reconstruct/construct up to 2.0 miles of temporary road to access landings. Decommission these temporary roads following project completion;
13. Perform general maintenance on ~68 miles of road (~52 miles tied directly to timber harvest operations);
14. Decommission ~9 miles of unclassified/unauthorized routes not identified as integral to OHV recreational trail system or fire suppression activities.
15. Restore 2 headcuts within thinning units adjacent to a meadow (3282 and 3283).

Chapter 2 discusses how the proposed action will be accomplished in greater detail. Unit 3191 – a 15-acre unit encompassing Hull Creek Campground – has been dropped from the proposed action since scoping.

When: *Treatments are expected to begin as early as the 2009 field season. Mechanical thinning (including biomass) is expected to take place during the first 7 years. Post-thinning evaluation will determine the extent of treatments necessary to meet project objectives. All project related activities are expected to be completed within 10 years of the start of implementation. Actual timing may vary based on weather, resources available (personnel and budget).*

Where: *The Phase II project is located on the Mi-Wok Ranger District of the Stanislaus National Forest, roughly between the North Fork of the Tuolumne River and the first prominent ridge east of Dodge Ridge, encompassing portions of the Wrights Creek, Hull Creek and Rush Creek drainages. The project area stretches from the District boundary to the north, and is bounded by Basin Creek to the south. The project lies entirely within Tuolumne County. The legal description of the project area is: Sections 12, 13, 24, 25, 35-36, T2N, R 16E; Sections 2, 4-5, 7-8, 17, 18, 30, T2N, R17E; Sections 13, 21-28, 32-35, T3N, R17E; Sections 4-8, 17-20, 30, T3N R18E; and sections 31-33, T4N, R18E. Within this area, treatment units encompass a variety of land allocations that include wildland urban intermix (WUI) defense zone, WUI threat zone, California spotted owl home range core areas (HRCAs), California spotted owl protected activity centers (PACs), old forest emphasis area, general forest, as well as combinations of two or more of the aforementioned designations.*

1.4. Decision Framework

The proposed action falls within the authority of the Forest Supervisor (Responsible Official). The Forest Supervisor will consider public comments, an internal analysis of this project, and the consequences of similar, completed projects in determining the need for, and extent of further analyses. In addition, the Forest Supervisor's assessment of the direct, indirect, and cumulative environmental effects, along with current policy, law, and regulation, will determine the appropriate level of environmental analysis and documentation needed for this project.

After consideration, the Forest Supervisor may choose to:

1. Select the proposed action (Alternative 1) and adopt the project as written;
2. Select a modified version of the proposed action developed in response to scoping (Alternative 3);
3. Modify an action alternative and/or adopt a modified version of the project, or;
4. Select the no action alternative.

In making this decision, the Forest Supervisor will consider such questions as:

1. How well does the proposed action meet the purpose and need described in this EA?
2. How well does the proposed action move the project area toward the desired conditions established in the Forest Plan? and,
3. Does the proposed action mitigate potential adverse effects?

All treatments authorized by this decision would consistent with the 2005 Stanislaus National Forest (STF) Forest Plan Direction[8] (Forest Plan) – a directional document which integrates the SNFPA ROD (2004) and other pertinent amendments, into the STF Land and Resource Management Plan[9] (1991) – and would not require any further amendment.

[8] USDA 2005. Forest Plan Direction. July 2005. Forest Service, Stanislaus National Forest, Sonora, CA.
[9] USDA 1991. Land and Resource Management Plan. 1991. Forest Service, Stanislaus National Forest, Sonora, CA

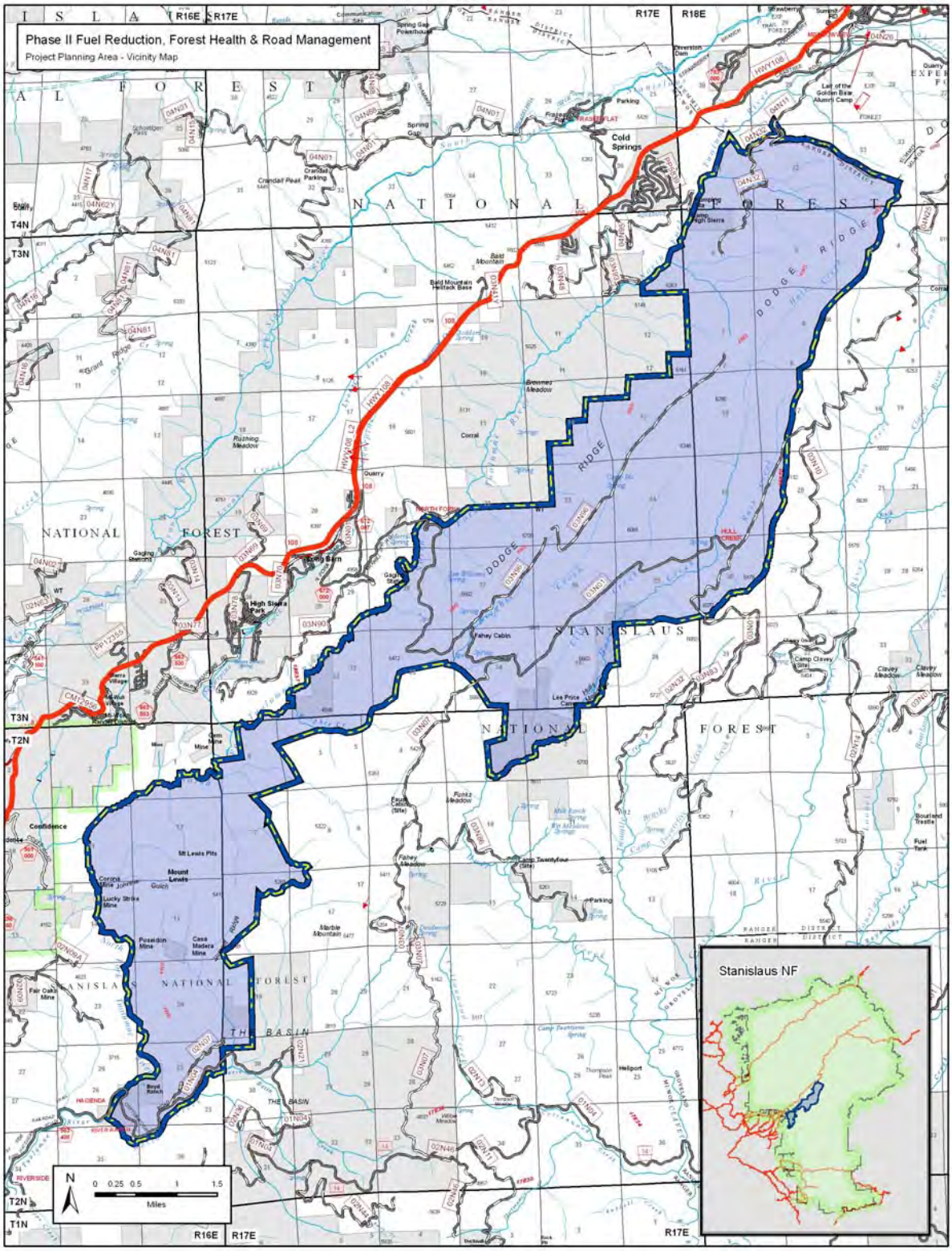

Figure 2-1. Phase II Fuel Reduction, Forest Health, and Road Management Project vicinity map. Additional maps are located in the Appendix.

1.6. Public Involvement

In 2005 the USDA Forest Service hosted the Stanislaus National Forest Stewardship and Fireshed Assessment, designed to collaboratively develop a 5-year integrated vegetation management program of work for the Stanislaus National Forest. Planning units, that combined form the Phase II planning area, were identified during this process as one of Mi-Wok's vegetation management project. Project specific involvement began in September of 2007, when Mi-Wok district personnel contacted groups who regularly submit comments on District projects. Two fieldtrips to the Phase II project area were held, one with those associated with various aspects of the timber industry (10/16/2007), and the other with those associated with environmental organizations (10/25/2007). Lists of field trip participants are located in the project record, on file at the Mi-Wok District office.

The Phase II project was listed in the Stanislaus NF Schedule of Proposed Actions (SOPA) in January of 2008. The SOPA is distributed to over 61 people, including a wide array of governmental agencies, interest groups, and interested individuals. The SOPA is also posted on the Stanislaus National Forest's web site: http://www.fs.fed.us/r5/stanislaus/projects/sopa. In addition to the listing, the scoping letters were mailed out to over 500 individuals, permitees, landowners, organizations, government agencies and other interested and/or affected parties. Scoping information was also posted on the Stanislaus NF website: http://www.fs.fed.us/r5/stanislaus/projects/index.shtml. Information regarding this project was presented at Highway 108 FireSafe Council meetings and the annual Tribal Consultation (4/27/2007 and 4/23/2008). Public involvement efforts are filed in the project record on the District.

Six letters and or e-mails were received which commented on the proposed action. Additional letters and e-mails were received requesting additional information, and to be kept inform as the project progresses. Two groups were contacted by District personnel to clarify issues raised in their comment letters. Comments and responses to comments were documented and filed in the project record (available by request).

1.7. Issues

An issue is a point of dispute or disagreement about some perceived effect related to the proposed action. The Forest Service separated issues into two groups: significant and non-significant issues. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or, 4) conjectural and not supported by scientific or factual evidence. Significant issues were defined as all other issues directly or indirectly caused by implementing the proposed action. The Council on Environmental Quality (CEQ) NEPA regulations require 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)…"

Issues were identified during scoping, most of which could be addressed through clarification of intended actions of more specific descriptions of various aspects of the proposed action. Issues identified as significant that could not be reconciled in responses of clarifications were used to generate alternatives to the proposed action, or were used to more specifically define the proposed action. The significant issues needing further consideration are briefly summarized below.

1. Thinning that removes larger trees and reduces canopy cover will adversely affect various wildlife species dependent on 'old forest' habitat.
2. Thinning of larger trees (particularly, trees > 20" dbh) is not needed to produce desirable fire behavior.

3. There is a need to open up the canopy to the extent the 2004 Sierra Forest Plan Amendment Record of Decision allows, as well as increase the average diameter of sawlogs to make sales as economic as possiible.

Diameters of trees removed and residual canopy cover were units of measure chosen to compare and evaluate alternatives. Merchantable boardfeet per acre was also examined. Chapter 2 describes and compares the various alternatives both considered in detail as well as those considered but eliminated from detailed study.

Other issues regarded perceived effects (especially cumulative effects) to wildlife and watershed values. Effects analysis for various resources addresses these issues. Economics was also raised as an issue, and will be weighed in evaluating alternatives; however, specific alternatives to improve economic efficiency beyond that proposed under Alternative 1 were not developed. Responses to comments and rationale for determining significance are documented in the project record on file at the District.

After review of public comments on the proposed action, the Deciding Official determined that it was necessary to examine in detail an additional alternative to the proposed action in addition to no action alternatives. Chapter 2 discusses the alternatives, including those that were considered but eliminated from detailed study.

1.8. Tiering and Incorporation by Reference

This Environmental Assessment (EA) tiers to the Stanislaus National Forest Land and Resource Management Plan, as amended, which is summarized in the Forest Plan Direction[10]. It also references the Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental Environmental Impact Statement (FSEIS) and Record of Decision[11] (2004 ROD), the Central Stanislaus Watershed Analysis Report[12] (CSWA) and the Clavey River Watershed Assessment[13] (CRWA).

The following documents were prepared as part of this analysis, and are incorporated by reference (documents can be found in the project record and are available by request): Aquatics Biological Assessment/Biological Evaluation; Biological Evaluation and Assessment for Federally Threatened, Endangered, Proposed and Forest Service Sensitive Terrestrial Wildlife Species; Biological Assessment and Evaluation for Sensitive Plants; Cultural Resource Management Report 05-16-1293; Fire and Fuels Report; Hydrology Report; Project Management Indicator Species (MIS) report; Botany Report for Watchlist and other Rare Plants, Fens, Noxious Weeds, and Other Botanical Resources; Silviculture/Forest Health Report; and, Soil Evaluation.

1.8.1. Laws, Regulations and Policy

The proposed project's authority, alternative development and implementation will be in accordance with the pertinent sections of the following laws and regulations with appropriate amendments, as well as agency policy:

- Organic Administrative Act of June, 1897;
- Knutson-Vandenberg Act of June, 1930;
- Multiple-Use Sustained Yield Act of 1960;
- National Historic Preservation Act of 1966, as amended;

[10] USDA 2005. Forest Plan Direction. July 2005. Forest Service, Stanislaus National Forest, Sonora, CA.

[11] USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment. Final Supplemental Environmental Impact Statement and Record of Decision. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

[12] USDA 2002. Central Stanislaus Watershed Assessment. August 2002. Forest Service, Stanislaus National Forest, Sonora, CA.

[13] Clavey River Ecosystem Project Team (CREP), Clavey River Watershed Assessment, March 2008. Clavey River Watershed Assessment Volume 1. www.claveyriver.net.

- National Environmental Policy Act of 1969 (NEPA);
- Federal Clean Water Act of 1972;
- Endangered Species Act of 1973;
- Forest and Rangeland Renewable Resources Planning Act of 1974;
- National Forest Management Act of 1976;
- Clean Air Act of 1977;
- Federal Land Policy and Management Act of 1976 (FLPMA);
- Fiscal Year 2001 Interior and Related Agencies Appropriations Act (National Fire Plan);
- National Environmental Policy Act Procedures – USDA Forest Service (36 CFR part 220);
- Forest Service Handbook; and
- Regional Forester's 7/14/04 Letter of Direction re: Conifer Forest Density Management for Multiple Objectives.

CHAPTER 2: ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1. Introduction

This chapter describes and compares the alternatives considered for the Phase II Fuel Reduction and Forest Health, and Road Management project. It presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. NEPA requires that the environmental analysis conducted for a proposed project rigorously explore and evaluate a range of reasonable alternatives (40 CFR 1502). Alternatives developed fully must meet the purpose and need of the proposed action (FSH 1909.15, Chapter 14). Alternatives may be considered but not analyzed in detail because they do not meet the purpose and need. The information used to compare the alternatives is based upon indicators used to measure achievement of project objectives as well as the environmental and social effects of implementing each alternative.

2.2. Alternatives Considered but not Analyzed in Detail

2.2.1. Thin from below to a dbh limit that meets fuels objectives

Utilize thin from below to meet fuels objectives of surface fire (i.e. not passive, active or conditional crown fire) with average flame lengths <4 feet under 90th percentile fire weather conditions. Diameter-at-breast-height (dbh) limits would be set based on the size tree necessary to meet this objective. This effectiveness is expected to last for 10 years.

This alternative was modeled for a few stands representing the range existing within treatment units. In general, thinning from below to 12” dbh would meet the majority of our fuels objectives. A few of the denser stands required thinning up to 16 inches. Prescribed burning to treat surface fuels following the 12” limit thin-from-below, resulted in mortality in trees 10-20 inches dbh, above those of both action alternatives; however, total residual trees within that diameter range were still slightly above Alternatives 1 and 3. Fire simulated under 90th percentile fire weather also resulted in increased mortality in the 10-20 inch diameter class as well as larger classes, leaving stands with an overstory similar to Alternative 3 but with higher densities and more trees in the mid-sized class. This alternative was not carried forward because (1) treatments did not reduce densities enough to meet forest health objectives, leaving them at increased risk to wide spread drought- and insect-related mortality, and (2) this would generate very little revenue if any to offset treatment costs. Within the ~17,700-acre planning area, ~5,600 acres are being considered for treatment. Of those acres almost half are plantations with minimal commercial value. The majority of the work in these plantations would require additional sources of funding. These plantations represent a substantial investment and their development into mature forest is of great ecological importance. Thinning in mature stands where mid- to large-sized sawlogs are removed, has typically offset the cost of the biomass removal. Funding for an additional 2,600 acres of service work, as would be required under this alternative, would not be conducting treatments in a cost efficient manner. Forest health objectives would not be met, and in the future, if drought- and insect-related mortality become widespread, fire hazard could increase dramatically.

2.2.2. Treatments consistent with the 2001 SNFPA ROD

During scoping the issue was raised that proposals implementing the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) were not legal and that treatments should be consistent with the 2001 SNFPA ROD. While the 2004 SNFPA ROD is our current direction, examining an alternative consistent with the 2001 SNFPA ROD is considered reasonable. The restrictions of limiting thinning to 12" dbh in CWHR 5M, 5D and 6 in HRCA (~670 acres) outside of the defense zone met the majority fuels objectives (described in Chapter 1); however, there were some stands which required the removal of larger trees. Additionally, forest health objectives could not be met (see preceding alternative discussion). The 2001 SNFPA ROD did allow for the removal of trees up to 20" dbh in certain circumstances, such as in general forest, or in HRCA and OFEA within WUI threat zone CWHR 4M and 4D. To approximate treatments similar to the 2001 SNFPA and address other concerns or suggestions raised, Alternative 3 was developed. That alternative, places a maximum diameter limit of less than 20 inches dbh and a minimum canopy cover of 50% where such canopy exists (see Alternative Considered in Detail, EA p.28).

2.2.3. Close or decommission unnecessary roads within the planning area

Analyze the transportation system within the planning area to determine which roads or routes are unnecessary, and close or decommission them. Do not add unauthorized routes to the NF trail system.

The Travel Management decision will determine which roads are open and available for use. The Phase II action alternatives (1 and 3) propose to physically close or decommission some roads/routes that occur within or adjacent to treatment units, that will not be open and available following the Travel Management decision Closing/decommissioning additional roads away from treatment units was considered but eliminated due to additional surveys and site specific information that would be required, and the fact that they would not be used during or affected by fuel reduction or forest health treatments. Additional closures/decommissioning could be conducted under separate NEPA following a Travel Management decision. Alternative 3 incorporates closing 3 additional roads/road segments to the public. Two of these roads are located close to the treatment units and run through CA spotted owl PACs. One road segment leads to an unauthorized river crossing. All roads utilized during the project would be reconstructed or maintained to protect resources. Some additional road segments with high and moderate condition ratings (that were hydrologically connected) were evaluated for reconstruction and/or maintenance to correct the negative impact on water quality. These road segments were part of roads connected to treatments, but where the segment in question was not specifically needed. These road segments will be fixed as funds become available.

The addition of unclassified roads to the trail system is being proposed in the STF Travel Management Plan and is outside the scope of this project. Road/route closing or decommissioning proposed in either Alternatives 1 or 3 would not take place until the Stanislaus NF Travel Management Record of Decision has been signed and implemented. Only actions consistent (not in conflict) with that decision would be implemented.

2.2.4. Reduce road densities to less than 2 linear miles per square mile

One comment suggested reducing road densities to less than 2 linear miles per square mile within the project area. Given the size of the planning area and dispersed nature of treatment and non-treatment area, the scope of road decommissioning in this project was limited to analyzing those roads occurring within or used to access treatment units. Roads within or adjacent to the planning area not proposed for treatment have been determined necessary to provide access for management activities or fire access, or

have been proposed for retention or inclusion into the NF road system under the Travel Management Plan process currently under way on the Forest. Only proposed road actions in the Phase II project that are consistent (not in conflict) with the Travel Management final decision would be implemented.

2.2.5. Restore springs, meadows, etc. within the planning area

Actively restore springs, seeps, fens, meadows and other such features within the planning area by restoring headcuts, thinning back encroaching conifers, fencing meadows temporarily, and decommissioning trails through/near these areas.

Where these features occur in or near treatment units, measures will be taken to thin encroaching conifers, promote hardwoods and riparian species, decommission unauthorized trails through these features. Two headcuts are proposed for restoration where they occur within treatment units and may be affected by treatment activities. Permanent fencing was not incorporated because it was determined to be unrelated to impacts from this project or their mitigations, and involves other issues beyond the scope of this project (such as range). Actively restoring these features outside the treatment units was considered outside the scope of this project.

2.2.6. Plant Oaks in the Wrights Creek Plantation Units

In addition to the proposed action, it was suggested that we plant oak trees in the Wrights Creek plantations. This was originally proposed as part of the Wrights Creek Burn Plantation Management revised EA and Decision Notice signed in 1994. After the decision, treatments areas were evaluated for oak planting. It was determined that without the use of herbicide or other measures to control the brush, success was unlikely. Field visits during reconnaissance have suggested that there is more black oak in the plantations than previously thought, though stand exam data doesn't necessarily reflect this. The lack of inventoried oak in the plantations may be attributed to the relatively small size of the oaks, and the designation of treatment units to avoid poorer sites where oaks would be expected to have a competitive advantage. The District is not ruling out the planting of oaks in the future; however, such a proposal could be done as a separate NEPA decision. After the Phase II project, suitable areas could be identified and a more concrete proposal could be put forward.

2.2.7. Include the area under Peter Pam and Cold Springs sub-divisions

One comment suggested the best use of funds would be treating the area under the Cold Springs and Peter Pam sub-divisions. The area in question was analyzed under the original South 108 project, and the majority of the National Forest System land was authorized for treatment. Treatment activities are currently under way. Some shredding and thinning/biomassing have been done, with more thinning and shredding treatments and prescribed pruning to come in the near future.

2.3. Alternatives Considered in Detail

2.3.1. Alternative 1 – Proposed Action

The proposed action described in Chapter 1 was developed to achieve project objectives as described in that chapter. The following prescriptions summarize treatments for a combination of activities based on existing conditions and specific land allocation. "Hazard tree" designation will adhere to the Stanislaus National Forest Hazard tree identification Guidelines (11/21/02). Prescriptions are consistent with all

pertinent laws, regulations and policy, including all standards and guidelines outlined in the STF Forest Plan Direction (2005). Units with similar treatments are grouped together here; however, unit specific prescriptions (located in the project file) may vary slightly to achieve results as disclosed throughout this document. Locations of units are displayed in Maps 2-4 (Appendix E). Stand attributes by unit for existing and projected post-treatment conditions are located in Appendix D (tables D-2 and D-3).

2.3.1.1. Thinning and/or Biomass/Shred Units: Spotted owl protected activity center (PAC)

Unit: 2076, 3351, 3180 (~7 acres)

Thinning, Biomassing and Shredding Guidelines

- Remove or otherwise treat all trees that constitute an imminent safety hazard. In unit 3351, retain felled hazard trees on site as down logs.
- **RETAIN ALL TREES > 12 INCHES DBH**, <u>except</u> where these trees pose a safety hazard, are within road construction or landing clearance limits, or otherwise preclude operability.
- Remove majority of the trees in suppressed and intermediate crown position < 12” dbh. Intermediates may be retained if they appear thrifty (good form, no defect or disease, and a crown ratio greater than 30%) and are receiving sufficient sunlight that they are capable of growing into the overstory. These intermediates would primarily be preferred species such as sugar pine and Douglas fir and ponderosa pine (and occasional incense cedar), with the intent of favoring more early and mid seral and/or fire resistant tree species, which are losing dominance in the canopy.
- Dominant/ codominant trees under 12” dbh in openings are to be thinned to a 15-30’ spacing.
- Remove sugar pines less than 12 inches dbh with evidence of heavy blister rust infection (swollen bole or branches w/ dead or dying needles).
- Biomass and/or shred (masticate) conifers smaller than 10” dbh, brush, snags < 15” dbh and slash. Dominant/ codominant trees under 10” dbh in openings are to be thinned to a 15-30’ spacing.
- Retain additional canopy cover (up to 5%) in trees 6-12 inches DBH, where they would not contribute substantially to crown fire initiation or stress to large overstory trees.
- Shred down woody material that is less than 15” in diameter and ten feet in length.
- Retain hardwoods. Some hardwoods under 12” dbh may be masticated to facilitate efficiency, safety and/or efficacy of the treatment.
- Retain a minimum of 50% ground cover, at least 1 inch thick.

2.3.1.2. Thinning Units: Natural Stands outside HRCA, HRCA in the WUI Defense Zone and HRCAs where existing canopy cover is < 50%

Units: 2070, 2072, 2242, 2244, 2248*, 2246-1, 2245, 3041, 3044* 3301, 3065*, 3080, 3191, 3221, 3231, 3350, 4310, 4320, 4321*, 4322, 4323*, 4324*

Thinning Guidelines

- Remove or otherwise treat all trees that constitute an imminent safety hazard.
- Retain all trees 30 inches dbh and larger, <u>except</u> where these trees pose a safety hazard, are within road construction or landing clearance limits, or otherwise preclude operability.
- **MAINTAIN AT LEAST 40% CANOPY COVER** averaged across treatment area.
- Remove majority of the trees in suppressed and intermediate crown position < 30” dbh. Intermediates may be retained if they appear thrifty (good form, no defect or disease, and a crown ratio greater than 30%) and are receiving sufficient sunlight that they are capable of growing into the overstory. These intermediates would primarily be preferred species such as sugar pine and Douglas fir and ponderosa pine (and occasional incense cedar), with the intent of favoring more early and mid seral and/or fire resistant tree species which are losing dominance in the canopy.

- Remove sugar pines less than 16 inches dbh with evidence of heavy blister rust infection (swollen bole or branches w/ dead or dying needles).
- Remove trees with broken tops having less than a 30% crown ratio. Trees with broken tops and greater than 30% crown ratio may be retained.
- Retain some mid- and large-diameter trees (≥15" dbh) across treatment units that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole, mistletoe platforms, witch's brooms) to serve as future replacement snags and to provide nesting, roosting and resting structures.
- Release black oaks and riparian hardwoods by removing conifers other than thrifty sugar pines adjacent to or growing up through the crowns of black oaks larger than 6 inches dbh, where their removal would not cause excessive damage to the oaks.
- Retain an average crown spacing between ½ and 1 full crown width between codominants. Trees may be left closer than this if they are larger than the maximum dbh; if they are sugar pines; or if the trees are adjacent to open spaces such as skid trails, holes left by the removal or death of other trees, roads, etc.. Clumps of 2-6 codominants may be left w/ interlocking or touching crowns provided surrounding crown spacing is a minimum of one full crown width to the next individual or clump of codominants.
- Species preference for retention, all else being equal, is: 1) sugar pine, 2) Douglas-fir, 3) ponderosa pine, 4) incense cedar, and 5) white fir. Some codominant white fir less than 30" dbh may be removed in place of thrifty intermediate pine, Douglas-fir, oak, and occasional cedar, where these species are lacking in the overstory.

Biomass and Shredding Guidelines:

- Remove or shred (masticate) conifers smaller than 10" dbh, brush, snags < 15" dbh and slash. Dominant/ codominant trees under 10" dbh in openings are to be thinned to 15-30' spacing.
- Retain additional canopy cover (up to 5%) in trees 6-12 inches DBH, where they would not contribute substantially to crown fire initiation or stress large overstory trees.
- Shred down woody material that is less than 15" in diameter and ten feet in length.
- Leave untreated, approximately 10% of the area to be shredded/biomassed.
- Leave untreated, areas larger than 1 acre in size, with less than 15% cover of brush or conifers.
- Treat conifers less than 10" dbh, other than thrifty sugar pines, if they are within ~20 feet of black oaks or other hardwoods greater than 4" dbh.
- Retain hardwoods. Some hardwoods under 12" dbh may be masticated to facilitate efficiency, safety and/or efficacy of the treatment.
- Retain a minimum of 50% ground cover, at least 1 inch thick.

*Fuelbreaks

Applies to Units: 2070, 2248, 3044, 4321

Same as above with the following exceptions:

- Remove or otherwise treat all snags and down logs. Some large down logs may be retained provided they do not pose a safety hazard or otherwise preclude successful prescribed burning or suppression operations.
- Untreated patches will be located such that they will not compromise the effectiveness of the fuelbreak.
- When leaving clumps, keep location and the potential for aerial retardant penetration in mind.

2.3.1.3. Thinning Units: Natural Stands within HRCA where existing canopy cover is > 50%

*Units: 2071, 2073, 2074, 2075, 2243, 2246-2, 3043, 3061, 3062, 3063**, 3064**, 3170, 3180-1, 3190, 3194, 3200, 3210**, 3211, 3241, 3271-2, 3300, 4311, 4325, 4326*

Thinning Guidelines

- Remove or otherwise treat all trees that constitute an imminent safety hazard.
- Retain all trees 30 inches dbh and larger, <u>except</u> where these trees pose a safety hazard, are within road construction or landing clearance limits, or otherwise preclude operability.
- **MAINTAIN AT LEAST 50% CANOPY COVER** averaged across treatment area.
- Remove the majority of trees in the suppressed and intermediate crown position < 30” dbh. Intermediates may be retained if they appear thrifty (good form, no defect or disease, and a crown ratioo greater than 30%) and are receiving sufficient sunlight that they are capable of growing into the overstory. These intermediates would primarily be preferred species such as sugar pine, Douglas fir and ponderosa pine (and occasional incense cedar), with the intent of favoring more early and mid seral and/or fire resistant tree species which are losing dominance in the canopy.
- Remove sugar pines less than 16 inches dbh with evidence of heavy blister rust infection (swollen bole or branches w/ dead or dying needles).
- Remove trees with broken tops leaving less than a 30% crown ratio. Trees with broken tops and greater than 30% crown ratio may be retained.
- Retain some mid- and large-diameter trees (≥15” dbh) across treatment units that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole, mistletoe platforms, witch’s brooms) to serve as future replacement snags and to provide nesting, roosting and resting structures.
- Release black oaks and riparian hardwoods by removing conifers other than thrifty sugar pines, adjacent to or growing up through the crowns of black oaks larger than 6 inches dbh, where their removal would not cause excessive damage to the oaks.
- Retain an average crown spacing between ½ and 1 full crown width between co-dominants. Trees may be left closer than this if they are larger than the maximum dbh; if they are sugar pines; or if the trees are adjacent to open spaces such as skid trails, holes left by the removal or death of other trees, roads, etc.. Clumps of 2-6 codominants may be left w/ interlocking or touching crowns provided surrounding crown spacing is a minimum of one full crown-width to the next individual or clump of codominants.
- Species preference for retention, all else being equal, is: 1) sugar pine, 2) Douglas-fir, 3) ponderosa pine, 4) incense cedar, and 5) white fir. Some codominant white fir less than 30” dbh may be removed in place of thrifty intermediate pine, Douglas-fir, oak, and occasional cedar, where these species are lacking in the overstory.
- **Units **3063** and **3064** are helicopter units and **3210** is a cable unit. Whole tree yard if economical. Tops and branch material may be piled to be burned later. Lop and scatter may be allowed with Fuels Specialist approval. Do not shred unit **3064.**

Biomass and Shredding Guidelines

- Remove or shred (masticate) conifers smaller than 10” dbh, brush, snags < 15” dbh and slash. Dominant/ codominant trees under 10” dbh in openings are to be thinned to 15-30’ spacing.
- Retain additional canopy cover (up to 5%) in trees 6-12 inches dbh, where they would not contribute substantially to crown fire initiation or stress large overstory trees.
- Shred down woody material that is less than 15” in diameter and ten feet in length.
- Retain discontinuous, staggered patches/stringers of small trees and/or shrubs, so as to limit visibility and provide structure, cover and habitat diversity throughout the treatment units.

Stringers of trees may vary in size and shrub patches should be approximately 50 feet in diameter. Approximately 10% of the treatment area will not be shredded/biomassed. Natural features such as rocky outcrops, cutbanks, areas inoperable for equipment and archaeological sites may be used to fulfill these requirements.

- Leave untreated, areas larger than 1 acre in size, with less than 15% cover of brush or conifers.
- Treat conifers less than 10" dbh, other than thrifty sugar pines, if they are within 20 feet of black oaks or other hardwoods greater than 4" dbh.
- Retain hardwoods. Some hardwoods under 12" dbh may be masticated to facilitate efficiency, safety and/or efficacy of the treatment.
- Retain a minimum of 50% ground cover, at least 1 inch thick.

2.3.1.4. Thinning Units: Plantations within HRCA where existing canopy cover is > 50%:

Units: 2120-2, 2247, 2249*, 3042, 3171, 3283, 3320-2, 3340, 3342,*

Thinning Guidelines

- Remove or otherwise treat all trees that constitute an imminent safety hazard.
- Retain all trees 30 inches dbh and larger, <u>except</u> where these trees pose a safety hazard, are within road construction or landing clearance limits, or otherwise preclude operability.
- Maintain 50% canopy cover averaged across treatment area.
- Remove majority of the trees in suppressed and intermediate crown position < 30" dbh. Intermediates may be retained if they appear thrifty enough (good form, no defect or disease, and a crown ratio greater than 30%) and are receiving sufficient sunlight that they are capable of growing into the overstory. These intermediates would be primarily be preferred species such as sugar pine and Douglas fir (and occasional incense cedar), with the intent of increasing species diversity within these ponderosa/Jeffrey pine plantations.
- Remove sugar pines less than 16 inches dbh with evidence of heavy blister rust infection (swollen bole or branches w/ dead or dying needles).
- Remove trees with broken tops having less than a 30% crown ratio. Trees with broken tops and greater than 30% crown ratio may be retained.
- Release black oaks and riparian hardwoods by removing conifers other than thrifty sugar pines or Douglas-firs, adjacent to or growing up through the crowns of black oaks larger than 6 inches dbh, where their removal would not cause excessive damage to the oaks.
- Thin codominants leaving "clumps" of 2-6 trees. Trees within clumps should have 90% of crown contact removed, and clumps should be spaced at least 1 crown width to the next tree or clump of trees while maintaining a **MINIMUM of 50% CANOPY COVER.** Use openings between clumps to favor oak and other hardwoods. Due to lack of species diversity, species preference for retention would be conifers other than ponderosa/Jeffrey pine, if the trees are equal in terms of size, good form and good vigor.
- *Unit 2249 and 2247 are helicopter unit. Whole tree yard if economical. Tops and branch material may be piled to be burned later. Lop and scatter may be allowed with Fuels Specialist approval.
- Cull logs at least 10 feet in length and a diameter > 15 inches at the small end, may be limbed and left to meet soil quality standards for large woody material; however, these logs should be left in such a way that prescribed burning or suppression operations would not be significantly impacted.

Biomass and Shredding Guidelines

- Remove or shred (masticate) conifers smaller than 10" dbh, brush, snags < 15" dbh and slash. Dominant/ codominant trees under 10" dbh in openings are to be thinned to 15-30' spacing.
- Shred down woody material that is less than 15" in diameter and ten feet in length.

- Retain discontinuous, staggered patches/stringers of small trees and/or shrubs, so as to limit visibility and provide structure, cover and habitat diversity throughout the treatment units. Stringers of trees may vary in size and shrub patches should be approximately 50 feet in diameter. Approximately 10% of the treatment area will not be shredded/biomassed. Natural features such as rocky outcrops, cutbanks, areas inoperable for equipment and archaeological sites may be used to fulfill these requirements.
- Leave untreated, areas larger than 1 acre in size, with less than 15% cover of brush or conifers.
- Treat conifers less than 10" dbh, other than thrifty sugar pines, if they are within 20 feet of black oaks or other hardwoods greater than 4" dbh.
- Retain hardwoods. Some hardwoods under 12" dbh may be masticated to facilitate efficiency, safety and/or efficacy of the treatment.
- Retain a minimum of 50% ground cover, at least 1 inch thick.

*Fuelbreaks

Applies to Units: 2247, 2249

Same as above with the following exceptions:

- Remove or otherwise treat all snags and down logs. Some large down logs may be retained provided they do not pose a safety hazard or otherwise preclude successful prescribed burning or suppression operations.
- Untreated patches will be located such that they will not compromise the effectiveness of the fuelbreak.
- When leaving clumps, keep location and the potential for aerial retardant penetration in mind.

2.3.1.5. Thinning Units: Plantations outside HRCA or where existing canopy cover is < 50%

Units: 2120-1, 2121, 2241, 3180-2, 3193, 3201, 3230, 3250, 3260, 3271-1, 3282, 3320, 3322*, 3341*

Thinning Guidelines

- Remove or otherwise treat all trees that constitute an imminent safety hazard.
- Retain all trees 30 inches dbh and larger, <u>except</u> where these trees pose a safety hazard, are within road construction or landing clearance limits, or otherwise preclude operability.
- **MAINTAIN AT LEAST 40% CANOPY COVER** averaged across treatment area.
- Remove majority of the trees in suppressed and intermediate crown position < 30" dbh. Intermediates may be retained if they appear thrifty enough (good form, no defect or disease, and a crown ratio greater than 30%) and are receiving sufficient sunlight that they are capable of growing into the overstory. These intermediates would primarily be preferred species such as sugar pine and Douglas fir (and occasional incense cedar), with the intent of increasing species diversity within these ponderosa/Jeffrey pine plantations.
- Remove sugar pines less than 16 inches dbh with evidence of heavy blister rust infection (swollen bole or branches w/ dead or dying needles).
- Remove trees with broken tops having less than a 30% crown ratio. Trees with broken tops and greater than 30% crown ratio may be retained.
- Release black oaks and riparian hardwoods by removing conifers other than thrifty sugar pines, adjacent to or growing up through the crowns of black oaks larger than 4 inches dbh, where their removal would not cause excessive damage to the oaks.
- Thin codominants leaving "clumps" of 2-6 trees. Trees within clumps should have 90% of crown contact removed, and clumps should be spaced at least 1-2 crown widths to the next tree or clump of trees. Use openings between clumps to favor oak and other hardwoods. Due to lack of species

diversity, species preference for retention would be conifers other than ponderosa/Jeffrey pine, if the trees are equal in terms of size, good form and good vigor.

- Cull logs at least 10 feet in length and a diameter > 15 inches at the small end, may be limbed and left to meet soil quality standards for large woody material; however, these logs should be left in such a way that prescribed burning or suppression operations would not be significantly impacted.

Biomass and Shredding Guidelines

- Remove or shred (masticate) conifers smaller than 10” dbh, brush, snags < 15” dbh and slash. Dominant/ codominant trees under 10” dbh in openings are to be thinned to 20-40’ spacing.
- Shred down woody material that is less than 15” in diameter and ten feet in length.
- Retain discontinuous, staggered patches/stringers of small trees and/or shrubs, so as to limit visibility and provide structure, cover and habitat diversity throughout the treatment units. Stringers of trees may vary in size, and shrub patches should be approximately 50 feet in diameter. Approximately 10% of the treatment area will not be shredded/biomassed. Natural features such as rocky outcrops, cutbanks, areas inoperable for equipment and archaeological sites may be used to fulfill these requirements.
- Leave untreated, areas larger than 1 acre in size, with less than 15% cover of brush or conifers.
- Treat conifers less than 10” dbh, other than thrifty sugar pines and Doug-firs, if they are within 20 feet of black oaks or other hardwoods greater than 4” dbh.
- Retain hardwoods. Some hardwoods under 12” dbh may be masticated to facilitate efficiency, safety and/or efficacy of the treatment.
- Retain a minimum of 50% ground cover, at least 1 inch thick.

***Fuelbreaks**

Applies to Units: 3322

Same as above with the following exceptions:

- Remove or otherwise treat all snags and down logs. Some large down logs may be retained provided they do not pose a safety hazard or otherwise preclude successful prescribed burning or suppression operations.
- Untreated patches will be located such that they will not compromise the effectiveness of the fuelbreak.
- When leaving clumps, keep location and the potential for aerial retardant penetration in mind.

2.3.1.6. Hand Cut Units

Unit: 3195

- Remove intermediate and suppressed conifer trees < 12” dbh to the extent necessary to break up the horizontal continuity and remove ladder fuels. Thrifty intermediates of desirable species (pines or Doug-fir) may be left provided doing so would not contribute to crown fire initiation.
- Thin trees < 12” dbh to release riparian vegetation.
- Thin codominant trees < 12” dbh to an average spacing between 10-20 feet. Trees may be left closer if they are near openings or roads where they may act as a barrier to motorized vehicles. Clumps of 2-5 trees less than 12” dbh may be left with approximately 90% of crown contact removed, provided there is at least 1 full crown width (overstory trees) to the next tree or clump.
- Prune trees to at least 4 to 6 feet above the ground, provided doing so leaves a minimum 30% live crown ratio. If doing so would leave less than 30% crown, consider removing if the torching tree would ignite the neighboring tree.
- Remove brush as needed to break up horizontal continuity of the live surface fuel load.

- All cut material will be piled for burning unless other treatments (such as lop and scatter) are approved by the District Fuels Specialist

2.3.1.7. Shredding Units

Units: 2130, 2182*, 2250, 2251*, 3040, 3066*, 3081, 3280, 3281, 3352, 4330**

Shredding Guidelines

- Shred/masticate suppressed and intermediate conifers less than 10” dbh; snags less than 15” dbh; brush; and all down woody material less than 15” in diameter and 10’ feet in length that is capable of being shredded.
- Retain dominant/codominant trees less than 10” dbh in openings at an average spacing of 15-30’. Order of preference for conifer retention (all else being equal) is as follows: 1) sugar pine, 2) Doug-fir, 3) ponderosa pine, 4) incense cedar, and 5) white fir.
- Retain all hardwoods greater than 10 inches dbh unless they are a safety hazard or are within road or landing clearance limits and consider them when applying spacing guidelines. Some hardwoods less than 10” dbh may be masticated to facilitate efficiency, safety and/or efficacy of the treatment as long as they are left at a minimum spacing of 20’ x 20’.
- Maintain discontinuous, staggered patches/stringers of small trees and/or shrubs, so as to limit visibility and provide structure, cover and habitat diversity throughout the treatment units. Stringers of trees may vary in size and shrub patches should be approximately 50 feet in diameter. Approximately 10% of the treatment area will not be shredded. Natural features such as rocky outcrops, cutbanks, areas inoperable for equipment and archaeological sites may be used to fulfill these requirements.
- Leave untreated, areas larger than 1 acre in size w/ less than 15% cover of brush species or conifers are to be left untreated.
- Retain a minimum of 50% ground cover, at least 1 inch thick.

Additional Hand Cut Guidelines

Applies to units: 2130, 2182, 2251, 3066, 4330
Following shredding as described above:

- Remove additional intermediate and suppressed conifer trees < 12” dbh to the extent necessary to break up the horizontal continuity and remove ladder fuels. Thrifty intermediates of desirable species (pines or Douglas fir) may be left provided doing so would not contribute to crown fire initiation.
- Prune trees to at least 4 to 6 feet above the ground, provided doing so leaves a minimum 30% live crown ratio. If doing so would leave less than 30% crown, consider removing if the torching tree would ignite the neighboring tree.
- Remove additional brush as needed to break up horizontal continuity
- Cut material will be piled for burning unless other treatments (such as lop and scatter) are approved by the District Fuels Specialist

*Fuelbreaks

Applies to units: 2130, 2182, 2251, 3066, 4330

Same as above except for the following:

- Remove or otherwise treat all snags and down logs. Some large down logs may be retained if they are not a safety hazard or otherwise preclude successful prescribed burning or suppression operations.
- Untreated patches will be located such that they will not compromise the effectiveness of the fuelbreak.

2.3.1.8. Prescribed Burning

All burning activities would adhere to pertinent air quality regulations. Prescribed burning would occur when prescriptions outlined in the burn plan are met and weather conditions allow. Activities and prescriptions related to prescribed burning are listed below.

Firelines

Units: All Units

- Construct fireline around units, or within treatment units to protect resources where roads, trails or other natural barriers are absent. Dozer lines may be used where slope and best management practices allow, consisting of a maximum 7 ½' scrape to mineral soil. Hand construction will be used on steeper slopes, or areas where resource damage may be a concern. This would consist of scraping up to 3' to mineral soil with a 6' hand thin/prune.
- Trails used as fireline may be improved and/or modified to meet fireline specifications provided BMPs have been followed, and, those trails are returned to a condition consistent with their intended use.
- Prune/hand thin along roads used as fireline as necessary.
- All snags that pose threat to a fireline and/or road will be removed.

Burn – Primary Treatment:

Units: 3060, 3232, 3240, 3270,

- Hand cut brush and trees $\leq$ 6 inches DBH to the extent necessary for safe, effective burning conditions and minimal mortality of desirable trees.
- Limit mortality in the dominant and codominant trees to less than 10 percent.
- Remove (consume) 60-80% of down woody material less than 3 inches in diameter, 50-80% of herbaceous material, and 50-70% of shrubs, brush, and ladder fuels.
- Material greater than 3 inches will be partially consumed, retaining DWM >15" in diameter to the extent possible.
- Retain average ground cover of 50% within units. Retain 60-80% of ground cover in SMZs.

Burn – Follow-up Treatment:

Units: All Units

Prescribed burning as a follow up treatment will consist of the treatments listed above in addition to the following:

- Following primary treatment, reevaluate fuel loading. Where units have been thinned and or biomassed, prescribed burning may be used without additional shredding. Where thinning and/or shredding have occurred, either as the primary or secondary treatment, prescribed burning may be delayed for two or more years.
- Limit mortality in the dominant and codominant trees to less than 10 percent.
- Remove (consume) residual logging slash after harvest operations are complete.
- When units are in close proximity to private property and lack strategic places to hold fire, pile burning will be utilized in some units in an effort mitigate smoke emissions and reduce surface fuels.

2.3.1.9. Fuelbreaks

Units: 2130, 2182, 2247, 2249, 2251, 3066, 3322, 4330

In addition to prescriptions described above, the following applies to those designated as fuelbreak units.

Proposed fuelbreak are designed to break up the continuity of the surface and ladder fuel, provide for firefighter access and safety, increase suppression opportunities, and provide pre-existing control points for prescribed fire. Removal of the vegetation will vary from low to moderate depending on slope and the amount of vegetation in the area. All slash, snags, and debris will be disposed by piling, burning, and/or chipping along the system roads and on the ridge. Fuelbreak prescriptions are as follows:

- Fuelbreaks on prominent ridge tops will have a width of ~250 feet; on flat areas or valleys where ground is level or nearly level, width would be ~300 feet. Both sides of ridges and/or roads used as control points should be of similar width (~125-150 feet).
- Utilize mechanical and hand treatments to thin and pile or otherwise treat surface and ladder fuels (See unit treatments above).
- Within fuelbreaks, break up continuous vegetation under 12' into naturally appearing clumps or islands of varied size and shape. Interrupt horizontal fuel continuity across the fuel break. Modify vegetation so that it does not act as a fire ladder into existing overstory.
- Construct fire line in the outer perimeter of the fuelbreak. All construction will be in accordance with established BMPs.
- Use existing and proposed road system to provide/maintain access.
-

2.3.1.10. Road Treatments

Roads/routes that may be utilized for the proposed action are listed in Table 2-1, with the type of activity proposed. The locations of these roads/routes are displayed on maps 5-7 of Appendix E. All road management decisions are consistent with the Stanislaus Travel Management Plan proposed action (March 2009); however, some road/route actions may be in conflict with other Travel Management Alternatives. Road/route closing or decommissioning would not take place until the Stanislaus NF Travel Management Record of Decision has been signed and implemented. Only actions consistent (not in conflict) with that decision would be implemented.

Table 2-1 Roads and Routes Proposed for Treatment under the Proposed Action.

Road/Route #	Length (miles)	System	Proposed Activity
1N04, 2N07C, 2N28, 2N93, 2N93A, 3N01, 3N01D, 3N07, 3N18Y, 3N21Y, 3N33Y, 3N38YA, 3N47Y, 3N53Y, 3N96, 4N09, 4N25, 4N26, 4N33	51.4	**NFS Road**	**Road maintenance** tied to timber harvest activities.
31727Z	<0.1	**Unauthorized**	**Road maintenance** tied to timber harvest activities. Previously created for use as a developed water source. Proposed addition to system maintenance level 1 (ML1) for admin use only.
2N07, 2N47, 2N47A, 3N08, 3N20, 3N21Y, 3N21YA, 3N28Y, 3N60A, 3N60D, 3N76Y, 4N11, 4N11A	15.5	**NFS Road**	**Road maintenance** tied to other treatments (such as fuelbreak maintenance and prescribed burning).
21613A, 21624B	0.8	**Unauthorized**	**Road maintenance/closure** tied to other treatments (such as fuelbreak maintenance and prescribed burning). Routes proposed for addition to the system as ML1, administrative use only, for fire access.
2N07, 2N93*, 3N01V, 3N03Y, N03YA, 3N08, 3N09, 3N20, 3N28Y, 3N28YA, 3N37Y, 3N38Y, 3N39Y, 3N47Y, 3N53Y, 3N60, 3N76Y, 3N96, 4N09B, 4N11, 4N11A, 4N32, 4N32A, 4N72Y, 4N72YA, 17EV71**	29.3	**NFS Road /** ****NFS Trail**	**Road Reconstruction** tied to timber harvest activities. *This section of 2N93 will be closed following project activities and changed to ML1, administrative use only. **17VE71 is an old logging road that has been incorporated into the managed trail system.

Road/Route #	Length (miles)	System	Proposed Activity
4N11	1.6	**NFS Road**	**Road Reconstruction** tied to other treatments activities (such as prescribed burning, watershed treatments, and fire access).
2N07D	<0.1	**NFS Road**	**Road Closure.** 2N07D is supposed to be closed (ML1) but is being used and needs to be closed again.
21718, 318006C	1.2	**Unauthorized**	**Road Closure.** May use for treatment activities and close after project.
31806A, 31806B,DEC_31725E, TEMP1, Other	2.0	**Unauthorized / NA**	**Temporary construction/reconstruction** to access landings. Includes up to 1 mile of temporary road not shown on maps, to be determined after sale but prior to harvesting operations.
3N03Y, 17EV205, 17EV217, 17EV300, 17EV53, 17EV54, 17EV67A, 17EV75, 17EV78, 17EV85, 17EV88, 17EV91, 18EV110, 18EV134, 18EV260, 18EV90, 18EV91	19.0	**Unauthorized** but managed as part of, or proposed for addition into, designated trail system	**Protect Road/Trail.** May be used for treatment operations provided route is returned to conditions consistent with its authorized use (including proper drainage) upon completion of activities in the immediate area.
16EV299, 16EV299B, 17EV161, 17EV202, 17EV298, 17EV50, 17EV75, 18EV94*, 18EV112, 18EV275,18EV308, 21613A, 31721H, 31721J, 31723E, 31723F, 31727D, 31728Z, 31733A, 31733D, 31735J, 31804B, 31805H, 318080, 31817F, 31818A, 31818E2, 31820A, 31820B, 31830K, 31830L, 31830P, 31830W,41831B, 41831C, 41831D, 41831F, 41832E1, FR6680	9.2	**Unauthorized**	**Close/Decommission**. These unauthorized routes may be used for harvesting operations and decommissioned upon completion of the project. *18EV94 may not be used where it enters lava cap, and skid trails should not enter route south of flagged area (coordinate with Botany). Upon completion road should be closed off to allow for continued dispersed camping.

"System" refers to whether the road/route is part of the National Forest System Road network or is unauthorized (managed trail or unmanaged user created route). All road segment lengths are estimates. Roads categorized as tied to timber sale may vary slightly. If not tied to timber sale, road work would be conducted as funding and personnel allow.

Closing/Decommissioning

Decommissioning may include sub-soiling; ripping; and/or barricading routes using earth, boulders, logs or slash, in order to effectively close routes following fuel reduction treatments. Roads to be closed but not decommissioned would not receive sub-soiling (such as maintenance level 1 roads). Where regular administrative access is needed, gates will be installed as opposed to other more permanent barriers.

2.3.1.11. Headcut Restoration

Units: 3282, 3283

Restoration of headcuts would occur within treatment units using standard practices to stabilize, backfill, and adjust gradient as necessary. Mechanized equipment on site (such as skidders, dozers or excavators) may be utilized, or additional smaller mechanized equipment may be brought in after other unit treatments have occurred. Stabilization and backfilling would utilize material on site. If additional material is needed, the District Botanist would be consulted prior to implementation. The restored area would be temporarily fenced (up to 5 years) to allow for re-vegetation and stabilization. Restoration efforts will involve close coordination with a Forest Service Hydrologist.

2.3.2. Alternative 2 – No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. Fuel breaks and strategic fuels treatments would not be established or maintained within the project area. No thinning, biomassing, shredding, or prescribed burning would be implemented to accomplish project goals. Routes would not be decommissioned and roads would not be reconstructed or

maintained under this project; however, it is conceivable those activities would be conducted under other future projects.

2.3.3. Alternative 3 – Modified proposed action: 20 inch DBH limit and 50% canopy cover

Alternative 3 is the same as Alternative 1 with the exception of canopy cover, diameter limit, and thinning type. This alternative would implement a "low thin", or "thin-from-below" where smaller diameter trees are removed before larger trees until objectives are met, or diameter or canopy cover limits are reached. All trees 20 inches diameter at breast height (4.5 feet) and larger would be retained except for where they pose a safety hazard, or are within road or landing clearance limits. Hazard trees would be felled and left in place if down log standards are not currently being met in a unit, unless doing so would pose a safety hazard or jeopardize prescribed burning or suppression activities. In mature forest (CWHR size/density 4M, 4D, 5M, 5D, and 6) where canopy cover is currently at or above 50%, canopy cover would not be reduced below 50%. Plantation prescriptions would be the same as Alternative 1 with the exception of a 20" diameter and 50% canopy cover limit in CWHR 4M and 4D stands. Two additional roads (2N49A and 3N23Y) would be changed from open to maintenance level 1 (ML1) – which means they would receive erosion control measures and then be closed (not decommissioned). These roads would remain in the system, but would only be opened up from time to time for management activities. One additional road (2N49) would be changed from open to administrative use only.

2.4. Design Features Common to Alternatives 1 and 3 _____

The following design features have been incorporated into the action alternatives (Alternatives 1 and 3) to reduce or eliminate potential adverse effects stemming from this project. Potential impacts relative to significance are discussed in the "Environmental Consequences" section, which takes these incorporated measures into consideration.

2.4.1. Air Quality

Guidelines for reducing adverse effects of prescribed burns are termed "Best Available Control Measures" (BACM) and are based on the *Prescribed Burning Background Document and Technical Information Document for Prescribed Burning Best Available Control Measures* (http://www.epa.gov/ttncaaa1/t1bid.html). BACMs are based on avoidance, dilution, and emission reduction strategies.

Prescribed Burning

1. Prescribed burning would be conducted in accordance with a smoke management plan approved by the Tuolumne County Air Pollution Control District (APCD). Smoke mitigation techniques include consideration of atmospheric conditions, season of burn, fuel and duff moisture, diurnal wind shifts, appropriate ignition techniques and rapid mop-up. Burn plans for the proposed prescribed burns would identify and follow BACMs and smoke mitigation techniques to prevent adverse air quality effects.

2.4.2. Cultural Resources

Cultural sites have been identified through reconnaissance surveys. Archaeological and historical resources at risk from project activities will be protected. Protection of these sites is included as part of the project design and will follow the measures outlined in the Programmatic Agreement (PA) between Forests of the Pacific Southwest Region, the California State Historic Preservation Officer (SHPO), and

the Advisory Council on Historic Preservation (ACHP). Site-specific treatments have been identified for cultural resources within or near to treatment units. Implementation of these treatments must be coordinated through the District Archeologist. Protection measures may include the following:

1. Avoid ground disturbing activities within sites. Sites requiring protection will be flagged prior to implementation and identified on Sale Area Maps identified as a "Controlled Area".
2. Timber harvest and procurement contracts shall contain provisions to protect any new sites discovered as a result of treatment activities, by the cessation of activities until an Archaeologist evaluates the discovery and provides for an appropriate level of protection.
3. Directionally fall timber away from sites.
4. Remove timber or other material posing a risk to cultural resources (coordinate with District Archeologist for locations and appropriate treatments).
5. By agreement and with close coordinating with the District Archeologist, removal of timber designated within a site may be removed if doing so would not affect the integrity of the resource.
6. Retain/add buffers to site boundaries in coordination with the District Archeologist.
7. The District Archaeologist will work with the District Fuels Officer during preparations for prescribed burning activities to insure that fire lines are not constructed within cultural/historical site boundaries; and to prescribe the appropriate protection measures for preservation of sites that have the potential to be impacted by burning activities.
8. Road management treatments on existing roads through cultural and historical properties will involve coordination between the District Archaeologist and the Forest Service Contracting Officer's Representative (COR) or Sale Administrator to ensure protection of the sites.

2.4.3. Facilities/Improvements

1. Improvements will be protected from harvest activities by directional falling. Trees utilized as an integral part of infrastructure (e.g., grazing allotment fence) will be retained unless they pose a hazard or significantly compromise the effectiveness of the fuels treatment. Trees removed for the reasons described above will be replaced by a wooden brace or other means necessary to ensure the integrity of the infrastructure is retained.
2. Where prescribed burning, firelines will be constructed, or other mitigation activities implemented, to prevent any adverse affects to the quality and/or effectiveness of the facility or improvement.
3. Identify range fences on sale area maps. Fences may be temporarily taken down (as determined necessary by the Sale Administrator) to facilitate harvest activities. Prior to this action, the purchaser or Sale Administrator must contact the Range allotment permittee 24 hours prior to removal of the fence. The fence will be replaced upon completion of harvest activities in the immediate area.

2.4.4. Haul Routes, Skid Routes and Season of Operations

1. Conduct mechanical operations during the normal operating season (NOS) (May 1- October 31) unless the Sale Administrator or COR, in consultation with a Forest Service Soil Scientist, has determined operations (including mitigations) would ensure R5 soil quality standards would be met.
2. Main skid trails must be approved by the Sale Administrator prior to operations.
3. During hauling operations, haul routes with native surfaces would be treated to minimize dust.
4. Treatment areas and/or routes within the planning area may be temporarily closed during operations for safety reasons.
5. During project activities, signs will be posted in accordance with pertinent health and safety laws, codes and Forest Service direction.

2.4.5. Mechanical Treatment Equipment

General slope limitations for mechanical equipment (for pitches > 100 feet) apply to treatment areas unless otherwise determined by the Forest Service Soil Scientist, or Sale Administrator/COR after consulting the Soil scientist. The following equipment may be used for the ground based thinning, biomass and shredding treatments, or prescribed burning operations:

1. Wheeled feller-bunchers or feller bunchers/harvesters with fixed cutting attachments – limit operations to slopes generally < 35%;
2. Tracked feller-bunchers/harvesters with a boom – limit operations to slopes generally < 45%;
3. Rubber-tired (or tracked) skidders—limit operations to slopes generally < 35%;
4. Dozers – limit operations to slopes < 35%;
5. Low ground pressure equipment with frontal shredding attachment – Limit operations to slopes generally < 40-45%,
6. Tracked harvesters and/or excavators with a boom and shredding head – limit operations to slopes generally < 40-45%.

Also see the Soil Conservation (2.4.8) and Water Quality (2.4.11) sections. Feller-bunchers may be used on portions of helicopter/skyline units where slope limitations and other soil and watershed management requirements can be met.

2.4.6. Noxious Weed Management

1. All "Off-Road Equipment" including logging, shredding, or construction machinery except for log trucks, chip vans, service vehicles, water trucks, pick-up trucks, cars, and similar vehicles must be free of soil, mud (wet or dried), seeds, vegetative matter or other debris that could contain seeds in order to prevent new infestations of noxious weeds in the project area. Dust or very light dirt that would not contain weed seed is not a concern.
2. Use weed-free straw if possible, if not, use rice straw. Inform Botanist where straw is used.
3. If sources of gravel and other materials on the forest are used during road maintenance, survey them for weeds first and avoid using materials in areas that would spread weeds that are not already there.
4. Vehicles and equipment should avoid flagged noxious weeds (white and black striped flagging or orange with "NOXIOUS WEEDS" in black) that are in or near **Units 2250, 2251** (map in project file). If this is not possible, clean any equipment that enters those areas before moving it to another unit or another part of the unit. Do not cut line through weed populations.
5. In **Unit 2250 and 2251,** do not treat and keep all equipment out of site infested with French broom (with the exception of hand tools for eradication) **(**map in project file).
6. Weeds may be pulled, cut, and hand dug in stands prior to, during, and after the timber sale to minimize spread and expansion and to protect sensitive plants. In the area of French broom, hand pulling and cutting may occur during or post-project with the intent of eradicating the occurrences. The broom will be lopped and scattered to reduce the fuel load. Fire personnel may later pile and burn the stems. The District Archaeologist will be consulted to ensure that cultural sites are protected.
7. To minimize the spread of yellow starthistle and other weeds along the 2N07 fuelbreak (**Units 2250 and 2251),** avoid noxious weeds in the vicinity of 1N04 and 2N07, treat them last, or clean the equipment before it goes on to areas that do not have weeds (map in project file).
8. Plan the order of treatment to avoid spreading weeds to weed-free areas or clean the equipment (see #1) before moving from areas with weeds to areas without weeds. This applies to yellow starthistle, and to lava caps that are free from cheatgrass. If cleaning is required prior to moving from an infested location to another location, a cleaning area will be designated in consultation

with the Botanist and watershed specialist , and measures will be identified to reduce potential impacts associated with the cleaning.

2.4.7. Riparian Conservation Areas

Riparian Conservation Areas (RCAs), as defined in the SNFPA, are areas: 300 feet on each side of perennial streams and around special aquatic features; 150 feet on each side of seasonally flowing streams; and to the top of the inner gorge for streams in the inner gorge. The RCAs are divided into 3 streamside management zones (SMZs) – exclusion, transition and outer. Based on several years of monitoring timber harvest operations, the Stanislaus National Forest has developed guidelines to ensure the Riparian Conservation Objectives defined in the SNFPA ROD (pp 62-66) are met. Design elements utilizing BMPs (Best Management Practices) are located in Appendix A, Table A-1.

2.4.8. Recreation

1. Protect all routes and system roads identified as a trail or candidate for a trail under the Travel Management process (Appendix maps 4-7). Identified routes utilized or disturbed during project activities will be restored to previous condition, or an improved condition consistent with their intended use.
2. Temporary route/road closures may occur during treatment activities where those routes/roads are being used for operations.
3. Remove activity related slash and debris from recreation parking and camping sites identified in Appendix E following project completion (Appendix maps 4-7).
4. Installed barriers in and/or around landings where needed to prevent parking and camping areas from expanding and causing resource damage where such a concern is warranted.
5. Keep landings above (southeast) road 3N09 and protect multiple dispersed rec. sites between road and creek.

2.4.9. Sensitive Plants

1. Except as noted below, all known or newly discovered occurrences of Sensitive Plants will be protected from all project activities. Sensitive plant occurrences will be flagged.
2. Areas of suitable habitat that have not been surveyed will be treated as having sensitive plants, unless surveys are done and no sensitive plants are found. These areas are all on lavacaps (map in project file). Unsurveyed suitable habitat will be mapped, but not flagged.
3. Effectively block or decommission all temporary roads, dozer lines, and hand lines that are created by this project (e.g., recontour the first 100-200' or until out of site and cover with slash). Effectively block access to the Boundary fuelbreak and to the lavacap above and to the west of units **3170, 3171, 3201** (map in project file).
4. Leave islands of vegetation along the following sides of units where necessary to block access to lava caps and the Boundary fuelbreak: **Units 3170, 3171 and 3201** and **Units 4321, 4324 and 4330** respectively. These leave islands will be flagged with orange and white flagging. Maps of these locations are in the project file. Vegetation islands in unit **3170** will not be flagged in until skid trails have been located by the purchaser and approved by the Sale Administrator (coordinate with Botanist). Skid road should enter route **18EV94** to the north of the point indicated on map (located in the project file). If that is not possible, then block the route below the point of entry with large rocks to prevent access during implementation. The landing also should not go beyond that point.
5. Equipment and vehicles are to stay on roads in lava cap areas and shall not leave the road to park unless the area has been approved in advance by the Botanist. Check with Botanist before using

OHV trails for vehicles wider than existing use. Do not "walk" tracked vehicles off the road on lava caps.

6. Do not drive on or park on sensitive plants (flagged) or unsurveyed suitable habitat (unflagged) along roads **1N04, 1N35Y, 2N07, 2N49, 3N01, 3N07, 3N20, 3N20A, 3N21Y, 3N23Y, 3N42, 3N42A, 3N47Y, 3N48Y, 3N49, 3N60D, 3N64, 3N64A, 3N76Y**, **3N79**; trails **17EV50, 17EV53, 17EV78, 17EV79, 17EV88, 17EV91, 17EV296, 17EV300, 17EV303, 18EV70, 18EV94, 18EV110, 18EV134, 18EV170, 18EV275, 18EV308; non-system roads 21625A, 31713H, 31725E, 31725H, 31734N,31818G, 31830P, 31831A;** or other routes **FR8291, FR98601,** and **FR98602** (maps in the project file).
7. Do not use vehicles wider than quads (<50 inches) on **17EV50, 17EV88,** and **18EV134**; or motorcycles (single track) on **18EV110** or **18EV170**, unless a site visit shows that established existing use is wider. Do not go past the first campsite on **18EV94**. If decommissioning any of these routes, check with Botanist first.
8. Do not push soil off the side of the road along Forest Road **2N49** starting from 2/3 mile before (east of) the intersection with **2N49A,** and for the first ¼ mile of **2N49A** (map in project file).
9. To minimize the spread of cheatgrass in the areas of lava cap species, work in areas free of cheatgrass first and last in areas with it, or clean equipment before moving from one area to the another (map will be provided for implementation).
10. Do not send concentrated water runoff to Sensitive Plants or unsurveyed suitable habitat along roads **3N20, 3N21Y, 3N42, 3N42A, 3N53Y, 3N60D, 3N64, 3N64A, 3N76Y, 3N79, 3N96, 4N33**; or trails **17EV50, 17EV53, 17EV78, 17EV79, 17EV88, 17EV91, 17EV296, 17EV300, 17EV303, 18EV94, 18EV110, 18EV134, 18EV170, and 18EV275;** or non-system roads **21625A**, **31713H**, **31725E**, **31725H**, **31734N, 31818G, 31830P;** or routes **FR8291, FR98601,** and **FR98602** (maps in project file). If runoff into sensitive plant populations is unavoidable, ensure waterbars are spaced very closely in order to avoid soil loss in these sensitive areas.
11. Ensure that engineering gets copies of the project maps (contract maps) prior to road management activities. Check with botany before decommissioning **18EV308** in order to protect Sensitive Plants. If **17EV50** is used, do not use vehicles wider than existing use (quads) (see 7 above).
12. Keep equipment off of flagged and/or mapped areas in or near Units: **2241, 2250, 2251, 3080,, 3170, 3171, 3180, 3190, 3193, 3194, 3195, 3200, 3201, 3230, 3231, 3232, 3240, 3241, 3250, 3251, 3260, 3270, 3271, 3300, 3341, 3350, 3351, 3352, 4321, 4325 and 4330** (known occurrences); and **3060, 3195, 3300** and **3350** (unsurveyed suitable habitat). Known or newly discovered occurrences of Sensitive Plants are also to be avoided by foot traffic except where necessary to conduct work directly related to the Sensitive Plants (map in the project file).
13. Do not pile slash on Sensitive Plant occurrences or on unsurveyed suitable habitat, even temporarily. In regards to debris from shredding, ensure that there is less than 5% cover of shredding bits on the flagged lava cap within 20' of any units, and no more than a nominal amount farther than 20' from the units if Sensitive Plants or unsurveyed suitable habitat are present (maps in the project file).
14. If burning Units **2250** and **2251** after November 15th and before August 15th, protect the densest sites of *Clarkia biloba* ssp. *australis* from burning (sites will be selected in conjunction with District Botanist).
15. The three sites of Himalayan blackberry may be dug before, during, or after the project. Any digging or pile burning will be done in consultation with the District Archaeologist (map in the project file).
16. If constructing hand lines through lava cap, avoid Sensitive Plants and unsurveyed suitable habitat and keep the lines as close to the target vegetation as possible.
17. Do not pile brush in the opening on the top of the knob near the southern end of the 2N07 fuelbreak (T2NR16ESec25 SW corner) unless the area has been surveyed and the plant there is determined not to be *Perideridia bacigalupi* (map in project file).
18. Do not burn fens or the meadows possibly containing fens (map in the project file).

2.4.10. Soil Conservation

It is assumed that long-term soil productivity will be maintained in all treatment units when project-level Soil Management Practices (SMPs) are implemented. Additional soil information, including specific soil concerns and management requirements are discussed in Appendix B. Management practices apply to all units; however, Table B-2 emphasizes specific soil management practices for individual units. Soil management requirements, in conjunction with hydrology management requirements (tables A-1 and A-2, Appendix A) mitigate watershed concerns.

Soil Organic Matter and Cover

1. Maintain Soil Organic Matter and Cover

1.1 Maintain at least 50 percent well-distributed soil cover post treatment. Soil cover should be in place prior to seasonal precipitation to avoid a high EHR condition (R-5 Erosion Hazard Rating method). Litter about an inch thick will provide effective cover since it will remain intact through the winter storm season. Maintain the following cover:

- 50% cover on slopes <35%;
- 60% cover on slopes >35%; and,
- 75% cover in RCAs (See Water Quality Section, and Table A-1 in Appendix A)

1.2 Retain downed logs in the range of 3 to 6 tons per acre (15 to 20 plus inch diameter, retaining the largest log) outside of defense zones and fuelbreaks.

1.3 Limit the depth of masticated fuels to a maximum of 4 inches, if burning on dry soils.

Soil Compaction Hazard for Ground-based Equipment

2. Determination of soil compaction hazard for ground-based equipment.

2.1. Ground based equipment will operate on relatively dry soils of high soil strength or bearing capacity. Dry soil conditions will be determined by use of a modified Froehlich equation that predicts soil compaction on skid_trails[14] or other reliable field techniques. *This requirement is particularly important in plantations where it is very difficult to subsoil to reduce overall levels of compaction*.

2.2. Areas will be monitored on a sample basis by soil type, to assure favorable soil moisture and operating conditions. Winter shredding operations will also be monitored. A Soil Scientist can help the Sale Administrator monitor such operations.

Detrimentally Compacted Areas

3. Subsoil Detrimentally Compacted Areas: subsoil landings, main skid trail, and temporary roads. Coordinate with Soil Scientist during project implementation to determine final subsoiling needs.

3.1. Landings should be subsoiled in most cases, including skyline landings.

3.2. In tractor units, with low compaction hazard and low existing compaction – subsoil the first 100 yards of skid_trail from landings or as determined by Soil Scientist.

3.3. In tractor units with high compaction hazard or high existing compaction – subsoil all main skid_trails. Main skid_trails typically have 20 passes or more, the litter layer is removed, bare soil is exposed and a compacted soil structure is evident, soil displacement has lowered the trail surface below natural grade, and berms are usually present.

3.4. Tractor units, inappropriate to subsoil include units dominated by thin or rocky soils, or thinned plantations (high frequency of stumps in skid_trail).

[14] Heath, M. and E.B. Alexander. 1982. Soil compaction on skid_trails, Peak Timber Sale: Validation of predictive equations. USDA For. Serv., Region 5. Earth Resources Note 3. San Francisco, CA

3.5. A Soil Scientist experienced with subsoiling may advise the Sale Administrator on soil-site conditions (i.e. rock content, slope gradient, moisture conditions, depth to restricting layer, erosion hazard). *This is particularly important on trail gradients approaching 15% to 20%.*

3.6. **Subsoiling Provision:** Ensure contract specifications or operating plans include the required depth of subsoiling; maximum depth of furrowing; a requirement for backblading when the depth of furrowing is exceeded; winged ripper tool design specifications (example of approved equipment). The original Johannson tool design is used as an example of approved equipment. Acres or miles of subsoiling will be provided.

Surface Disturbance Hazard and Slope Limitations for Ground-based Equipment

4. Determination of surface disturbance hazard and slope limitations for ground-based equipment

4.1. Possible treatments on steep slopes (steeper than 35% for more than 100 feet) include: 1) exclude area from treatment; 2) aerial harvest; 3) the feller-buncher may be used to "pac" wood to less than 35% slopes to minimize detrimental soil displacement; and/or, 4) use corrective measures to return as much displaced soil to its original location, insofar as practicable, without creating additional disturbance (correct the disturbance footprint to less than 15% of area).

4.2. The need to "adverse skid" a unit sets up similar requirements to avoid detrimental soil displacement.

4.3. If low disturbance yarding equipment is available (FMC, KMC, Morgan), generally no re-contouring or backblading of displaced soil is required.

4.4. Tractor piling should generally be done on slopes less than 25%. Steeper pitches may piled if the operation can retain a ground cover (duff and woody debris) of 50% and excessive furrowing can be avoided. Excessive furrowing will be corrected by backblading, without creating additional disturbance. Consider shredding treatment on high disturbance hazard areas.

4.5. Construct prescribed fire dozer lines on slopes less than 35%. Avoid blading into bare mineral soil, creating detrimental soil displacement (trenched trails). Prior to winter storms, pull any soil berm back into control lines and waterbar according to Erosion Hazard Rating (EHR) spacing guidelines to prevent erosion. Recommend backblading to line of sight firelines in close proximity to OHV activity.

4.6. Consult with Soil Scientist and monitor selected units considered to have a high disturbance hazard (i.e., steep tractor slopes, thin soils, high "legacy" disturbance).

4.7. Avoid the spring in Unit **2083**.

4.8. In units 3282 and 3283, consult with Soil Scientist or Hydrologist prior to approving landing locations or skid trail layout. Consult with Soil Scientist prior operations in these units to ensure sufficient soil strength.

2.4.11. Water Quality

Management requirements designed to protect water resources are derived from *Water Quality Management for Forest System Lands in California, Best Management Practices*[15] and Riparian Conservation Objectives (RCOs) (SNFPA 2004 ROD). Applicable BMPs are located in Appendix A (tables A-1 and A-2). General requirements are identified below (also in Appendix A).

[15] USDA Forest Service. 2000. Water Quality Management for Forest System Lands in California. Best Management Practices. Pacific Southwest Region. Vallejo, CA.

The Forest will submit a conditional waiver of waste discharge according to the California Regional Water Quality Control Board, Resolution No. R5-2003-0005 for actions implemented under this EA for timber related activities (including prescribed burns).

Riparian Conservation Areas (RCAs)

1. Mechanized equipment will adhere to management requirements in Appendix A (Table A-1), unless the hydrologist and/or Soil Scientist has been out to the site and has specified alternate acceptable activities. Each zone listed below represents the standard minimum distance on each side of streams. Widths may be increased where conditions warrant. Maps identifying these features are located in the project file and will be consulted prior to implementation.

Erosion Control

Applies to all mechanized harvesting, shredding and skidding equipment units.

2. Install and maintain erosion control measures, and ensure adequacy of these measures at the completion of the project.
3. Skid trails on slopes should have occasional breaks in grade or logging slash that disperse water.
4. Where skid trails cross streams, install waterbars or turnouts to divert all runoff away from stream channel.

Log Landings

5. Re-use log landings to the extent feasible. New landings should not be constructed within 100 feet of perennial or intermittent streams and 50 feet of ephemeral streams. Exceptions may be allowed following site-specific evaluation by a Forest Service Hydrologist and/or Soil Scientist.
6. Subsoil landings when harvest/biomass operations are complete. Exceptions may be made where existing landings are being used to support recreational activities (i.e. pre-existing parking, staging or camping areas) and their use is not causing resource damage, or where determined inappropriate by the Soil Scientist.

Roads

7. Service and refuel equipment outside of RCAs.
8. Maintain roads during the life of the project and control road use during wet periods to prevent or minimize entrainment of sediment into stream courses.
9. Use existing water sources for road watering for dust abatement and road surface protection. If one is not available and surface water is used, pool volume should not be adversely depleted. Installed screens on water intake lines to prevent entrainment of fish and amphibians. The North Fork Tuolumne River at 3N01 is recommended as a drafting area.

Slope Limitations

10. See Soil Conservation section

Prescribed Burning

11. Avoid damage to obligate riparian vegetation (e.g., willows, alders, cottonwoods).
12. Retain 75% ground cover within 100 feet of perennial and intermittent streams and 50 feet of ephemeral streams.
13. New dozer lines should not be constructed within 100 feet of perennial and intermittent streams and 50 feet of ephemeral streams.
14. Do not bulldoze the surface within SMZs or near streams. Hand tools and equipment should be favored on steep slopes, fragile soils and in sensitive areas such as SMZ approaches.
15. Restore constructed fire lines upon completion of prescribed burning and/or prior to each winter when fire lines are exposed to the potential for erosion. Restoration should consist of water

barring hand and dozer lines, recontouring of benched trails, and sub-soiling of detrimentally compacted dozer lines.

16. No debris or soil that might impede water flow or cause stream bank degradation will be placed in any stream.
17. Place burn piles a minimum of 50 feet away from perennial or intermittent streams and 25 feet away from ephemeral streams unless otherwise approved by a hydrologist and/or Soil Scientist. Piles should be located outside of areas that may receive road runoff.
18. In units **3282, 3270,** and **3283**, due to soils sensitivity to erosion: maintain 60% ground cover out of SMZs (map located in project file). Do not burn over the gully.

Unstable Slopes

19. Layout of skid trails will be located away from areas adjacent to and above unstable road cuts. This is particularly applicable to **Units 3061** and **3064** along road 4N32 (callout #18 on map located in the project file).

2.4.12. Wildlife

Aquatics

1. In unit **2250**, do not conduct fuel reduction activities between the 1N04 road and Basin Creek to avoid the potential impacts to foothill yellow-legged frogs and western pond turtles.

Elderberry Avoidance Measures

These measures apply to all elderberry shrubs within 100 feet of shred/burn **units 2250** and **2251** (map located in the project file).

2. Flag all elderberry plants with stems over 1” diameter in all units below 3,200 feet (~118 acres).
3. Biologist will brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.
4. Biologist will instruct all crews working in the area on the status of the valley elderberry longhorn beetle and the need to protect its host plant, elderberry.
5. Remove of vegetation adjacent to elderberry shrubs using hand treatments; no mechanical activities or burning shall occur within 50 feet of flagged plants.
6. Prescribed burning and mechanical activities within 100’ of flagged shrubs will be subject to an LOP from April 1 through June 30 of any given year to avoid fire and dust impacts to adult beetles during their flight period.
7. Crews will wet all elderberry shrubs and area around them prior to burn operations.
8. Biologist or other qualified Forest Service employee will patrol units 2250 and 2251 with fire personnel after prescribed burn to ensure no flagged plants are lost or damaged.
9. If additional elderberry shrubs with stems over 1” diameter are found prior to or during project implementation, they will be avoided and the Biologist will be notified immediately.

Limited Operating Periods (LOPs)

10. Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately 0.25 miles of California spotted owl activity centers from March 1 through August 15, unless surveys confirm that California spotted owls are not nesting that year (Table 2-4).
11. Maintain an LOP, prohibiting vegetation treatments within approximately 0.25 miles of goshawk nest sites from February 15 through September 15, unless surveys confirm that northern goshawks are not nesting that year (Table 2-4).
12. Where necessary, the LOP restrictions may be waived for early season prescribed burning.
13. LOPs may be established for additional areas if new activity centers/nest sites are found within 0.25 miles of a treatment unit.

Table 2-4 California spotted owl and northern goshawk Protected Activity Centers (PACs), and treatment units potentially affected by LOPs.

SPECIES	PROTECTED ACTIVITY CENTER (PAC)	BURN and HAND THIN RX UNITS	MECHANICAL RX UNITS	PAC ENTRY (YES/NO)	LIMITED OPERATING PERIOD
California spotted owl	TL132 (Hull Creek Camp)		**3190, 3191**	No	March 1 - August 15
California spotted owl	TL133 (High Sierra North)		**4324, 4326**	No	March 1 - August 15
California spotted owl	TL156 (High Sierra South)	**3060**	**3061, 3065**	Yes	March 1 - August 15
California spotted owl	TL260 (Lily Creek)		**3351, 3260**	Yes	March 1 - August 15
Northern goshawk	T51-01 (N. Fork Tuolumne)	**3060**	**3061, 3064, 3065**	Yes	February 15- September 15
Northern goshawk	T51-04 (Hull Creek)	**3195**	**3191, 3193, 3194 3250, 3251, 3260, 3300, 3301**	No	February 15- September 15
Northern goshawk	T51-18 (Camp High Sierra)	**3063**	**3062, 4310, 4311 4320 - 4322, 4326**	No	February 15- September 15
Northern goshawk	T51-20 (Upper Hull Creek)	**3240**	**3170, 3171, 3180 3190, 3241**	No	February 15- September 15
Northern goshawk	T51-21 (High Sierra East)		**3040, 3041, 3043, 3061, 3066, 4323, 4324, 4325, 4326, 4330**	No	February 15- September 15

Snag Retention

14. Retain all snags greater than 15” dbh except where they occur in or adjacent to fuelbreaks and subdivisions, or where they pose a threat to human safety.
15. Across treatment units, retain some mid- and large-diameter trees (≥15” dbh) that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole, mistletoe platforms, witch’s brooms) to serve as future replacement snags and to provide nesting, roosting and resting structures.

Downed Wood

16. Retain all downed logs greater than 15” dbh at the small end and 10 feet or longer except where they pose a threat to safety, control efforts or efficacy of other fuel treatments. Maintain downed wood loading (emphasizing larger diameter logs) averaging 8-12 tons/acre where feasible. In areas with less than this average, retain as much as possible during treatments. Cull logs and cull hazard trees meeting minimum dimensions should be left on site to reduce deficiencies.
17. In plantation units, cull logs meeting minimum dimensions should be left on site to increase downed woody material.

Hardwood Management

18. Avoid shredding hardwood or riparian species, including but not limited to oak, alder, willow, dogwood, ash and maple to the extent feasible.
19. During prescribed burning treatments, minimize damage of hardwoods and riparian species to the extent feasible.
20. Promote the health, vigor and recruitment of black and canyon live oaks by heavily thinning around existing oaks. Avoid damaging oaks to the extent feasible when removing conifers.

Wildlife Habitat Structure and Diversity

21. Maintain discontinuous, staggered patches/stringers of small trees and/or shrubs, both to limit visibility and to provide structure, cover and habitat diversity throughout the treatment units. Leave approximately 10% of the treatment area unbiomassed and/or unshredded. Stringers of trees may vary in size and shrub patches should be ~50 feet in diameter. Natural features such as rocky outcrops, cutbanks, areas inoperable for equipment and archeological sites may be used to fulfill these requirements.
22. Within California spotted owl Home Range Core Areas (HRCAs), retain additional canopy cover (up to 5%) in trees 6-12 inches DBH, where they would not substantially contribute to crown fire initiation or stress large overstory trees.

RX Burn Unit 3060

23. There is one California spotted owl activity center and one Northern goshawk nest within this unit. Each site shall be flagged to create a 500-foot buffer and a hand line will be constructed to retain current habitat structure during treatment.

Skid Trail Impact Prevention

24. Block temporary roads, skid trails and landings. Where feasible, require debris and slash to be scattered behind blocks (~100 ft). Objective is to discourage unauthorized motor vehicle travel.

2.4.13. Monitoring

Noxious Weeds

1. Monitor representative areas of straw application for weeds.

Sensitive Plants

2. Sensitive Plant monitoring should take place during project activities and directly after project activities culminating near Sensitive Plants to ensure that protective measures are sufficient.
3. Sensitive Plant monitoring of impacted occurrences should take place yearly for up to five years to determine whether the occurrences are still extant (have not been extirpated) and to determine whether impacts will have lasting adverse effects.

Soil Quality

4. Soil porosity in units treated with ground-based equipment will be evaluated post-treatment by either the Forest Soil Scientist or a representative to ensure that soil porosity standards and guidelines are met.
5. Consult with Soil Scientist and monitor selected units considered to have a high disturbance hazard (i.e., steep tractor slopes, thin soils, high “legacy” disturbance). Refer to Appendix B.

Water Quality

6. Conduct implementation and effectiveness monitoring using the Best Management Practices Evaluation Program (BMPEP)[16].
7. Focus evaluations on mechanized equipment operations in sensitive watershed locations.

Wildlife/Recreation

8. Use post-project monitoring results to determine if problem areas of unauthorized use develop. New routes identified would be barricaded or otherwise closed to ensure OHV compliance.

[16] USDA Forest Service. 2002b. Investigating Water Quality in the Pacific Southwest Region. Best Management Practices Evaluation Program (BMPEP) User’s Guide. Pacific Southwest Region. Vallejo, CA.

2.5. Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. The tables below compare alternatives by indicators chosen to describe the activities and their effects in a way that quantitatively contrasts those alternatives.

2.5.1. Activities

Accomplishments in terms of acres treated, miles of roads treated and miles of fuelbreaks established or maintained were compared across alternatives (Table 2-5). There is no substantial difference between the action alternatives with regard to these accomplishments; however, the difference between Alternative 2 (no action is quite clear)

Table 2-5 Accomplishments authorized under the alternatives

	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Modified Proposed Action)
Acres of WUI treated	4,900	0	4,900
Acres of plantations treated	2,330	0	2,330
Acres of naturally established stands treated	3,310	0	3,310
Acres of CA spotted owl PAC entered	172	0	172
Acres of Northern Goshawk PAC entered	111	0	111
Acres thinned, shredded, and burned	105	0	105
Acres thinned, biomassed, shredded, and burned	440	0	440
Acres thinned up to 12" dbh, biomassed, shredded, and burned	81	0	81
Acres shredded and burned	474	0	474
Acres hand cut, pruned, piled and burned	2	0	2
Acres prescribed burned as primary treatment	601	0	601
Miles of fuelbreak established/maintained	21	0	21
Miles of open NF System roads proposed for public closure	1.0	0	4.8
Miles of existing road added to NF road system	.8	0	.8
Miles of roads reconstructed	35.3	0	35.3
Miles of roads maintained	68.1	0	68.1
Miles of unauthorized OHV routes decommissioned	8.9	0	8.9

2.5.2. Fire Behavior

Average predicted fire behavior is similar under Alternatives 1 and 3. Alternative 2 is analogous to the existing condition, which is not consistent with the desired condition as identified in the Forest Plan. Fire behavior under both Alternative 1 and 3 would meet objectives to reduce the fire hazard to the public and firefighters, and provide for increased protection of natural resources. Reduction in surface, ladder, and crown fuels will enhance fire suppression capabilities by minimizing fire behavior and reducing the ability of a surface fire to transition into a crown fire (Table 2-6). The Fire and Fuels Report prepared for this project (on file at the District Office and available by request) displays fire behavior by units.

Table 2-6 Average Fire behavior across treatment units. Numbers in brackets indicate the range of values across treatment units. Fire behavior under both Alternative 1 and 3 would meet project purpose and need and are consistent with Forest Plan desired conditions. Alternative 2 does meet purpose and need and is not consistent with desired conditions.

Indicator	Alternative 1 (Proposed Action)	Alternative 2 No Action	Alternative 3 (Modified Action)
Fire Type[17] (90th percentile)	surface fire	surface fire, active, passive crown fire	surface fire
Rate of Spread (chains/hr)	1-5	2-42	1-5
Fireline Production Rate[18] (chains/hour)	7-40	6	7-40
Canopy Base height[19] (feet)	24	18 (0-43)	23
Flame lengths (feet)	1-2	6 (1-13)	1-2
Percent Mortality BA, 90th percentile)	<20%	>20%	<20%

2.5.3. Vegetation Characteristics

Vegetation/Habitat

With regard to forest vegetation, all alternatives retain much the same amount of forest/habitat type; however, structural stage/characterization does vary between Alternative 2 and the action alternatives. Alternatives 1 and 3 primarily reduce CWHR type 4D and 5D to 4M and 5M respectively. There is no substantial difference in CWHR types among action alternatives (Table 2-7).

Stand Characteristics

Existing canopy cover (Alternative 2) averaged across mechanical thinning units was ~61% (ranging from 39-89%) in naturally established stands and 53% (38-83%) in plantations. Alternative 1 would reduce average canopy cover slightly more than Alternative 3 (Table 2) in both plantations and natural stands. Average canopy cover values for individual units ranged from 36-73% under both action alternatives. Currently, thirteen units proposed for mechanical thinning (~1,280 acres) have a canopy cover < 50%. Alternative 1 would reduce canopy cover below 50% in an additional 26 units covering ~1,400 acres (~1,000 acres of plantation). Alternative 3 would reduce canopy cover below 50% in an additional 4 plantation units covering approximately ~640 acres. Canopy cover values for individual units can be found in Appendix D (Table D-2).

With respect to forest health, under Alternative 1, ~75% of the 4,164 total acres proposed for mechanical thinning and/or biomassing will remain below SDI thresholds (230 for ponderosa pine and 300-333 for mixed-conifer) for a period of 20 years (Table 2-8). Under Alternatives 2 and 3, 16% and 50% respectively are projected to meet desired SDIs. Just over 25% of the basal area (BA) would remain in the intermediate and suppressed crown class under Alternative 2. Alternative 1 would retain ~5-10% of the BA in suppressed and intermediate crown classes, while Alternative 3 would retain ~ 7% in the plantations and ~ 21% in the natural stands.

Alternative 1 would reduce the number of trees $\geq$ 20 inches DBH by an average of ~4 trees per acre in the natural stands and ~3 per acre in the plantations (Table 2-8). Of those trees removed, ~1-2 per acre would

[17] Fire type in brush fuel models are considered surface fires.
[18] Production rate for a 20-person handcrew.
[19] Average canopy base height calculated for forested thinning units only.

be larger than 24 inches DBH. Twenty years post-treatment, Alternative 1 would average ~1 tree per acre 24 inches and larger less than Alternatives 2 and 3.

Table 2-7. Acre comparison of CWHR size/density classes for Phase II mechanical thinning units. Action alternatives primarily convert 4D and 5D to 4 and 5M. The "Existing" field is considered synonymous with Alternative 2 (No Action).

	Total Thinning Acres			Natural Stands			Plantations		
CWHR	Existing	Alt 1	Alt 3	Existing	Alt 1	Alt 3	Existing	Alt 1	Alt 3
4P	346	401	346	13	68	13	333	333	333
4M	1449	2716	2667	489	1261	1212	960	1455	1455
4D	1492	164	164	935	82	82	557	62	62
5P	0	0	0	0	0	0	0	0	0
5M	464	868	972	464	868	972	0	0	0
5D	330	26	26	330	26	26	0	0	0
6	75	0	0	75	0	0	0	0	0

Table 2-8. Comparison of mechanical thinning unit stand attributes as computed in FVS based on stand inventory data. Averages were computed across both plantations and naturally established stands. Some stand attributes were further separated by Sierra mixed-conifer (SMC) and ponderosa pine (PPN) vegetation types.

	Naturally Established Stands			Plantations		
Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 1	Alt. 2	Alt. 3
[20]Average total QMD (in.)	18.5	14.4	18.1	15.5	13.2	15.5
[21]Average Overstory QMD (in.)	23.5	22.8	25.1	17.7	17.0	18
Average Overstory QMD (in.) @ 20 yrs	27.2	25.8	29.0	21.7	20.4	21.9
Average Canopy Cover (%)	48%	61%	50%	42%	53%	45%
PPN Average Trees/Acre	120	233	119	84	237	105
SMC Average Trees/Acre	106	292	119	93	129	87
PPN Average Basal Area (ft2/acre)	212	161	166	115	152	128
SMC Average Basal Area (ft2/acre)	255	184	176	117	87	89
%BA Suppressed and Intermediates	25%	8%	21%	28%	3%	7%
PPN Stand Density Index @ 20 years	243	316	251	311	231	248
SMC Stand Density Index @ 20 years	329	476	354	145	160	165
Percentage of acres meeting SDI targets[22]	58%	9%	39%	96%	25%	64%
Trees/Acre ≥ 20" dbh	29.0	33.6	33.6	14.4	14.5	15.6
Trees/Acre ≥ 24" dbh	18.4	19.7	20.0	4.3	4.4	4.7
Trees/Acre ≥ 24" dbh @ 20 years	26.3	28.4	29.0	13.8	14.4	14.4

[20] Stand quadratic mean diameters (QMD) were calculated for all trees ≥2 inches dbh and averaged across stand types.

[21] Stand QMD was first calculated for all trees in the dominant and codominant crown position to get the stand overstory QMD and then averaged across stand types. This measure was used to determine the diameters for CWHR size classifications since utilization of total stand QMD would result in smaller size classes which may not be consistent with actual suitability.

[22] Target stand density index (SDI) of less than 300-333 for mixed conifer stands and less than 230 for ponderosa pine stands, are based on desired conditions outlined in CSWA (2002) and CREP (2007) as well as relevant research regarding susceptibility to competition- and/or insect-related mortality.

Timber Volume[23]

While the number of residual medium- and large-sized trees (> 20”dbh) does not vary much between action alternatives, the merchantable volume removed does. Under Alternative 1, ~16.6 million board feet (MMBF) would be removed, representing ~15% of the total merchantable board feet (Table 2-9). Approximately two-thirds of that volume (10.6 MMBF) would come from natural stands. It is likely that merchantable estimates for plantation volumes are a little high due the structural characteristics of smaller trees; however, the numbers are still useful for comparisons among alternatives at this stage. Alternative 3 would reduce the total volume proposed under Alternative 1 by ~8.5 MMBF (a 5.9 MMBF reduction occurring in natural stands and 2.6 MMBF reduction occurring in plantations). Alternative 3 would remove ~7% of the total merchantable board feet within treated stands, about half the amount removed under Alternative 1.

Table 2-9. Comparison of merchantable volume (in thousand board feet or MBF) per acre and total merchantable board feet (in million board feet or MMBF). Volume was estimated based on FVS simulation of stand data for each alternative and not actual cruise data which may differ. Defect was modeled in FVS based on cruise data from similar timber sales in the area.

	Existing*	MBF/acre Removed			Existing*	MMBF total Removed		
	MBF/Acre	Alt. 1	Alt. 2	Alt. 3	MMBF	Alt. 1	Alt. 2	Alt. 3
Natural Stands	33.6	4.6	0	2.0	77.4	10.6	0.0	4.7
Plantations	18.3	3.2	0	1.9	33.8	6.0	0.0	3.4
Average/Total	26.8	4.0	0	2.0	111.2	16.6	0.0	8.1

*Existing volume based on only those units proposed for thinning.

[23]Volume was estimated based on FVS simulation of stand data for each alternative and not actual cruise data, which may differ. These estimates should not be used for contract data; however, they are useful in comparing different alternatives since assumptions for estimating volume for each alternative are the same.

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

This section summarizes the environmental effects of the alternatives relative to the factors used in determining significance. Addressing environmental effects this way focuses this assessment on pertinent effects necessary to make a decision, allowing for a concise document as directed by the Council of Environmental Quality's regulations for implementing NEPA (40 CFR Parts 1500-1508). BAs (Biological Assessments), BEs (Biological Evaluations) and other resource reports prepared for this project are briefly summarized and incorporated by reference. These reports are on file at the District office and available by request[24].

3.1. Consequences Relative to Significant Issues

3.1.1. Retention of large trees necessary for old forest dependent species

Differences among the alternatives with regard to large trees are summarized in Chapter 2. There are short-term differences in the number of residual large trees; however, the differences are minor (~1-2 trees > 24" dbh per acre). This difference is less apparent on the landscape scale when considering mature forest within the planning area that is not proposed for any treatment. All alternatives will retain the large tree component associated with old forest dependent species in the short term where they currently exist. Alternative 2 has a higher risk of losing these trees to stand replacing fire. Where these large trees are deficient, alternatives 1 and 3 will accelerate the development of the large tree component.

3.1.2. Retention of canopy cover > 50 % to maintain suitable breeding habitat and maintain habitat connectivity

Both Alternatives 1 and 3 would degrade suitable spotted owl and goshawk breeding habitat, affecting individual birds. Given the remaining suitable habitat within the planning area, including the extensive network of PACs, which will remain generally unaffected with regard to suitability, the District Biologist has determined that neither action alternative would lead to a trend toward Federal Listing for any old forest dependent species. Effects to wildlife are further discussed in section 3.2.

3.1.3. Removal of large trees and opening up the canopy to increase economic efficiency

Removes larger trees and opens up the canopy to the maximum allowable under the 2004 SNFPA ROD.

Due to poor market conditions and long haul distances, it neither Alternative 1 nor Alternative 3 would produce enough revenue to offset all costs associated with fuel reduction and forest health improvement treatments. An alternative that had larger logs would increase economic efficiency; however removal of larger trees while retaining smaller trees (generally shade tolerant species, or trees in the intermediate or suppressed crown position) would not be consistent with project forest health objectives or the desired condition.

Alternative 1 reduces canopy to the extent allowable under the 2004 SNFPA ROD; however, it generally retains the largest trees in a given area, with a few exceptions to reduce white fir and favor earlier seral species such as pines and black oak.

[24] Due to the sensitive nature of some of these reports (particularly with regard to cultural and historical resources) some of the information contained within these reports may not be available to the public.

Both Alternatives 1 and 3 meet the primary project objectives with regard to predicted fire behavior while mitigating adverse impacts to resources. As discussed in Chapter 2, Alternative 3 would remove ~2 MBF per acre in natural stands, while Alternative 1 would remove approximately 4.6 MBF per acre. This difference is a result of removing ~4 trees per acre greater than 20 inches dbh (~1-2 trees/acre > 24" dbh), and reducing canopy cover to 40 % on ~400 additional acres.

3.2. Consequences Relative to Significance Factors

In determining whether or not an action may pose a significant effect on the human environment, the agency must consider (a) context and (b) intensity of the proposed action as defined in 40 CFR Part 508.27. This section discusses the consequences of implementing the alternatives relative to those factors. Section 3.2.2, subpart 1 (Impacts that may be both beneficial and adverse) discusses potential direct and indirect effects by resource. Section 3.2.2., subpart 7 (Whether the action is related to other actions with individually insignificant but cumulatively significant impacts) discusses potential cumulative effects by resource.

3.2.1. Context

The project area and effects associated with the proposed action are localized, mostly limited to a portion of the North Fork Tuolumne watershed, and a small portion of the Clavey watershed. Treatments would occur on approximately 6.2% and 1.3% of these 5th field watersheds respectively. Effects of the proposed action would be potentially discernible at the levels of 7th and 8th field watersheds, the Phase II planning area, the Central Stanislaus Watershed Analysis area and Clavey Watershed Assessment area, or the Stanislaus National Forest and adjacent communities. The extent of potential effects varies by resource but becomes less discernible as the analysis area is expanded from the local level to the larger regional planning areas. In general, effects of the project at the Forest level would be hard to discern. At the sub-watershed level, and within the WUI associated with the Highway 108 communities, the most noticeable effects would occur, such as visible smoke production from prescribed burning operations. Of particular note is the cumulative benefit of this project with other recent projects designed for hazardous fuels reductions and reduced wildfire behavior within these areas.

Direct adverse societal impacts are expected to be small and of limited duration. People most affected by project activities would be the residents of the communities along the Highway 108 corridor, many of whom are only present during weekends and holidays, and those from surrounding areas who recreate in the area. Thinning and biomass removal would consist of the use of chainsaws and mechanized equipment. These activities may cause temporary disturbance to Forest users and adjacent landowners by noise and increased traffic; however, the majority of operations are on the other side of the North Fork Tuolumne River away from those highway communities.

Certain areas may be temporarily closed to recreation during treatment activities. The areas closed at any one time relative to comparable recreational locations would be small, given the size and location of the proposed treatment areas. Mechanical operations (thinning, biomass removal, shredding) are expected to occur between March and November, depending on weather and accessibility. Completion of the road improvement activities, thinning, biomass removal, hand thinning, and shredding are expected within four years of the decision.

Prescribed burning, most of which will be completed after the thinning and shredding, is expected to be done within the next five to seven years. Prescribed fire activities will be conducted for approximately 20-30 days in the spring or fall burning season each year. This activity may cause minor disturbance to Forest users and adjacent landowners from the smoke and increased traffic. Air quality provisions described in Chapter 2 would mitigate adverse effects relative to health concerns, in accordance with pertinent laws and regulations. Impacts from prescribed burning are expected to be orders of magnitude

lower than wildfire burning through the same area due to the timing and atmospheric conditions of the burn and the amount of acres burning at any given time. Activities similar to the Phase II project in scope and intensity have occurred regularly in the past, and will occur in the future within and adjacent to the project area.

Greater detail of context, as it relates to factors influencing intensity of potential impact is discussed below.

3.2.2. Intensity

This refers to the severity of the impact. The following 10 factors are considered in evaluating intensity of the alternatives:

1. Impacts that may be both beneficial and adverse.

This section focuses on those effects that are both beneficial and adverse. While effects may be beneficial on the whole, adverse effects must be examined to determine if a significant effect exists. Biological Assessments (for species listed or proposed for listing as federally threatened or endangered) , Biological Evaluations (for Forest Service sensitive species), and Management Indicator Species Reports (for species listed as management indicator species in the Forest Plan) for terrestrial and aquatic wildlife were prepared for this project and are incorporated by reference. Additional resource reports were also prepared to determine the effects of the Alternatives. Effects and determinations are summarized below.

Air Quality

Direct and Indirect Effects

Under Alternatives 1 and 3, decreasing fuel loads through the use of prescribed burning will result in the production of smoke which can affect visual quality, and produce particles (PM_{10} and $PM_{2.5}$) which have the potential to adversely affect some people. Smoke production is calculated using a series of multipliers (emission factors) applied to the amount of fuel consumed in each size class[25]. For duff and large woody fuel, these multipliers vary with moisture content. Prescribed fire burn plans will include a smoke management plan that provides information on the estimated smoke emissions (particulate matter) projected for the prescribed burn and/or pile burn units. The Tuolumne County Air Pollution Control District (TCAPCD) approves the plan, regulates the permissive burn days, and prioritizes multiple prescribed burn projects in their air district to minimize the impacts of smoke. Therefore, it is expected that affects to air quality will not cause unreasonable or significant impacts due to regulation by the State.

Temporary and short-term visibility impacts can be expected in the immediate project area during actual ignition and would be affected by wind speed and direction. Drainage inversions will affect nighttime dispersal of smoke, with possible smoke effects 5 to 10 miles down canyon. Visibility is not expected to be negatively impacted in the wilderness areas due to their distance from the project area.

If a wildfire event does occur after implementation of the proposed action, concentrations of all smoke related emissions would be expected to be less than in the “No Action” alternative due to the reduced levels of fuel available. A wildfire following a prescribed burn or mechanical treatment would burn with less intensity and consume fewer fuels, resulting in fewer emissions. Annual prescribed burn emissions are less than half of the wildfire emissions. In addition, prescribed burns would be conducted during meteorological periods favorable to smoke dispersion.

[25] Reinhardt, E. D.; Keane, R. E.; J. K. Brown. 1997. First order fire effects model: FOFEM 4.0, User’s Guide USDA - Forest Service GTR INT-344, Ogden, UT.

Dust created by logging and hauling operations, and tractor yarding can also affect PM_{10} concentrations. Dust abatement measures for road construction and hauling would be used to mitigate fugitive dust effects during implementation of the proposed action.

Climate Change

Direct and Indirect Effects

Alternatives 1 and 3 would lead to short-term localized increases in CO2 and other greenhouse gasses (GHGs), primarily as a result of prescribed burning. There may also be a slight short-term decrease in CO2 absorption due to the removal of some trees that are currently removing carbon from the atmosphere. Longer-term increase in individual tree growth and absorption of CO2, coupled ith reduced mortality due to competition, insects and disease will likely negate any short-term reduction in absorptive capacity.

Indirectly, action alternatives reduce the potential for stand replacing fire, which would release magnitudes more CO2 and other GHGs into the atmosphere, while simultaneously reducing the area's ability to absorb CO2 substantially. Alternative 2 would leave these stands at higher risk to stand replacing fire, and the associated indirect effect on GHG emissions.

Indirect effects also include global climate change as a result of the increase in concentrations of GHGs. This indirect effect (climate change) is not quantifiable at this project-level scale.

Cultural Resources

Several historic and prehistoric resources of interest are located within and/or adjacent to treatment areas. Protection measures are described in Chapter 2 of the EA. Specific treatments within or near specific sitesare described in the Cultural Resource Management Report (#05-16-1293) and in the project compliance letter. Based on those protection measures, a **no effect recommendation** was made for the above undertaking in accordance with the provisions set forth in the "Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, California State Historic Preservation Officer and Advisory Council on Historic Preservation Regarding Identification, Evaluation and Treatment of Historic Properties Managed by the National Forests of the Sierra Nevada, California (October 1996)", aka the Sierra PA.

Diversity

Vegetation Diversity

Direct and Indirect Effects

Alternatives 1 and 3 would directly increase vegetative diversity on the landscape scale, primarily by decreasing densities in stands strategically located across the landscape. The within-stand vertical structure of treatment units would decrease due to the removal of much of the small and mid sized trees. However, adjacent untreated stands, including PACs, provide for an increase in horizontal diversity. Plantations proposed for treatments have been previously thinned/biomassed, so an increase in horizontal-understory-, and species diversity is expected. Where chaparral or other areas dominated by brush are treated, either mechanically or through prescribed burning, age class diversity will increase.

Alternative 1 would increase stand level structural diversity slightly more than Alternative 3 since there would be more flexibility to retain smaller healthy trees of a desirable species in place of crowded codominants between 20 and 30" dbh. Alternative 3's thin-from-below prescription and diameter limit would require removal of more small to medium sized trees to meet fuels and forest health objectives.

No type conversions are proposed, and thinning treatments will have a small effect on overstory tree composition within treatment units due to diameter limits and prescriptions proposed. Understory

diversity will increase in treated stands due to increase in light penetration through the canopy to the lower levels. On the landscape scale, effects on species composition will be hard to detect. Indirectly, reducing densities and re-introducing fire should move species composition and structure within treatment units toward more open stands dominated by fire resistant/resilient species, which would be a contrast to the untreated areas of denser, more shade tolerant species.

Federally Threatened, Endangered, and Forest Service Sensitive plant species are discussed later in this chapter. Those species' contribution toward diversity with regard to Alternative 1 or 3 will not be affected. Alternative 2 (no action) increases the potential for increase in high severity fire which could directly and indirectly adversely affect their presence within the landscape, thereby increasing the risk of lowering diversity in the future.

Alternative 2 would indirectly move the landscape toward more homogeneous structure and composition. Within stand vertical structure would continue to stay high for a period of time, and then decrease as lower levels come shaded out. On both the stand and landscape level, tree species diversity would slowly decrease as shade intolerant species begin to die out and become replaced due to their lack of regeneration under denser conditions. Understory vegetation would continue to decrease and possible loss of species in localized areas could eventually occur.

Fish and Wildlife Diversity

Federally Threatened, Endangered, and Forest Service Sensitive wildlife species, and Management Indicator Species (MIS) are discussed later in this chapter. Those species' contribution toward diversity with regard to Alternative 1 or 3 will not be affected. Alternative 2 increases the potential for increase in high severity fire which could directly and indirectly adversely affect their presence within the landscape, thereby increasing the risk of lowering diversity in the future.

Fire and Fuels

The following is a summary of the effects discussed in the Fire and Fuels Report[26] (2008) prepared for this project (on file at the Mi-wok District Office).

Direct and Indirect Effects

Both Alternatives 1 and 3 would reduce the fire hazard to the public and firefighters, and provide for increased protection of natural resources. Fire behavior characteristics will be altered as flame lengths and intensity levels are changed from high intensity to low intensity. Reduction in surface, ladder, and crown fuels will enhance fire suppression capabilities by minimizing fire behavior and reducing the ability of a surface fire to transition into a crown fire. Scorch height and related tree mortality will be decreased, along with the potential for crown fire initiation.

Both of the action alternatives support Forest Plan Direction (2005) to reduce hazardous fuels and effectively modify wildland fire behavior to reduce the negative effects of wildland fire. Under Alternatives 1 and 3 post-treatment fire behavior, predicted under typical late summer fire weather conditions (90th percentile), is reduced to levels that meet the objectives stated in the purpose and need for the project (see Table 2-6). Predicted flame length is reduced to less than 4 feet, allowing for safe and effective use of hand crews in fire suppression. Predicted rate of spread is reduced by 50%, from an average of 2-42 chains/hour (chain is 66 feet) pre-treatment to 1-5 chains/hour post-treatment, also improving effectiveness of fire suppression resources. Fireline production rate is predicted to double from 6 chains/hour pre-treatment to 7-40 chains/hour post-treatment.

[26] USDA. 2008a. Fire and Fuels Report. Phase II Fuel Reduction, Forest Health and Road Management . Stanislaus National Forest, Mi-Wok Ranger District. Mi-Wuk Village, CA. Prepared by Anna Payne, District Fuels Officer.

In units where pre- treatment conditions showed a potential for passive or active crown fire, both Alternatives 1 and 3 reduced the predicted fire type to surface fire. The canopy base height pre-treatment average was 18 feet, post-treatment 23 feet, further reducing the potential for crown fire initiation. In some cases, removal of trees from the canopy and understory could conceivably increase surface wind movement[27] and facilitate drying of live and dead fuel[28], although effective removal of ladder and surface fuel should mitigate these factors by reducing the fuel load and potential fire spread. Treatment of surface fuels usually result in efficient fireline construction rates, so the control potential can increase dramatically after fuels treatment[29]. Observations and post-fire assessments on the 2007 Antelope Complex Wheeler Fire[30] confirmed that spot fires were contained or went out on their own in treated areas. The assessment of the 2007 Angora Fire[31] found that "[m]ost of the area fuel treatments reduced fire behavior from a crown fire to a surface fire. Area fuel treatments adjacent to subdivisions provided important safety zones, increasing suppression effectiveness, which saved houses."

Activities such as opening up the canopy and prescribed burning could potentially increase the understory brush component in some stands where brush is present, requiring additional treatments in the future to maintain desired fireline intensities and production rates.

Fuel treatments would reduce potential fire severity and prescribed burning would reintroduce fire within treatment areas, helping to restore key ecosystem components and processes over time. Multiple treatments over time may be needed in some areas to fully restore and maintain the desired conditions.

Without the fuels treatments (Alternative 2) our objectives would not be met and over time the area will further depart from desired conditions. The potential wildland fire spread and intensity could increase over time. Canopy base height would allow a surface fire to reach the canopy and the potential for crown fires would exist. The stands with dense stocking conditions would contribute to additional mortality, adding to the existing fuel loading. In addition to the increased dead fuels component, thickets of shade tolerant reproduction would continue to increase in the understory, adding to the vertical fuel ladder. Aerial retardant would be less effective on surface fire spread due to dense tree canopies, which are harder to penetrate.[32]

Forest Health, Composition and Structure

Potential significant effects with regard to the timber resource would come from loss of productivity due to soil impacts, vegetation type conversion or large-scale disturbance, either natural or human caused. Effects to soils and productivity are discussed in the soils and section of this chapter. By adhering to regional soil quality standards and BMPs describes in the Soils and Water Quality sections of Chapter 2, no significant effects to soil resources are expected. No clearcuts or type conversions are proposed. With regard to forest health, composition and structure, the action alternatives provide benefits while mitigating most adverse impacts.

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[27] Albini, F.; Baughman, R.G. 1979. Estimating windspeeds for predicting wildland fire behavior. INT-221. USDA Forest Service Intermountain Forest and Range Experiment Station. Ogden, UT. 92 pgs.

[28] Pollet, J.; Omi, P.N. 2002. Effects of thinning and prescribed burning on crown fire severity in ponderosa pine forests. International Journal of Wildland Fire. 11: 1-10.

[29] Agee, J. K., B. Bahro, M. A Finney, P. N. Omi, D. B. Sapsis, C. N. Skinner, J. W. van Wagtendonk, and C. P. Weatherspoon. 2000. The use of shaded fuelbreaks in landscape fire management. Forest Ecology and Management 127:55–66.

[30] Fites, Jo Ann, Mike Cambell, Alicia Reiner and Todd Decker. 2007. Fire Behavior and Effects Relating to Suppression, Fuel Treatments, and Protected Areas on the Antelope Complex Wheeler Fire. Prepared by the Fire Behavior Assessment Team, August 2007.

[31] Murphy, Kathy, Tim Rich and Tim Sexton. 2007. An Assessment of Fuel Treatment Effects on Fire Behavior, Suppression Effectiveness, and Structure Ignition on the Angora Fire. Report submitted to Ed Hollenshead, Regional Fire Director, Pacific Southwest Region, Vallejo, California.

[32] Omi, Phillip N., and Martinson, Richard J. 2002. Effects on fuel treatment on wildfire severity. Final report. Western Forest Fire Research Center, Colorado State University. 36 pgs.

The Silviculture/Forest Health Report prepared for this project (on file at the District office and incorporated by reference) discusses existing conditions and effects of the various alternatives. Below is a summary of the effects. Appendix D displays stand attributes by unit (Tables D-2 and D-3).

Direct and Indirect Effects

Implementation of Alternative 1 would result in the reduction of stand density levels and a decrease in competition for resources. In both Sierra mixed conifer (SMC) and Ponderosa pine/Jeffrey pine (PP/JP) vegetation types, ~25 % of stands proposed for mechanical thinning (1,034 acres) would not be reduced to desired SDI levels due to Forest standards and guidelines regarding canopy cover requirements for HRCA and PACs; however, these stands would still experience some degree of decreased competition and increased growth and vigor initially. Treatments in CA spotted owl PACs (~80 acres) would not reduce SDI levels below target thresholds for any period of time; however, a decrease of smaller trees would benefit residual larger trees. Thinning treatments within HRCAs where a 50% canopy cover was retained met desired SDI level for a period of ~10 years, which suggests that if these stands are to be maintained below desired SDI thresholds, units within HRCAs would have to be re-entered ~10 years earlier than stands that were thinned to ~ 40% canopy cover, or else remain at increased risk for the additional 10 year period prior to reentry. All treatment units would experience a substantial decrease in the potential for crown fire initiation under 90th percentile fire weather (Fire and Fuels Report).

Selection of Alternative 3 would have effects similar to those within HRCAs, meaning that a greater portion of thinned stands would remain below desired thresholds for the entire 20-year period.

Under Alternative 1, a large portion of trees in the suppressed and intermediate crown classes would be removed; reallocating resources to both younger, vigorous trees, as well as larger, old trees whose growths have slowed and are more susceptible to drought and insect related mortality. Species composition and future stand trajectories would be pushed toward more fire resistant/resilient species due to preferential selection. White fir and incense cedar densities would be dramatically reduced, particularly in the lower strata. Residual density levels would still favor successful regeneration of those species; however, conditions favorable for regeneration of more shade-intolerant species, such as pine and oak, will also be enhanced by mechanical thinning and prescribed burning treatments (Tappeiner 2007)[33]. Stand structure would be altered so that surface fire could be used to maintain lower densities and reduce the advantage of the more shade-tolerant but less fire-tolerant white fir and incense cedar.

Alternative 3 would retain more trees in the suppressed and intermediate crown position due to the retention of trees > 20” dbh, leaving them at an elevated risk of competition and insect related mortality; however, reductions in stand densities overall, will minimize this effect. The largest trees (generally slower growing or declining pine) will experience a decrease in competition, thus retaining live large tree presence in the area. This level will be slightly reduced from Alternative 1, though this is hard to quantify since it relies on so many variables. Ultimately, retaining more medium sized trees (usually in the vicinity of larger trees) would place increased stress on all residual trees, though the effects at the landscape level would be very slight.

Effects to snags are expected to be minimal. A small number of snags will be lost directly during prescribed burning, or if they are a safety hazard or are located within a fuelbreak. A small number of snags are expected to be created during prescribed burning as well. Longer-term, snag densities in thinned units are expected to be lower due to the decrease in insect- and competition related mortality. In plantations, when snags do occur naturally, they are expected to be of larger diameter than if thinning treatments had not occurred. Snag levels are expected to increase over time at a greater rate under Alternative 2; however, the average sizes of the snags are expected to be much smaller as a whole, except where large “old growth” trees die out due to competition, drought and insects.

[33] Tappeiner, J.C.; D.A. Maguire and T.B. Harrington, 2007. Silviculture and Ecology of Western U.S. Forests. Oregon State University Press. Corvalis, OR.

Within thinning units, stand structure and complexity would be decreased in the short term as the majority of the lower strata would be removed. Some trees and other vegetation in the lower strata would be retained, and patches within treatment units (approximately 10 % of the unit) may remain untreated altogether due to design criteria, operational constraints and/or the presence of sensitive resources. Based on past projects with similar treatments, it is expected that this simplification of structure would be of limited scope and would actually contribute to the overall diversity across the planning area. Oak in the mid and lower strata is expected to respond quickly to the increase in light and nutrient availability, filling in and contributing to a two- or multi-canopy stand structure. Brush and other understory vegetation will increase as more light becomes available, increasing as canopy cover decreases. Prescribed burning would also stimulate brush germination and or resprouting.

Prescriptions in larger plantations (CWHR size class 4), would actually increase structural diversity by breaking up the crown continuity and even distribution of these single storied, relatively homogenous stands. Preferential thinning would increase species diversity, and provide growing space for other conifers and hardwoods (especially oaks), as well as grasses, forbs and brush.

Long-term, structural complexity of thinned natural stands would return to pre-treatment levels, as smaller trees grow and seedlings become established and grow. Based on stand data modeling, the effects of treatments under this alternative in terms of structure and density are expected to last for up to 50-70 years for the most intense treatments, to 5-10 years for lighter treatments. This does not reflect habitat suitability or desired condition, but rather is an estimate of how long it would take a stand to return to pre-treatment conditions.

The number of trees-per-acre would be reduced dramatically while quadratic mean diameter (QMD) – the DBH of the average tree – would increase slightly. Preferentially removing trees in the suppressed and intermediate crown position, generally speaking, would remove the smaller trees that are less vigorous and more likely to experience competition-based mortality[34]. Residual trees would grow at an increased rate compared to current growth rates. Thinning of stands, especially in the plantations, would also accelerate the stand's movement toward the large tree sizes typical of late-seral stands favored by wildlife such as spotted owls or northern goshawks. Preferential retention of sugar pine and oaks would increase the size, frequency and persistence of these species within the stand. Preferential removal of white fir and incense cedar would shift species composition toward a mix more suited to the site under drought conditions and natural fire regimes (CSWA 2002, SNFPA FSEIS 2004).

Shredding treatments in forested stands would remove small trees and brush, increasing water and nutrient availability for the residual trees without substantially altering canopy cover. Shredding treatments would also decrease the amount of large, decadent brush, thereby decreasing competition with smaller desired trees. Expected flame lengths, fireline intensities, and predicted mortality would all decrease. Brush that re-sprouts will provide diversity in both age and structure, producing tender shoots favored by deer and other browsers and grazers. Smaller oak may be shredded during treatments; however, this is expected to have limited effect since oaks readily re-sprout following topkill[35, 36]. Given this ability to re-sprout, oaks will be favored over other conifers and non-sprouting brush species, increasing their potential to reach the mid- and upper-levels of the forest canopy.

Selection of Alternative 2 (no action) would retain stand densities and species compositions in their current conditions allowing them to develop on their current trajectories. Stand densities (as measured in

[34] Oliver, C.D. and B.C. Larson. 1996. Forest Stand Dynamics, Updated Edition. John Wiley and Sons, United States of America.
[35] Plumb, T.R. and P.M. McDonald. 1979. Oak Management in California. USDA Forest Service Pacific Southwest Forest and Range Experiment Station. Gen. Tech. Rep. PSW-54.
[36] Tappeiner, J. and P. McDonald. 1979. Presented at the Symposium on the Ecology, Management, and Utilization of California Oaks, Claremont, California, June 26-28. 1979.

SDIs) would continue to increase, increasing competition between trees, slowing growth and increasing the likelihood of insect and disease outbreaks and density related mortality[37, 38].

For all stands, maintaining and increasing these density levels as proposed under Alternative 2 puts them at an increased risk of stress-induced mortality, especially in drought conditions. The competition between trees for moisture, light and nutrients reduces their vigor, making them more susceptible to pests[39, 40]. Whereas some mortality is desirable for generating snags, the condition of prolonged drought coupled with the overstocked stands has the potential to kill large portions of stands, as has happened on the San Bernardino National Forest in the past few years, and is currently going on across the southwest. In this case, suitable wildlife habitat for Forest Service listed sensitive species would be reduced or lost, and the risk of fire danger and severity would increase.

In the absence of fire, heavy concentrations of fuels would continue to accumulate as drought-, and insect-related mortality continues. Stands would continue to shift toward a more shade tolerant species composition as the overstory trees (predominantly pine and oak species) are replaced by the white fir and incense cedar that dominate the lower strata (Tappeiner, et al. 2007). Currently over 90% of the understory tree species are shade tolerant incense cedar and white fir. These species are also present in the overstory in sufficient quantities to ensure their continued regenerations, especially given high stand densities and current canopy closure levels favorable for their successful establishment.

In the Wrights Creek plantations, existing oaks are sparse and of small size in relation to the plantation trees. Following fire, oaks have the advantage over other tree species because of their ability to re-sprout with an already established root system[41]. On relatively good sites, conifers will eventually be able to reoccupy the site, and over time, replace them in the overstory. If sites remain relatively open due to site conditions or disturbance, oaks are able to persist in the stand. With intensive site preparation and subsequent planting, oaks lose their relative advantage, and are relegated to poorer quality sites, or scattered in the understory. Where extensive site prep was not done due to slope steepness or because site quality was not appropriate for timber production, oaks are thriving. In the natural stands, larger black oak have lost or are beginning to lose dominance, and large portions of their crowns are dying. Under the no action alternative in the absence of stand replacing fire or wide spread drought/insect-related mortality, large, mature oaks will continue to become overtopped, lose vigor and eventually die, resulting in fewer large oaks on the landscape (McDonald and Tappeiner 1996, Tappeiner, et al. 2007). Small and medium oaks will not be released, decreasing the likelihood of reaching the overstory or persisting within the stand. Oak seedling establishment will become increasingly difficult.

The overstocking of the stands is also substantially hindering the stands' movement toward the large tree sizes typical of late-seral stand stands favored by wildlife such as spotted owls and goshawks[42, 43, 44, 45, 46]

[37] Sartwell, C. and Stevens, R.E., 1975. Mountain pine beetle in ponderosa pine: prospects for silvicultural control in second-growth stands. J. For. 73, pp. 136–140.

[38] Oliver,W.W. and F.C.C. Uzoh. 1997. Maximum stand densities for ponderosa pine and red and white fir in northern California. In: Proceedings of the 18th Annual Forest Vegetation Management Conference, Sacramento, CA, January 14–16, 1997, pp. 57–65 (1997)

[39] Sierra Nevada Ecosystem Project (SNEP). 1996. Status of The Sierra Nevada, Final Report to Congress. Vol. I-III. Wildland Resources Center Report No. 37. University of California, Davis.

[40] Tappeiner, J.C.; D.A. Maguire and T.B. Harrington, 2007. Silviculture and Ecology of Western U.S. Forests. Oregon State University Press. Corvalis, OR.

[41] McDonald, P.M. and J.C. Tappeiner. 1996. Silviculture-ecology of forest-zone hardwoods in the Sierra Nevada. In: Sierra Nevada Ecosystem Project: Final Report to Congress. Volume III, assessments, commissioned reports, and background information. Davis, CA: University of California, Centers for Water and Wildlife Resources; 621-636.

[42] Oliver, W.W. 1997. Twenty-five-year growth and mortality of planted ponderosa pine repeatedly thinned to different stand densities in northern California. West. J. Appl. For. 12(4): 122-130.

[43] Barrett, J.W. 1983. Growth of ponderosa pine poles thinned to different stocking levels in central Oregon. USDA Forest Service Res. Pap. PNW-311.

Larger, "old growth" trees will remain at an increasing risk of drought and insect related mortality risk due to their declining vigor and increased competition from smaller trees. Snag levels, particularly in the largest and smallest size classes are expected to increase.

Without disturbance agents (such as fire, insect outbreaks, or human activities), plantations trees would continue to grow and canopies would continue to close in. Lower branches will start to die, raising the canopy base height. Shrubs in the understory would eventually be shaded out and die. Understory diversity as well as structural diversity would continue to decrease for a while, until some disturbance creates gaps in the overstory. Shade tolerant trees may establish under the canopies; however, those trees would be suppressed as they grew up into the canopy. The in-growth of these shade tolerant trees, along with the denser canopy will increase competition for resources, as well as increase the potential for stand replacing fire in the future. These stands would also remain at high risk to severe bark beetle outbreak, with hazard increasing as they grow due to their extensive distribution and uniform structure.

Noxious Weeds

To summarize the Noxious Weed Risk Assessment prepared for this project, within the project area weed risk can be divided into two geographic locations, the Duckwall landscape and Dodge Ridge Landscape (CSWA 2002). The project also falls in the Clavey River Watershed Assessment conducted by the Clavey River Ecosystem Project (CRWA 2008). The weeds in that area are the same as those in the Dodge Ridge landscape and will be included in that portion. The concerns are as follows:

Duckwall

- A three-acre and a ¼ acre infestation of French broom (*Genista monspessulana*), a C listed weed;
- Multiple infestations of yellow starthistle (*Centaurea solstitialis*), also a C listed weed, along Forest Roads 1N04 and 2N07;
- One infestation of Tree of heaven (*Ailanthus altissima*), also a C listed weed, along 1N04;
- Two infestations of Himalayan blackberry (*Rubus discolor*), which is a concern because it spreads in some of the habitat of the sensitive plant *Erythronium tuolumnense.* One is 0.1 acres. The other is smaller. Although there is no *E. tuolumnense* in this portion of the project, there are four occurrences within a quarter mile of the project in the area where Himalayan blackberry is growing.
- Cheatgrass (*Bromus tectorum*) is scattered along the lower portions of some roads.

Dodge Ridge

- Bull thistle (*Cirsium* vulgare) is scattered in many locations, and Klamath weed (*Hypericum perforatum*) was also found in several locations within the project area.
- Cheatgrass (*Bromus tectorum*) was found in portions of the project. It is of concern because it can grow in areas where the sensitive plant *Lomatium stebbinsii* grows.
- Ox-eye Daisy (*Leucanthemum vulgare*) was found in a few areas
- Woolly mullein (*Verbascum thapsus*) is scattered along roads.

Bull thistle and mullein are not of concern in this analysis because they are scattered through much of the project. They may increase initially and then would return to reduced levels as the canopy increases again.

[44] Boldt, C.E. 1970. Sequential thinnings boost productivity of a ponderosa pine stand in the Black Hills of South Dakota. USDA Forest. Service Res. Note RM-172.
[45] Cochran, P.H. and J.W. Barrett. 1995. Growth and mortality of ponderosa pine poles thinned to various densities in the Blue Mountains of Oregon. USDA Forest Service Res. Pap. PNW-RP-483.
[46] Ronco, F., Jr., C.B. Edminster and D.P. Trujillo. 1985. Growth of ponderosa pine thinned to different stocking levels in northern Arizona. USDA Forest Service Res. Pap. RM-262.

Klamathweed has an effective biological control agent and also will not be considered further. It generally spreads fairly slowly. Cheatgrass is not a concern in the Duckwall landscape because there are no lava caps and many other annual grasses there.

Direct and Indirect Effects

With respect to noxious weeds, the effects of implementing alternatives 1 and 3 are identical. Increased site disturbance and increased vectors have the potential to introduce new weed populations or lead to the spread of existing populations within the treatment units. However, the District Botanist has determined that implementing the management requirements listed in Chapter 2 reduces or eliminates the risks of introducing or spreading noxious weeds in the project area and would impart a low risk of noxious weed introduction and spread by either action alternative. There is a higher risk in the lower portion of Unit 2701 because the weeds in the access road on private land cannot be mitigated as fully as in other areas.

Indirect effects of Alternative 2 (no action) include an increased risk of high intensity fire, and increased probability of fire suppression activities in emergency situations. Both of these factors have the high probability of introducing and/or spreading noxious weeds within the analysis area.

Range

Direct and Indirect Effects

Impacts include short-term disturbance to cattle during harvesting operations. Cattle may have to be relocated temporarily while activities are occurring. One location near Sam Williams spring may be temporarily fenced (up to 5 years) following headcut restoration; however, the amount of area to be excluded is relatively small and similar vegetation type will still be available in the area for cattle. Other impacts include a short-term (<1-2 years) decrease in forage availability followed by an increase in forage availability starting 1-3 years after treatments (an indirect effect). Treatments (especially shredding and or prescribed fire) will stimulate growth of desirable forage.

Recreation

Primary recreational activities within the planning area include dispersed and non-dispersed camping, hunting, fishing, hiking, picnicking, driving and off-highway vehicle use. Within the planning area there are ~153 miles of motorized routes. Approximately 107 miles are National Forest System roads, ~41 miles of unauthorized roads/trails, with private roads, county and other roads comprising the remaining mileage. Approximately 75 miles of NFS roads are authorized for OHV use and ~5 miles are maintenance level 1 (closed to the public but available for occasional administrative use).

Direct and Indirect Effects

Impacts to recreation activities are expected to be minor and of short duration. These disturbances include temporary trail/road closures and increased noise levels in localized areas where treatment activities are taking place. Potential dispersed camping and parking spots may be temporarily unavailable; however, given the relatively small area that will be affected at any given time, and the vast amount of area available for recreation throughout the Forest and within relatively close proximity to the proposed treatment areas, these areas are easily avoided and should constitute only a minor , short-term disturbance.

No major changes to access are proposed; however, the reduction of ~10 miles of unauthorized routes will slightly reduce the number of routes available for recreational riding. These areas represent less than 10 % of available trails and are in locations where other alternatives are available in close proximity. Closures identified under Alternative 1 are consistent with the Stanislaus NF Travel Management proposed action, which provides for a wide range of motorized and non-motorized recreational needs. Alternative 3 is proposing additional road/route actions which are not consistent with the current Forest Travel Management, but are unlikely to substantially affect recreational access and opportunities in the area. Additionally, this EA and subsequent decision will defer to the Travel Management Plan Record of

Decision once it is finalized, ensuring routes are not prematurely closed in spite of ongoing consideration occurring for that project.

Sensitive Plants

Potential effects to Forest Service Sensitive Plants and their suitable habitat within the project area are discussed in detail in the Botany Biological Assessment/ Biological Evaluation prepared for this project and on file at the Mi-Wok District office. In summary, of the 39 Sensitive Plant species on the Regional Forester's list for the Stanislaus NF, known occurrences or unsurveyed suitable habitat for 8 species are present in or adjacent to project units. Known occurrences of sensitive plants within or near the project area include *Bruchia bolanderi, Cypripedium montanum, Clarkia biloba ssp. australis, Erythronium tuolumnense, Hydrothyria venosa, Lewisia kelloggii ssp. hutchensonii* or *ssp. kelloggii*, and *Lomatium stebbinsii*. These populations have been protected from many direct and indirect effects. Indirect effects have been minimized and core areas of these occurrences protected.

Direct and Indirect Effects

Alternatives 1 and 3 may have a beneficial effect on *Bruchia bolanderi* by removing conifers encroaching on suitable habitat. Alternative 2 (no action) would have no direct effects; however, continual growth and encroachment by conifers may reduce suitable habitat for that species. *Clarkia biloba ssp. australis* may benefit from increased sunlight caused by burning and mechanical treatments. Clarkia is also expected to benefit from the increase in pollinators associated with increase in flowering understory vegetation. These favorable conditions could also favor the spread of yellow star thistle which could reduce cover of clarkia in areas where they co-occur; however, mitigations reduce the potential for this to occur.

Alternative 3 could potentially benefit one population of *Cypripedium montanum* by closing a road which goes past this population, thereby reducing the potential for off-road travel and impacting of that population. Alternatives 1 and 3 could potentially benefit *Erythronium tuolumnense* by increasing soil moisture downslope where populations occur, and by allowing for the treatment of two Himalayan blackberry populations which can occupy the same habitat as this species.

Alternatives 1 and 3 have the potential to indirectly impact *Lomatium stebbinsii, Lewisia kelloggii ssp. hutchensonii* or *ssp. kelloggii* by changing road drainage patterns, which could potentially erode away potential habitat. Potential increases in cheatgrass from road treatments and prescribed burning may allow fire to burn into lava caps where it has not historically occurred and for which *Lomatium* or *Lewisia* are not adapted. However, design criteria discussed in Chapter 2 have been incorporated to mitigate potential adverse effects. The proposed closure of some routes that run through Sensitive Plant populations would provide a benefit to the species.

Determinations

By incorporating project design criteria as described in Chapter 2, the BA/BE documents the District Botanist's determination that alternatives 1 and 3 may affect individuals of the following Sensitive Plant species but is not likely to result in a trend toward federal listing or loss of viability for that species: *Bruchia bolanderi, Clarkia biloba ssp. australis, Cypripedium montanum, Lomatium stebbinsii, Lewisia kelloggii ssp. hutchensonii* or *ssp. hutchinsonii*. The action alternatives would not affect *Erythronium tuolumnense* or *Hydrothyria venosa*.

Watchlist Plants

There is only one watchlist species of particular concern in this project. That is *Perideridia bacigalupi.* Of the species within elevation range, there is no habitat for *Eriogonum ovalifolium* var. *eximum; Bolandra californica* and *Rhynchospora capitellata* are primarily found in moist habitats which are already protected; no *Drosera rotundifolia* was found during surveys of all suitable habitat; *Madia*

yosemitana and *Carex tompkinsii* mainly occur to the south of the project; and *Mimulus grayi* and *M. inconspicuous* have been combined with *M. exigua* and are no longer rare.

Direct and Indirect Effects

The possible occurrence of *Perideridia bacigalupi* is currently in a small opening at the top of a knob surrounded by dense brush and small trees. Direct negative effects from the action alternatives would occur if brush were piled on this relatively open site and burned. All other effects of opening up the canopy would be positive for this species. Negative impacts would be mitigated by avoiding piling brush in that area unless surveys determine the plant is not *Perideridia bacigalupi.* With that measure the impacts would primarily be beneficial in the long-term and would counter balance increased shrub encroachment.

Aquatic Wildlife

The BA/BE discuss the Federally listed Threatened and Forest Service Sensitive aquatic wildlife species potentially occurring within or near the Phase II project area. If the project area is **not** within the geographic **and** elevation range of a species, the species was not considered further in that document. These species include: **Central Valley steelhead** (*Oncorhynchus mykiss*), **delta smelt** (*Hypomesus transpacificus*), **Lahontan cutthroat trout** (*Oncorhynchus clarki henshawi*), and **limestone salamander** (*Hydromantes brunus*). If the project area is within the geographic range **but** not within the elevation range of a species, it was not considered further in that document. These species include: **Hell hollow slender salamander** (*Batrachoseps diabolicus*), **Yosemite toad** (*Bufo canorus*), and **hardhead** (*Mylopharodon conocephalus*).

The following species are addressed further: **California red-legged frog** (*Rana aurora draytonii*), **foothill yellow-legged frog** (*Rana boylii*), **mountain yellow-legged frog** (*Rana (sierrae*) *muscosa*), and **western pond turtle** *(Clemmys (Actinemys) marmorata*).

Benefits to All Aquatic Species

Indirect Effects

Implementation of the road management portion of Alternative 1 or 3 would improve the existing condition of the road system within the project area. Road treatments would include road reconstruction and general maintenance on approximately 31 and 68 miles of road, respectively. Reconstruction and general maintenance activities typically result in a short-term (1 year) increase in sediment delivery to aquatic systems because the non-paved road surface is disturbed and fine sediment can be liberated during periods of runoff. However, these short-term increases are offset rapidly in subsequent years (up to 5 years following implementation) by fixing chronic sources of road related fine sediment. For example, roadwork can reduce inside ditch distances and reduce the length of hydrologically connected road segments through installation of water control and diversion structures (e.g. waterbars, rolling dips). Furniss and others[47] (1991) indicated that road-related fine sediment is frequently the primary source of sediment in aquatic systems from non-natural sources (such as landslide). The extent of the road treatments proposed by the project would considerably mitigate the potential contributions of fine sediment from other sources tied to the project (mechanical thinning, prescribed fire). There would be a net benefit to the habitat required by all of the aquatic species analyzed in this document. Effects to individual aquatic species of concern from implementing Alternatives 1 or 3 are discussed further.

The primary indirect effect of the Alternative 2 (No Action) is continued fine sediment routing to streams associated with the road system within the project area. Road maintenance would not occur on approximately 68 miles of road and the chronic sources of fine sediment associated with detrimental

[47] Furniss, M. J., T. D. Roelofs, and C. S. Yee. 1991. Road construction and maintenance. American Fisheries Society Special Publication 19:297-324.

runoff would not be remediated. In the absence of maintenance, the rate of fine sediment routing to streams would potentially increase in the long term as road surface gullies get larger, inside ditches incise and widen due to plugged culverts, and road crossings are at increased risk of failure during abnormal flood events. There would be a minor negative impact to all of the streams in the analysis area associated with deferred road maintenance.

In the foreseeable short- to mid-term (0 – 5 years), the composition of vegetation and fuel characteristics (loading, arrangement) on the analyzed landscape would remain essentially the same as in the existing condition. Stream and riparian characteristics would not significantly change.

In the longer term (>5 years), the area will further depart from desired conditions with regard to fire and fuel loading. The potential wildland fire spread and intensity could increase over time. However, within this time frame, however, the magnitude of risk would not be large enough to make the large-scale fire scenario a reasonably foreseeable action for aquatic species. Indirect effects on aquatic species of concern from the selection of the no action alternative will not be discussed further.

California red-legged frog (*Rana aurora draytonii*)

Direct and Indirect Effects

The California red-legged frog is a federally listed species. There have been no recent sightings (more than 30 years) of California red-legged frogs within ten miles of the project area. Since the four essential habitat elements do not occur in or adjacent to the project area, there would be no effect to the frog. The project analysis area lacks breeding and dispersal habitat. For the suitable non-breeding aquatic habitat in the North Fork adjacent to the project area, there would be no project activities that could directly or indirectly affect the non-breeding aquatic habitat or the upland habitat next to the river. Project activities in units encompassing or adjacent to the small tributaries would have negligible impact on non-breeding aquatic habitat in the North Fork Tuolumne.

Foothill yellow-legged frog (*Rana boylii*)

Direct and Indirect Effects

There is a very low risk to individual foothill yellow-legged frogs. Of the units identified in the Aquatics BA/BE (EA Appendix C, Table C-1), only unit 2250 poses moderate risk to the frog. This unit lies adjacent to Basin Creek and there would be shredding and prescribed fire planned for this unit. Mechanized equipment is not allowed within the immediate riparian zone and there would be no risk of injury or mortality from shredding brush in this unit. The only direct impact that is possible during shredding is physical disturbance as forest workers could come close to the stream and disturb individual frogs. This disturbance is expected to be relatively brief in duration (<1 week) since there is a limited amount of area between the road and the stream that can be mechanically shredded. Prescribed fire would likely occur outside of the time frame when the frogs would be present in Basin Creek. Frogs are typically active in the main stem of the creek from April to early October, while prescribed fire would occur in late fall or early spring. [Note: The portion of unit 2250 between the Cottonwood Road (1N04) and Basin Creek has been excluded from all treatment activities]. The likely adult winter refuge habitat on Basin Creek is outside of the project area. There would be no direct effects to the frog population in the North Fork Tuolumne River because project activities would occur well away (>0.5 miles) from the river.

Twelve units were identified in the small tributaries to the North Fork Tuolumne River as having a low potential to indirectly impact aquatic habitats through erosion and sedimentation processes. However, even with moderate increases in sediment it appears that the North Fork has a reasonable capacity to assimilate additional minor increases in fine sediment. This is based on the data gathered during SSI surveys which showed very low amounts of fine sediment in pool tails and pool beds as measured in the Gem Mine and Riverside reaches of the North Fork. These low values suggest additional assimilative

capacity before some level of detrimental impact occurs to frog habitat. The overall impact in the North Fork should be very minor and may not be measurable. The effect of increased sediment would first be seen in very small increases in pool bed sediments followed by increases in riffle habitat. These increases would likely have negligible effects on the frog because the critical habitat elements for reproduction include egg deposition sites and tadpole rearing habitat. Minor increases in sediment would have very little effect on either of these habitat elements. Overall, there would be a negligible effect on the suitability of the habitat in the North Fork.

There is a negligible potential that project activities in the upper watershed of Basin Creek could result in minor increases in sediment in the stream. Any increases in fine sediment would not have meaningful impacts to breeding and rearing habitat. Overall, there would be a negligible effect on the suitability of the habitat in Basin Creek.

Mountain yellow-legged frog (*Rana (sierrae) muscosa*)

Direct and Indirect Effects

Twelve units in the Hull Creek watershed (including Rush and Lily Creeks) were identified as having a low concern and one unit had moderate concerns. The units of low concern are adjacent to or encompass portions of intermittent reaches of the three streams. Forest management activities in these units have the potential to disturb the soil and create areas prone to erosion. If the eroded soil is delivered to a stream channel, then sedimentation can occur. The existing condition for Hull Creek indicates elevated levels of fine sediment in pool tails (15%), but minor amounts of fine sediment in the pools (4.5% of total pool length). Since the amount of pool habitat affected is a small percentage of length, this suggests that very little pool volume is being affected under the existing condition. Tadpole and adult occurrence is primarily concentrated in pool habitat; therefore, even minor increases in pool bed sediments would result in minor consequences to pool habitat. These impacts, reduced pool volume and loss of interstitial hiding spaces, would likely last three to five years and would begin to lessen after five years following project implementation. Lily and Rush Creeks provide very low suitability habitat due to lack of perennial water, even in pool habitats. Any increase in sediment in these streams would not affect the overall suitability of habitat in either stream. This sediment could be delivered to Hull Creek, but this deposition would occur downstream of the suitable habitat for the frog and would have no effect on the suitable habitat in Hull Creek. The unit with moderate concern is unit 3300 which is located along a perennial section of Hull Creek at the confluence of Rush Creek. In combination, the prescriptions for this unit (thin, biomass, shred, burn) have the potential to contribute minor amounts of sediment to Hull Creek. The habitat suitability is low primarily due to the presence of trout, so any increases in sediment would not reduce the suitability any further. Downstream of this unit, the habitat becomes less suitable as it drops out of the local elevation range of the frog so there would be no downstream impacts to habitat for the frog.

Six units were identified as having a low potential to affect mountain yellow-legged frog habitat in Wrights Creek. As with Hull Creek, the potential impact to habitat is associated with very minor increases in sedimentation. The existing condition indicates that the fine sediment measures, pool tail fines and pool bed sediments, were within an acceptable management range and that there is assimilative capacity for minor increases in fine sediment. The suitability of the habitat in Wrights Creek is low and any increase in sediment would not affect pool attributes to an extent that habitat suitability would be diminished.

Western pond turtle *(Clemmys (Actinemys) marmorata*)

Direct and Indirect Effects

Basin Creek is the only area where there is some concern for the western pond turtle. Unit 2250 is a shredding and prescribed fire unit that lies immediately adjacent to Basin Creek. The operation of shredding equipment near the stream poses a low risk of injury, death, or disturbance. The risk is greatest

to overwintering turtles when prescribed fire could burn through occupied habitat. The turtle buries itself into the leaf duff or under large surface objects (ex. logs) and the fire could burn through these habitat elements and injure or kill individual turtles. Ignition during the fall is riskier than spring burning because turtles typically move into the overwintering habitat prior to the onset of cold weather and return to the aquatic habitat by the end of March. The return to aquatic habitat is approximately timed to when spring ignition would occur. Basin Creek provides low suitability habitat for the turtle, so the likelihood that turtles would be present is relatively low especially when higher quality habitat is available in the North Fork Tuolumne River.

Prescribed fire in unit 2250 would have a limited duration effect on overwintering habitat, perhaps three to five years of reduced leaf duff. After this period, the leaf fall from live oaks, particularly the leaves thermally killed during fire, would build to levels suitable for supporting the overwintering behavior. The anticipated minor increases in fine sediment in the North Fork and in Basin Creek would not have a meaningful effect on pool habitat suitability. The existing condition indicates there is very little pool bed sediment and a slight increase would not impair pool volume or result in a loss of places for the turtle to hide under boulders or undercut banks.

Determinations

As documented in the Aquatics BA/BE prepared for this project, the Forest Aquatics Biologist determined that the Phase II project would have no effect on the California red-legged frog nor will the project adversely affect or destroy its habitat.

The project would have negligible direct or indirect effects to individual foothill yellow-legged frogs or western pond turtles, and the project would have negligible effect on the habitats required by the frog and turtle. Also, the project would not add any meaningful cumulative effect on either species. Therefore, it would have no effecton the foothill yellow-legged frog or western pond turtle.

Since the available suitable habitat for mountain yellow-legged frogs is assumed to be unoccupied, the project would have no direct, indirect, or cumulative effect on individual frogs, nor would it further reduce the suitability of their habitat. Therefore, the Phase II Project would have no effect on the mountain yellow-legged frog or habitats essential to its conservation.

Terrestrial Wildlife

Federally Threatened, Endangered or Candidate species protected under the Endangered Species Act (1973), and Forest Service Sensitive Species which occur, or whose habitat occurs, within the Phase II wildlife analysis area were examined to determine the potential effects to those species. The following species were considered in this project effects analysis if suitable habitat exists in the planning area within the elevation and geographic range of the species (Table 3-1).

Species occurrence information for the project area was also examined. The analysis area for considering effects to wildlife (~44,000 acres) was based on a circular “home range” buffer of 3,600 acres created around all California spotted owl PACs within the planning area (see Appendix C). The extensive network of spotted owl PACs throughout the planning area provides a biologically meaningful buffer of the planning area. This boundary provides an approximate one-mile buffer from the most recent active nest stands within occupied northern goshawk territories in the planning area. We have no documented occurrences of American marten or Pacific fisher in or near the planning area and therefore nothing to anchor an additional analysis boundary. Due to the mobility of wildlife, some species considered herein will use habitat outside this analysis area; however, this boundary is considered reasonable and will allow for meaningful analysis of effects to all species.

All Terrestrial Wildlife Species

Direct and Indirect Effects

Effects of Alternative 1 and Alternative 3 are similar with the following exceptions. Alternative 3 would accommodate the retention of more trees ≥ 20”dbh across the landscape which may benefit individuals considered herein; however, when averaged across the planning area, the benefits are considered minor. Under this Alternative 3, there would be less retention of the lower canopy structure because of the thinning prescriptions and diameter limits which may adversely affect individuals over the next 10-20 years. The effects between Alternatives 1 and 3 with respect to within stand structure and ≥ 20” dbh tree retention are a trade-off. Alternative 1 would likely result in greater within stand structure retention and Alternative 3 will likely result in greater tree retention ≥20”dbh. Potential fire behavior within stands is expected to be similar.

Table 3-1. Terrestrial animal species protected by the USFS and/or ESA, documentation of habitat and species occurrence in the project area, and effects determinations.

Federally Threatened and Forest Service Sensitive Species	Elevation and Geographic Range (Y/N)	Habitat Present (Y/N)	Occurrence Documented (Y/N)	Proposed Project Effects Determination
Valley Elderberry Longhorn Beetle (FT)	Y	Y	Y	Not likely to Adversely Affect
Bald Eagle (DM, FSS)	Y	N	N	No Effect
Northern Goshawk (FSS)	Y	Y	Y	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
Great Gray Owl (FSS)	Y	Y	N	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
California Spotted Owl (FSS, MIS)	Y	Y	Y	May Adversely Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
Willow Flycatcher (FSS)	Y	N	N	No Effect
Swainson’s Hawk (FSS)	Y	Y	N	No Effect
Wolverine (FSS)	N	N/A	N/A	No Effect
Pacific Fisher (FSS, C)	Y	Y	N	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
American Marten (FSS, MIS)	Y	Y	N	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
Sierra Nevada Red Fox (FSS)	N	N/A	N/A	No Effect
Pallid Bat (FSS)	Y	Y	N	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
Townsend's Big-Eared Bat (FSS)	Y	Y	N	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing
Western Red Bat (FSS)	Y	Y	N	May Affect Individuals, not Likely to Lead to a Trend Toward Federal Listing

FT= federally threatened, **C =** Candidate for listing under ESA, **DM =** Designated Monitoring species**, FSS** = Region Five Forest Service sensitive species, **MIS** = Management Indicator Species for the Stanislaus NF

For both Alternatives 1 and 3, potential direct effects to species in and near the planning area would be: 1) exposure to noise disturbance and added human presence from thinning, biomass, shred and prescribed burn treatments; and, 2) exposure to smoke/fire from prescribed burning. Because of the mobility of the terrestrial wildlife species considered here, the direct effects of project implementation would not likely

lead to injury or mortality of individuals. Temporary avoidance of the treatment areas is highly likely. This avoidance is expected to subside shortly after project implementation activities.

Potential indirect effects from proposed treatments include the following: The commercial and pre-commercial thinning prescriptions in natural stands are designed to retain large trees across the landscape, reduce stand densities and competition, and increase stand health, vigor and resistance to disease and drought. In the short term, there would be a reduction in canopy cover and basal area across the planning area. Treatments would likely reduce habitat suitability for certain species dependent on late seral stage forests over the next 10-50 years, based on site capability. In the long term, these treatments will lead to accelerated tree growth, increased species diversity and more resilient stand conditions.

Canopy cover reductions across the planning area are as follows: approximately 2,340 acres would be reduced to no lower than 40%, ~1063 acres would be reduced to no lower than 50%, and ~430 acres would be reduced to a canopy cover ranging from 56% to 81%. These figures represent approximately 13%, 6%, and 2% respectively, of the planning area. Fuel break canopy cover would range from 38% to 68% across ~152 acres proposed for fuel break thinning treatments. This is ~0.8% of the planning area. Basal area would be reduced to a range of 122 to 209 square feet per acre. Prescriptions would result in a variety of spacing between and clumping of trees (1 to 1 ½ crown widths apart and interlocking crowns) which will represent a more natural distribution of trees across the treatment units and the planning area. In 10-15 years, the average canopy cover in treated stands is expected to increase by ~ 10%; this will vary with site capability.

Variable spacing and clumping of trees within plantations would be implemented to reflect a more natural distribution of trees across the landscape, decrease the probability of crown fire initiation and spread, increase stand heterogeneity and accelerate the development of large trees, while keeping stand densities below the threshold for increased susceptibility to drought and insect related mortality for a period of 15-20 years.

In HRCAs within natural stands, some residual canopy cover (up to 5%) will be comprised of trees ranging from 6-12” dbh to maintain the multi-story structure of these stands and minimize impacts on wildlife species dependent on these features. This residual canopy cover is not considered part of the canopy cover estimates of 40-50% mentioned previously.

The biomass and shredding prescriptions would reduce ladder fuels and decrease the potential for stand replacing wildfire. Retention of ~10% of existing shrubs and smaller trees across all treatment units would maintain within stand structural diversity and provide continued cover and forage opportunity for a variety of wildlife species, as well as provide for natural ecosystem processes such as regeneration, erosion control and nutrient recycling. In the long term these treatments would promote a multi-aged, structurally diverse and species rich understory, which will provide for a wide variety of wildlife species.

Prescribed burning would be used as a follow up after other treatments, as needed to reduce existing surface material as well as that accumulated from biomass and shredding operations. Burning can result in a loss of habitat if the burn is hotter than expected, though this is unlikely under normal prescribed burning conditions. Burning also stimulates new growth which is palatable to a variety of wildlife as forage. In the long term, prescribed burning will enhance and maintain the effects of the biomass and shredding treatments.

Road densities within the planning area would slightly increase for the duration of project implementation. Approximately 10 miles of Forest Service roads will be closed and/or decommissioned as a part of this project, which would reduce the total mileage from ~177 miles to ~167 miles. It would result in a change from ~6.3 miles per square mile to ~6.0 miles per square mile. This is unlikely to make any significant improvement to habitat suitability overall for some wildlife species, such as the American pine marten or Pacific fisher, who show selection for habitat with low road densities. It may, however,

benefit individuals currently occupying territories where these roads are located. See direct and indirect effects for northern goshawk and California spotted owl for specific road closures.

Under Alternative 2, since no new management activities/treatments would occur in the project area, there would be no project-related disturbance and therefore no direct effects expected to terrestrial wildlife species in or near the action area associated with this alternative.

Indirect effects associated with the No Action Alternative may include a continued increase in mature natural stands with late succession conditions (large trees, dense canopy cover, and an abundance of down woody debris). As stands mature, however, this alternative would likely result at some point in a decrease in late succession conditions, as trees in overstocked stands die from intra- and interspecific resource competition. This situation could be exacerbated if drought conditions or insect infestations cause significant stress in the overstocked stands.

Under Alternative 2, plantations would not be treated and the current even spacing, even aged, homogenous stands with little species and structural diversity would remain unchanged. Perpetuating these conditions would continue to exclude many wildlife species, including Forest Service sensitive and USFWS candidate species. Stand growth is expected to slow as canopy closure, intra- and interspecific competition increases. Susceptibility of plantations to drought stress and insect infestations is expected to increase over time.

Fuels would continue to accumulate as shrubs and trees continue to grow, become decadent and die off with increased competition and natural succession. Woody debris would accumulate as trees fall adding to the existing levels that reflect nearly 100 years of fire suppression.

Since the amount of fuel in the stands would not be reduced, there is a greater potential for crown fire and increased wildland fire severity and spread than under the other alternatives. These types of wildfires would likely negatively affect the wildlife species considered in this BA/BE.

Under the No Action Alternative, the foraging efficiency for such species as spotted owls and goshawks would not be enhanced. Since the canopy cover would not be reduced through thinning, habitat quality would remain the same initially. Over time, tree mortality would likely reduce the canopy cover, thereby reducing habitat quality for wildlife species using moderately dense to dense canopied stands (goshawk, spotted owl, fisher, and marten).

Finally, under this alternative, no road construction or closures/decommissioning would occur. In general, this alternative would not provide the benefit to sensitive species of closed or decommissioned roads as would the other two alternatives. However, under this alternative, no road maintenance and/or reconstruction would occur, which would be beneficial to most sensitive species. Impacts from roads can eliminate or reduce habitat availability by further fragmenting habitat.

Bald eagle (*Haliaeetus leucocephalus*)

On the Stanislaus NF, there are two documented breeding pairs, one on Beardsley reservoir and the other on Cherry Lake (~3 and 7 miles from the project planning area respectively). The nearest potentially suitable habitat for bald eagle is at Lyons Reservoir and Pinecrest Lake, both approximately 2.3 miles from the project boundary.

Direct and Indirect Effects

This project is not likely to affect suitable habitat for bald eagles and is far enough away from potential breeding habitat that it is not likely to disturb individuals.

California wolverine (*Gulo gulo*)

Direct and Indirect Effects

Based on current literature as well as Forest Service monitoring and sighting records, it was determined that the proposed project is outside the elevation range of California wolverine. This species has not been confirmed on the Mi-Wok Ranger District and this project is not expected to affect this species.

Sierra Nevada red fox (*Vulpes vulpes necator*)

Sierra Nevada red foxes were historically found in the high elevations of the Sierra Nevada mountain range and from Mount Shasta and Lassen Peak westward to the Trinity Mountains. The Sierra Nevada red fox occurs at elevations from 4,500 feet to 11,500 feet but is most commonly found above 7,000 feet. They use forested habitats for reproduction and cover and will use open areas (grasslands, meadows, and shrublands) for foraging. The only population known to exist in recent times is found in Lassen National Park and the surrounding Lassen National Forest (over 200 miles from the project area).

Direct and Indirect Effects

The Sierra Nevada red fox has not been confirmed on the District; therefore, project effects to this forest carnivore will not be considered further.

Swainson's hawk (*Buteo swainsoni*)

Swainson's hawks occur in South America in the winter and make long distance migrations to lowland habitats in many states from Oregon to Canada as far east as Iowa, south to Texas and Mexico. Swainson's hawks breed in bottomland forests and oak woodlands in the Central Valley of California[48]. They typically forage over grasslands and agricultural fields. Swainson's hawks migrate across the Forest and have been sighted on the District in mid to high elevation meadows in the early summer and fall (District sightings records).

Direct and Indirect Effects

Suitable breeding habitat for Swainson's hawks does not exist in or near the project area; therefore, project effects to this species will not be considered further.

Willow Flycatcher (*Empidonax traillii*)

The willow flycatcher is a Region 5 Forest Service sensitive species and is designated state endangered by CDFG. The willow flycatcher is a nearctic-neotropical migrant species that breeds across North America and winters from Mexico to northern South America[49]. Currently half of the breeding population in California occurs in the Sierra Nevada. They breed in shrubby vegetation in meadow and riparian communities.

Direct and Indirect Effects

Hulls meadow is in the planning area and was identified as breeding habitat using the Sierra Nevada habitat summary[50]. Hulls Meadow was subsequently evaluated and it was determined there was not enough suitable habitat to sustain willow flycatcher. Surveys were conducted for willow flycatcher in 2002 and 2003 using Regional survey protocol (Ibid) and no detections were made on the District. There

[48] Bombay, H.L., T.M. Ritter, and B.E. Valentine. 2000. A willow flycatcher survey protocol for California. USDA Forest Service, Tahoe National Forest, California.

[49] USDA 2001. Sierra Nevada Forest Plan Amendment Environmental Impact Statement, Record of Decision, and Chapter 3, part 4. Pacific Southwest Region, USDA Forest Service, San Francisco, California USA.

[50] Breedy, E.C., and S.L. Granholm. 1985. Discovering Sierra Birds. Yosemite Natural History Association, and Sequoia Natural History Association, USA.

is no suitable breeding habitat for the willow flycatcher in the project planning area; therefore, project effects to this species will not be considered further.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

[Federally Threatened]

Surveys on the Mi-Wok Ranger District in 2004 have revealed the presence of elderberry plants with emergence holes in the Tuolumne watershed (Survey records available at District office). The project area appears to be on the fringe of the species range and only sporadic occurrences of elderberry shrubs have been documented within the Tuolumne watershed. Reproductive success of the beetle in this area is not known and is presumably limited by the distribution of elderberry shrubs. There is no federally designated critical habitat within the Phase II project; however, there is ~88 acres of potentially suitable habitat.

Direct and Indirect Effects

Indirect effects resulting from proposed treatments (Alternatives 1 and 3) would be the reduced likelihood of habitat loss due to high severity wildfire in and near the planning area. Reduced vegetative competition after shredding and burning may provide opportunity for new elderberry shrub recruits to get established, thus expanding habitat availability to the beetle. These effects are expected to be minor due to the small percentage of suitable habitat within the project area. The potential for high severity wildfire under Alternative 2 would remain the same in the short term, and likely increase in the long term.

Informal consultation was initiated on February 20, 2008; the US Fish and Wildlife Service (USFWS) was contacted regarding project design criteria (p. 33) to protect the valley elderberry longhorn beetle, a federally threatened species, and a letter of concurrence was received on April 7, 2008 from USFWS supporting the finding of not likely to adversely affect the valley longhorn elderberry beetle (letter is in the project file at the District office).

Late Successional Species

In general, several late succession species including the California spotted owl (*Strix occidentalis occidentalis)*, northern goshawk (*Accipiter gentilis*), Pacific fisher (*Martes pennanti pacifica*), American pine marten (*Martes americana*) and great gray owls (*Strix nebulosa*) depend on higher canopy cover and higher than average downed woody debris as well as a large number of snags across the landscape to fulfill various life cycle requirements. Generally, suitable habitat for these late succession species is considered $\geq$ 40% canopy cover with dominant and co-dominant trees $\geq$ 11” dbh (CWHR types 4M, 4D, 5M, 5D, and 6). There are ~11,300 acres of suitable habitat within the Phase II planning area, ~3,800 of those acres (34%) are proposed for treatment (Table 3-2).

Direct and Indirect Effects

Potential indirect effects to late succession species in and near the planning area may occur as a result of habitat alteration from thinning, biomassing, shredding and prescribed burning treatments.

Both Alternative 1 (proposed action) and Alternative 3 will result in the same CWHR designations after treatment. Approximately 3,800 acres of suitable habitat (~21% of the planning area) would have reduced canopy cover and basal area as a result of project implementation. While a net change across these five CWHR designations is not expected, habitat suitability for late succession species will be altered. In general, there will be a reduction in suitable roosting, resting and overall breeding habitat available for the next 10-50 years. Though these treated acres are still suitable habitat, they are considered to be at the low end of the suitable range for these species. For each 10-15 years, the canopy cover is expected to increase ~10% across the treatment units, dependent on specific site capabilities. Some sites with more productive soils will recover more quickly. Basal area, species and structural diversity will also increase over time, which will result in more diverse habitat conditions for wildlife.

Approximately 2,000 acres or 11% of the planning area would not be mechanically thinned and would maintain a canopy cover of ≥60%. These areas will continue to provide suitable nesting, roosting, resting and breeding opportunities within the planning area[51].

Table 3-2. Summary of CWHR habitat types (4M, 4D, 5M, 5D, and 6), acres proposed for treatment, canopy cover and basal area before and after treatment, by alternative.

CWHR Habitat Type	Acres Proposed For Treatment	Canopy Cover*			Basal Area* (square feet per acre)		
		Before (Alt.2)	After (Alt.1)	After (Alt.3)	Before (Alt.2)	After (Alt.1)	After (Alt.3)
4M	~1,450	48%	41%	45%	156	130	143
4D	~1,500	70%	51%	53%	247	161	172
5M	~450	54%	45%	48%	247	209	227
5D	~300	61%	49%	50%	278	216	231
6	~75	64%	47%	50%	273	191	214

* Weighted Average
CWHR size classes: 5=24-40”dbh, 6=Multi-storied where overstory size class is ≥24”dbh.
CWHR Density Classes (Canopy Closure): M= 40-59%, D=≥60%

Approximately 1,850acres of suitable habitat proposed for mechanical thinning under Alternatives 1 or 3 (45%) are plantation stands. These plantations are even-aged and consist of relatively evenly spaced trees with limited species diversity. Proposed treatments will reduce the canopy cover to no lower than 40% in plantations (where at least 40% cover exists). Some plantation units within HRCAs may be reduced below 50% to minimize the need for re-entry to maintain effective treatments, and to promote increased species and structural diversity as well as multi-aged stand conditions that will lead to healthy late-seral forest conditions in the long term (30+ years). A reduction in canopy cover is expected to promote development of understory herbaceous and woody vegetation[52], adding to the structural and species diversity creating microhabitat required by a variety of wildlife, both prey and predators. Both natural and plantation stands that are currently classified as CWHR size class 4 (11-24”dbh) will more quickly reach size class 5 (24-40”dbh) than if left untreated.

Prescribed burning will reduce downed woody debris while retaining the majority of the 1000 hour fuels (downed logs > 9” dbh)[53] (Anna Payne, USFS District Fuels Officer). Burning may result in snag loss; however, new snags and additional downed logs will likely be recruited. Live tree loss may also occur, which would result in snag recruitment. Prescribed burning will complement other treatments by further reducing fuel loading.

There are several design criteria that will be applied to this project in an effort to minimize adverse short-term effects and enhance long-term effects for late succession species (EA p. 37-39). Snags that are retained may serve as a food source, food cache, and nesting opportunities to several species taken as prey such as northern flickers, northern flying squirrels, ground squirrels and mice. Spotted owls great gray owls and goshawks use these structures for nesting; fisher and marten may use them for denning or resting sites. Retention across treatment units of some midsized- and large-diameter trees (≥15” dbh) that are currently in decline or have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole, mistletoe platforms, witch’s brooms) will serve as future snags and will also offer immediate opportunity for resting, roosting, nesting and denning sites required by these species

[51] Based on habitat models from California Department of Fish and Game. 2005. California Interagency Wildlife Task Group. CWHR Version 8.1 personal computer program. Sacramento, California USA.
[52] Tappeiner, J.C.; D.A. Maguire and T.B. Harrington, 2007. Silviculture and Ecology of Western U.S. Forests. Oregon State University Press. Corvalis, OR.
[53] Payne, A. – District Fuels Officer. 2008. Personal communication.

across the landscape. In maintaining these structural elements across the landscape during thinning operations, we ensure the long-term suitability of these habitats for late succession dependent species.

Retention of downed logs would maintain downed woody debris loading (emphasizing larger diameter logs) averaging 8-12 tons/acre. Cull logs and hazard trees meeting minimum dimensions would be left on site wherever feasible to reduce deficiencies. The retention of large downed woody debris or piles of smaller logs can serve as microhabitat for prey species such as mice and squirrels and will also provide potential resting or denning sites for marten and fisher.

The promotion of oaks across the landscape adds to structural and species diversity. Oaks produce acorns, a known food source for many prey species such as squirrels and grouse. Oaks also provide cavities for nesting, roosting, resting and denning used by all the late succession species analyzed herein.

Maintaining structure and cover in the understory will provide some of the microhabitat parameters required by certain prey species across treatment units. These stringers and patches of vegetation will also provide cover for species such as fisher and marten as they move across the landscape. Habitat connectivity across the planning area and landscape ($\geq$40% canopy cover) will be retained through a network of northern goshawk and California spotted owl PACs, as well as California spotted owl HRCAs, general and old forest emphasis areas. The habitat within treatment areas contributes to the landscape and are important for population viability and distribution of late succession species across their current range, and may prove important as some species (i.e., fisher) disperse into formerly occupied territories.

Potential direct effects are the same for both action alternatives. Indirect effects of those alternatives are also considered the same, based on the small biological differences resulting from the implementation of either Alternative 1 or 3, with a few exceptions:

Because of the “low thinning” and dbh limit proposed under Alternative 3, there would be less opportunity to retain the following than under Alternative 1: in HRCAs within natural stands, some residual canopy cover (up to 5%) would be comprised of trees ranging from 6-12” dbh. The idea is to maintain the multi-story structure of these stands and minimize impacts on wildlife species dependent on these features. This residual canopy cover is not considered part of the canopy cover estimates of 50% post treatment. This would add additional canopy cover, where available, to increase the average total canopy cover to as much as 55%.

With reduced opportunity to retain residual canopy cover with the smaller diameter trees (6-12”dbh) based on the lower thinning prescriptions, Alternative 3 would likely result in less understory structure than Alternative 1.

Under Alternative 3, two additional roads (2N49A and 3N23Y) would be changed from open to maintenance level 1 (ML1) – which means they would receive erosion control measures and then be closed (not decommissioned) and not maintained. These roads would remain in the system, but would only be opened up for management activities. One additional road (2N49) would be changed from open to administrative use only. The additional 3.2 miles of roads to be closed or used for administrative purposes only would further reduce road densities from alternative 1 estimate of 6.15 miles per square mile to 6.09 miles per square mile. Although these changes across the planning area are minor, those individuals occupying spotted owl territories Mount Lewis TL068 and NF Tuolumne TL057 may benefit from the reduced noise disturbance.

In summary, the implementation of the Phase II project may adversely affect habitat suitability and alter current use of habitat by individuals in or near the planning area over the next 10-50 years. Design criteria are expected to minimize some of these adverse effects in the short-term while enhancing expected long-term benefits. Both action alternatives adhere to the strategy outlined in the Sierra Nevada Forest Plan Amendment (2004) for maintaining species diversity and viability. Adverse effects resulting from this project are considered minor when weighed against the long-term benefits. Long-term benefits and improved quality of habitat for these species is expected by improving long-term tree growth rates

and stand health while reducing the risk of stand replacing wildfire. The affected area represents ~ 8.6% of CWHR habitat types 4M, 4D, 5M, 5D, and 6 currently available within the analysis area. Given the scale of the project and the effects of either action alternative, the District Wildlife Biologist has determined Alternatives 1 and 3 may affect individual northern goshawk, California spotted owl, great gray owl, American pine marten and Pacific fisher, but are not likely to result in a trend toward Federal listing or loss of viability of these species.

Northern goshawk (*Accipiter gentilis*)

Treatments are proposed in one goshawk PAC (T51-01) within the planning area. There are approximately 7,900 acres of highly suitable goshawk breeding habitat (CWHR types 4M, 4D, 5D, and 6) within the planning area and ~ 3,300 acres or 42% are proposed for treatment. Approximately 1,500 acres of those proposed for treatment are plantations.

Direct and Indirect Effects

Potential direct effects from the proposed action to goshawks in and near the planning area include: 1) exposure to noise disturbance and added human presence from thinning, biomassing, shredding and prescribed burning treatments; and, 2) exposure to smoke/fire from prescribed burning. LOP's would be implemented around each goshawk PAC in or near the planning area from February 15 through September 15 every year of project implementation which would reduce direct project effects to this species during the breeding season. Because of the mobility of this species, the direct effects of project implementation would not likely lead to injury or mortality of individuals. Temporary avoidance of the treatment areas is highly likely. This avoidance is expected to subside shortly after project implementation activities.

Potential indirect effects to goshawks in and near the planning area include: 1) habitat alteration from thinning, biomassing, shredding and prescribed burning treatments; 2) redistribution of prey across the planning area; and, 3) improved conditions for hunting and capturing prey.

Approximately 111 acres of goshawk PAC T51-01 (North Fork Tuolumne) is proposed for prescribed burn treatments to reduce fuel loading. There is one nest stand within a treatment unit (3060). A 500-foot buffer (~ 18 acres) would be flagged around the activity center, and hand treatments would be conducted to ensure retention of key elements (i.e. habitat structure) within the buffer during prescribed burn treatments. There is also a California spotted owl nest site that would be similarly buffered (see effects analysis for spotted owl for more info.). Approximately 117 acres, the portion of the unit outside the protective buffers would be prescribed burned. Unit 3060 includes 45% of PAC T51-01. Treatment would change habitat conditions such as reducing downed woody debris and shrub densities, which could affect small mammal and bird abundance and distribution in the short term (2-10 years). Treatments are expected to reduce the risk of high severity wildfire within the stand which would benefit these individuals through stand retention. Habitat characteristics (forest structure) would be unchanged in the remaining 55% of the PAC.

Reduction in the quantity and distribution of prey species favored by goshawks is expected to be minor and of short duration. Design criteria to be implemented with the proposed action such as snag, declining tree and hardwood and understory vegetation retention are expected to maintain microhabitat elements required by some goshawk prey species such as small mammals and birds. Because goshawk are shown to select stands based on forest structure, not prey abundance, effects of prey reduction are expected to be

minor and offset by the maintenance of forest structure[54]. Foraging efficiency may also be improved by opening up the understory[55].

Proposed thinning treatments would not result in a net change in total suitable breeding habitat available; however, the quality of that habitat would be reduced[56]. Post-treatment, the average canopy cover would be between 40-50%, which is considered marginally suitable for breeding (Ibid). In 20-40 years, these treatment units are expected to have suitable canopy cover (≥65%), and it can therefore be inferred that this habitat would offer marginal opportunity for nesting and roosting in the interim. Approximately 4,500 acres of 58% of suitable breeding habitat would not be thinned and would continue to offer nesting and roosting opportunities to goshawks in the planning area.

Five OHV trail segments would be closed and/or decommissioned as a part of this project: 41832E1 (.07mi), 41831B (.08mi), 41831C (.10mi), 41831D (.05mi), and 31805H (.11mi) are in and near the Camp High Sierra goshawk territory T51-18. The reduction of ~ 0.41 miles of OHV trail segments would reduce OHV access to this PAC and may benefit the individuals in this territory by reducing noise disturbance.

In summary, individuals in the North Fork Tuolumne territory may be adversely affected in the short term as described above; however, the long-term effect of reducing the risk of high severity wildfire should benefit these individuals. A 41% reduction in suitable breeding habitat across the planning area may adversely affect individuals in and near the planning area over the next 20-40 years. Individuals may benefit from the closure of ~12 miles of roads/trails. Long-term benefits across the planning area are also expected for the northern goshawk and are described in detail under the late succession species effects section.

California spotted owl (*Strix occidentials*)

Surveys for spotted owls were conducted in suitable breeding habitat within the Phase II project planning area in 2006 and 2007. Territories have been documented in this area since 1981. One new territory was discovered within the planning area (on non-National Forest System land) during surveys in 2006. A 300-acre circular PAC was established along with additional HRCA acreage in accordance with current Forest Plan Direction[57]. There are currently 12 territories partially or wholly within the planning area. Thirteen fledglings have been documented in these territories over the last 27 years. Documented reproductive output is relatively low in the planning area and can partially be attributed to the difficulty of finding nest sites and lack of survey effort. Survey efforts have varied from year to year dependent on staffing and budget, and sightings have been primarily driven by surveys in specific project areas.

Direct and Indirect Effects

There are approximately 2,570 acres of highly suitable spotted owl breeding habitat (CWHR types 5D and 6) within the planning area; ~400 acres or 16% are proposed for treatment (Table 3-3).

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[54] Beier, P. and J. E. Drennan. 1997 Forest structure and prey abundance in foraging areas of northern goshawk. Ecological Applications 7:564-571.

[55] Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rept. RM-217. Ft. Collins, CO. USDA For. Serv., Rocky Mtn. For. Range Expt. Stn.

[56] California Department of Fish and Game. 2005. California Interagency Wildlife Task Group. CWHR Version 8.1 personal computer program. Sacramento, California USA.

[57] USDA 2005. Forest Plan Direction. July 2005. Forest Service, Region 5, Stanislaus National Forest, Sonora, CA.

Approximately 434 acres of designated HRCAs are proposed for treatment. Treatments are proposed in three California spotted owl PACs and ten HRCAs within the planning area[58].

Potential direct effects from the proposed action to spotted owls in and near the planning area include: 1) exposure to noise disturbance and added human presence from thinning, biomassing, shredding and prescribed burning treatments, and 2) exposure to smoke/fire from prescribed burning. LOP's would be implemented around each of the four spotted owl activity centers in and near the planning area from March 1 through August 15 every year of project implementation, which would reduce direct project effects to this species during the breeding season. See Chapter 2 (Table 2-4) for units affected by LOP's.

Table 3-3. Acres of suitable breeding habitat for California spotted owl proposed for treatment, canopy cover and basal area before and after treatment by alternative.

CWHR Type	Acres Proposed For Treatment	Canopy Cover*			Basal Area* (ft^2/acre)		
		Before (Alt.2)	After (Alt.1)	After (Alt.3)	Before (Alt.2)	After (Alt.1)	After (Alt.3)
5D	~ 300	61%	49%	50%	278	216	231
6	~ 75	64%	47%	50%	273	191	214

* Weighted Average

CWHR size classes: 5=24-40"dbh, 6=Multi-storied where overstory size class is ≥24"dbh.

CWHR Density Classes (Canopy Cover): D=≥60%; a canopy cover of ≥ 60% is necessary to designate as CWHR 6

Because of the mobility of this species, direct effects of project implementation are not expected to lead to injury or mortality of individuals. Temporary avoidance of the treatment areas is highly likely. This avoidance is expected to subside shortly after project implementation activities conclude.

Potential indirect effects to spotted owls in and near the planning area include: 1) habitat alteration from thinning, biomassing, shredding and prescribed burning treatments; and, 2) redistribution of prey across the planning area.

Of the twelve spotted owl PACs located partially or wholly within the planning area, five have proposed treatments associated with them, TL164 (Dodge Ridge), TL260 (Lily Creek), TL141 (North Marble Mtn), TL156 (High Sierra South) and TL214 (Camp Ida).

The Dodge Ridge owl territory (TL164) was confirmed and a PAC designated in 2007. Pair occupancy was confirmed in 2006, the reproductive output is unknown. The proposed treatment would affect ~7 acres of this PAC. Because most of the owl activity, including pair detections and a pair roost site, and the most suitable breeding habitat (CWHR 5D) within the 300-acre circular PAC occurs outside unit 3180 (~188 acres), effects from proposed treatments are expected to be minor. This site would reach a CWHR size class 5 in ~20 years, several decades faster than without treatment.

The Lily Creek owl territory (TL260) was confirmed and a PAC designated in 2006. In both 2006 and 2007, pair occupancy was confirmed. Reproductive output is not known for this period. The proposed treatments would reduce the small tree component (up to 12" dbh), biomass and/or shred the understory and follow up as necessary with a prescribed burn on ~80 acres within this PAC, in order to reduce the ladder fuels currently present. Canopy cover within this portion of the PAC has dense patches; however, corrected canopy cover averages 42% across the treatment unit. Proposed treatments would reduce canopy cover slightly (to ~40%) across the unit. The PAC straddles a ridge with most activity occurring on the Northwest slope – the other side of the ridge from the treatment unit. The proposed treatment can

[58] Affected CA spotted owl PACs and HRCAs are displayed in Appendix D

alter habitat attributes, such as reducing the multi-story structure and some understory components in the short term. Treatment is not expected to materially alter habitat conditions for northern flying squirrels, the owl's main prey at this elevation[59]. Understory treatments would use retention criteria (EA, Chapter 2) to maintain some understory structure and woody debris. As a result, secondary prey such as deer mice and other rodents may be redistributed across the unit following treatment. All owl detections are outside this treatment unit. While treatments may affect individuals occupying this PAC, the adverse short-term effects are considered minor and outweighed by the beneficial effect of reduced risk of high severity wildfire in and near the unit.

Approximately 64 acres of California spotted owl PAC TL156 are proposed for prescribed burning (unit 3060); its activity center is also within the treatment unit. A 500-foot buffer (~18 acres) would be flagged around the activity center, and hand treatments would be conducted to ensure retention of key elements (i.e. habitat structure) within the buffer during prescribed burn treatments. There is also a northern goshawk nest site that would be similarly buffered (see effects analysis under northern goshawk for more info). Treatment would change habitat conditions such as reducing downed woody debris, the small tree component and shrub densities, which could affect small mammal abundance and distribution in the short term (2-10 years). Due to the nature of prescribed fire, some live trees and snags may be lost; however, snags would likely be recruited. Most 1,000 hour fuels (downed logs > 9" dbh) would be retained. Understory vegetative re-growth can be expected within a few years after treatment. Habitat characteristics would be unchanged in ~80% of the PAC. Adverse short-term effects to spotted owls from this project are considered minor and outweighed by the reduced risk of high severity wildfire which should benefit these individuals in the long term.

Prescribed burn treatment is proposed on ~11 acres of the Camp Ida PAC TL214 (unit 3232). No spotted owl detections occur within this treatment unit. Only surface fuels would be reduced in this unit; therefore, any effects to these individuals as a result of project implementation are considered negligible.

Shred and prescribed burn treatments are proposed on ~9.6 acres within the North Marble Mountain PAC (TL141). No spotted owl detections have been documented within this treatment unit (2067). Treatments are expected to alter habitat conditions such as reducing the small tree component and shrub densities, but are not expected to materially affect the small mammal abundance and distribution in this PAC due to the small amount of acres involved. Any effects to these individuals are considered negligible.

Ten of 12 spotted owl HRCAs located partially or wholly within the planning area are proposed for treatment. There are ~3,200 HRCA acres within the planning area. There are treatments proposed in ~1,850 acres or 58% of the HRCA acres outside spotted owl PACs. Approximately 350 acres are proposed for shred, hand cut and pile or prescribed burn treatments; ~865 acres are proposed for thinning trees < 30" dbh, retaining at least 50% canopy cover; and ~500 acres are proposed for thinning trees < 30" dbh, retaining at least 40% canopy cover. There are ~139 plantation acres in the Lily Creek HRCA at 38% canopy cover according to stand data. Based on current conditions, thinning of trees in unit 3260 < 30" dbh (quadratic mean diameter averages 18.2" dbh), with retention of at least 36% canopy cover across the unit is proposed. HRCAs proposed for treatments, acres, canopy cover and percent of HRCAs being treated is displayed in Table C-3 (Appendix C).

HRCA acres proposed for thinning treatments to no lower than 40% canopy cover are within plantations. Approximately 500 acres in HRCAs (all in plantations) would be thinned to ~ 40% (range 41%-44%) consistant with the Forest Plan direction (2005) which states, "in limited situations where additional trees must be removed to minimize re-entry and where 50% canopy cover cannot be retained, retain at least 40% canopy cover averaged within the treatment unit." Though the proposed treatment would temporarily reduce the canopy cover further, the increased growth rate and clumping of some trees across

[59] Verner, J., K.S. McKelvey, B.R. Noon, R.J. Guiterrez, G.I. Gould Jr., and T.W. Beck, (tech. cords). 1992. The California spotted owl: a technical assessment of its current status. Gen. Tech. Rep. PSW-GTR- 133, Pacific Southwest Research Station, USDA, Forest Service. Albany, California USA. 285 pp.

plantation treatment unit is expected to improve and accelerate stand conditions (health, diversity, structure) to a 5M in ~ 25 years.

Effects such as reduction in numbers and distribution of prey species favored by spotted owls is expected to be minor and of short duration. Design criteria to be implemented with the proposed action including snag, declining tree and hardwood and understory vegetation retention are expected to maintain microhabitat elements required by spotted owl prey species such as northern flying squirrels and rodents.

Reduction of canopy cover to 40 and 50% produces habitat of low breeding quality for spotted owls according to current literature which documents positive associations between canopy cover ≥70% and spotted owl survival and occupancy[60, 61]. Individuals have been documented using habitat with canopy cover between 40-69% both in proportion with and greater than its availability, which indicates some selection for this canopy closure [24]. Seamans[26] found a weak positive relationship between owl survival, territory colonization and forested habitat dominated by large trees with 30-69% canopy cover. These studies confirm that spotted owls use habitats with lower canopy cover; however, this use is poorly understood. It is likely, given this information, that the acres proposed for treatment would not provide suitable breeding habitat for spotted owls in the short term (10-20 years). Canopy cover within these treated areas is expected to return to pre-harvest levels in 20-40 years. Approximately 2,100 acres or 84% of highly suitable breeding habitat would not be thinned and would continue to offer nesting and roosting opportunities to spotted owls in and near the planning area.

Reduction in basal area in highly suitable breeding habitat would be reduced from an average of 278 square feet per acre to an average of 216 square feet per acre. This average is within the mean range for stands in which spotted owls have been found to forage (180-220 square feet per acre) and nest (185 to 220 square feet per acre).[24]

Approximately 4.4 miles of OHV trails and road segments would be closed and/or decommissioned as a part of this project. This reduction would reduce OHV/motorized access to these PACs and HRCAs which may benefit the individuals in these territories by reducing noise disturbance.

In summary, 5 PACs are proposed for treatment (Dodge Ridge, Lily Creek, North Marble Mtn, High Sierra South and Camp Ida). While the individuals in these territories may be adversely affected in the short term as described above, the long-term effects are expected to benefit the owls. A 16% reduction in available breeding habitat across the planning area may adversely affect individuals in and near the planning area in the short term (~20 years). Individuals may benefit from the closure of ~10 miles of roads/trails. Beneficial effects over the long term are also expected for California spotted owls and are described in detail under the late succession species effects section.

Great gray owl (*Strix nebulosa*)

There is no suitable breeding habitat that fit the criteria under this species habitat account within the planning area (CDFG 2005).

Direct and Indirect Effects

Because there is no suitable breeding habitat within the planning area and because there are no documented occurrences in the planning area over the last 12 years, direct effects are not expected.

Potential indirect effects of this project include: 1) a further reduction in canopy cover in the forested habitat surrounding Wrights creek and Hulls meadow areas. Proposed treatments would reduce canopy cover in units 3271, 3340, 3342, 3350, and 3351 from an average of 50 % to an average of 44 %

[60] Blakesley, J.A., B.R. Noon, and D.R. Anderson. 2005. Site occupancy, apparent survival and reproduction of California spotted owls in relation to forest stand characteristics. Journal of Wildlife Management 69:1554-1564.
[61] Seamans, M.E. 2005. Population biology of the California spotted owl in the central Sierra Nevada. Dissertation submitted to University of Minnesota, in partial fulfillment for PhD degree.

(weighted averages). Both average dbh and canopy cover within these units is expected to reach a closure that is suitable for nesting great gray owls in ~30-70 years. Short-term beneficial effects to great gray owls include the retention of snags and declining trees, as well as trees with desirable characteristics such as witch's brooms and large cavities or broken tops which would maintain a supply of potential nest sites. Adverse short-term effects to this species are expected to be negligible because the breeding habitat suitability designation for great gray owl is low both before and after treatment.

Long-term benefits are expected for dispersing great gray owls across the planning area as described under the late succession species effects section.

American pine marten (*Martes americana*)

Suitable habitat and potential dispersal corridors have been mapped for the American marten on the Stanislaus National Forest as CWHR types 4M, 4D, 5M, 5D, and 6 while taking into consideration road densities. The closest potential habitat from the planning area is ~ 0.4 miles to the southeast and the closest confirmed occupied habitat is ~ 3 ½ miles. Potential and occupied habitat has been mapped and can be found to the north, east and southeast of the planning area. A confirmed sighting of a marten ~ 5 ½ miles from the planning area was documented on Mi Wok District in 2006.

Even though there are no documented occurrences of marten in the planning area, CWHR habitat types 4M, 4D, 5M, 5D, and 6 are considered suitable habitat and would be analyzed for effects to marten. Using this criteria, there are approximately 11,300 acres of medium to high suitability breeding and foraging habitat for marten within the planning area and ~3,800 acres or 34% are proposed for treatment. Table 3-2 summarizes suitable habitat in the planning area, acres proposed for treatment, canopy cover and basal area before and after treatment by alternative.

The habitat rated as suitable for analysis does not account for the high road densities that occur throughout the planning area, which average 6.5 miles per square mile on National Forest lands. There are ~ 10 miles of Forest Service roads proposed to be closed and/or decommissioned as a part of this project. This would slightly decrease the road density to ~ 6.2 miles per square mile. This is still well above the recommended road densities of less than 2.0 miles per square mile for moderate to high capability marten habitat[62]

Direct and Indirect Effects

Potential direct effects from the proposed action to marten in and near the planning area include: 1) exposure to noise disturbance and added human presence from thinning, biomassing, shredding and prescribed burning treatments, and 2) exposure to smoke/fire from prescribed burning.

Thinning, biomass and shredding operations may occur during breeding and kit-rearing season. Because of the mobility of this species, the direct effects of project implementation would not likely lead to injury or mortality of individuals. Temporary avoidance of the treatment areas is highly likely. This avoidance is expected to subside shortly after project implementation activities conclude. Most prescribed burning treatments would occur in the early spring or late fall which should minimize the likelihood of disturbance from these activities during the highly sensitive kit-rearing time for marten.

Potential indirect effects may include habitat alteration from thinning, biomassing, shredding and prescribed burning treatments across the planning area.

Approximately 2,300 acres of suitable marten habitat proposed for thinning occur in natural stands. The canopy cover in ~ 1,000 acres within these units would be reduced to no lower than 50% and the canopy cover in ~1,300 acres would be reduced to no lower than 40%. Approximately 1,500 acres of suitable marten habitat proposed for thinning occurs in plantations. The canopy cover in ~1,300 acres of these

[62] USDA Forest Service. 1991. Stanislaus National Forest Land and Resource Management Plan. USDA Forest Service, Pacific Southwest Region, Stanislaus N.F., Sonora, CA.

units would be reduced to no lower than 40% and in the remaining ~200 acres, no lower than 35%. The stand data for unit 3260 indicates the existing canopy cover is 38%, not ≥40% as is indicated in CWHR (CDFG 2005). To meet our objectives of treating plantations effectively for 15-20 years would require a reduction in canopy cover to 36%. The proposed prescription would highlight clumping groups of trees with various spacing distances that would result in a more natural distribution of trees across the landscape.

Marten are known to take advantage of up to 100 different food items ranging from rodents to fish, invertebrates and fruit. Because of their opportunistic foraging style, effects such as reduction in numbers and distribution to prey species are expected to be minor and of short duration. Design criteria to be implemented with the proposed action such as snag, declining tree and hardwood and understory vegetation retention are expected to maintain microhabitat elements required by many species marten utilize such as squirrels, mice and birds.

Reduction of canopy cover to 40 and 50% produces habitat of low-medium quality for breeding marten (CDFG 2005). Marten are known to prefer stands with 40-60% canopy cover for resting and foraging, thus, this project would reduce denning/breeding habitat availability and increase resting and foraging habitat availability for marten.[63] Within the planning area there are ~3,600 acres (20% of forested habitat) with a canopy cover greater than 60%. Approximately 1,900 acres are proposed for thinning. Approximately 9% of the planning area would remain untreated and would retain ≥60% canopy cover. In addition to the amount of suitable habitat available, habitat connectivity must be considered. Marten rarely traverse areas with little or no canopy, and prefer to travel on ridge tops. The retention of at least 40% canopy cover, up to 5% additional residual canopy cover in trees 6-12" dbh, at least 10% in understory vegetation (where existing), large downed woody debris, and other natural features such as boulders should maintain connectivity between most treated and untreated units across most of the planning area immediately after treatment. Fuel breaks would retain less of these features and could present barriers that may further fragment suitable habitat available to them[64]. Retention of snags and large downed woody debris would serve to maintain key structural components required for marten resting and foraging activities and would benefit individuals in the short term (Spencer et al. 1983). Canopy cover would increase to 60% within 10-40 years after treatment. With the retention of key structural features, this habitat would be highly suitable for denning/breeding activities in the long term.

Long term benefits across the planning area are expected for dispersing marten and are described under the late succession species effects section and in the Wildlife BE prepared for this project).

Pacific fisher (Martes pennanti pacifica)

Potential habitat and dispersal corridors have been mapped for the Pacific fisher on the Stanislaus National Forest as CWHR types 4M, 4D, 5M, 5D, and 6 while taking into consideration road densities. The closest potential habitat from the planning area is ~0.4 miles to the southeast. Other potential habitat using this method can be found to the north, east, and southeast of the planning area. There are no documented occurrences of fisher in or near the project area, and they are not known to currently occupy the Stanislaus NF[65]. A new probability of detection model has been run using information collected from the Southern Sierra Fisher population and it has been determined that the forest, including the planning area, could prove important in the future regarding fisher expansion (Ibid).

[63] Spencer, W.D., R.H. Barrett, and W.J. Zielinski. 1983. Marten habitat preferences in the northern Sierra Nevada. Journal of Wildlife Management. 47(4):1181-1186.

[64] Zeiner, D. C., Laudenslayer, W. F. Jr., Mayer, K. E., and White, M. 1990. California Statewide Wildlife Habitat Relationships System. California's Wildlife. Volume III; Mammals. CA Department of Fish and Game, Sacramento, CA.

[65] Spencer, W.D., H. Rustigian, R. Scheller, and J. Strittholt. 2007. Baseline evaluation of fisher habitat and population status in the southern Sierra Nevada. Unpublished report prepared for USDA Forest Service, Pacific Southwest Region, Albany California.

Given this new information, CWHR habitat types 4M, 4D, 5M, 5D, and 6 within the planning area would be considered suitable fisher breeding and foraging habitat for analysis purposes. Using this criteria, there are approximately 11,300 acres of medium to high suitability breeding and foraging habitat for fisher within the planning area and ~3,800 acres or 34% are proposed for treatment. Table 3-2 summarizes suitable habitat in the planning area, acres proposed for treatment, canopy cover and basal area before and after treatment by alternative.

The habitat rated as suitable for analysis does not account for the high road densities that occur throughout the planning area, which average 6.5 miles per square mile on National Forest lands. There are ~10 miles of Forest Service roads proposed to be closed and/or decommissioned as a part of this project. This would slightly decrease the road density to ~6.15 miles per square mile. This is still well above the recommended road densities of 0.5 to 2.0 miles per square mile for moderate capability fisher habitat.[66].

Direct and Indirect Effects

Because fishers have not been documented in or near the planning area, direct effects from this project are not expected.

Potential indirect effects may include: habitat alteration from thinning, biomassing, shredding and prescribed burning treatments across the planning area.

Approximately 2,300 acres of suitable fisher habitat proposed for thinning occur in natural stands. The canopy cover in ~1,000 acres within these units would be reduced to no lower than 50% and the canopy cover in ~1,300 acres would be reduced to no lower than 40%. Approximately 1,500 acres of suitable fisher habitat proposed for thinning occur in plantations. The canopy cover in ~ 1,300 acres of these units would be reduced to no lower than 40% and in the remaining ~ 200 acres, no lower than 35%. The stand data for unit 3260 indicates the existing canopy cover is 38%, not ≥40% as is indicated in the CWHR model (CDFG 2005)[67]. To meet our objectives of treating plantations effectively for 15-20 years would require a reduction in canopy cover to 35%. The proposed prescription would highlight clumping groups of trees with various spacing distances that would result in a more natural distribution of trees across the landscape.

Fishers are opportunistic foragers utilizing a wide variety of food sources ranging from rodents to fruits and carrion. Because of their opportunistic foraging style, effects such as reduction in numbers and distribution of prey species are expected to be minor and of short duration. Design criteria to be implemented with the proposed action such as snag, declining tree and hardwood and understory vegetation retention are expected to maintain microhabitat elements required by many species fisher utilize such as mice, squirrels, rabbits and hares.

Reduction of canopy cover to 40 and 50% produces habitat of low-medium quality for breeding fisher (CDFG 2005). Up to 26% of fisher home ranges consist of forested habitat with 40-59% canopy cover, however, up to 71% consist of forested habitat with 60-100% canopy cover [68]. Within the planning area there are ~3,600 acres (20% of forested habitat) with a canopy cover greater than 60%. Approximately 1,900 acres are proposed for thinning. Approximately 9% of the planning area would remain untreated and would retain ≥60% canopy cover. The current availability of this habitat across the planning area is less than half of that recorded in 1 fisher home range (2,421acres/female-9,721acres/male) (Ibid). In

[66] USDA Forest Service. 1991. Stanislaus National Forest land and resource management plan. Forest Service, Region 5, Sonora, California USA.

[67] California Department of Fish and Game. 2005. California Interagency Wildlife Task Group. CWHR Version 8.1 personal computer program. Sacramento, California USA.

[68] Zielinski, W.J., R.L. Truex, G.A. Schmidt, F.V. Schlexer, K.N. Schmidt, and R.H. Barrett. 2004. Home range characteristics of fisher in California. Journal of Mammalogy 85(4):649-657.

addition to the amount of suitable habitat available, habitat connectivity must be considered. Fisher would move across areas with lower canopy cover or small openings and can even use shrub canopy for overhead cover and protection from predators. The retention of at least 40% canopy cover, up to 5% additional residual canopy cover in trees 6-12" dbh, at least 10% in understory vegetation (where existing), large downed woody debris, and other natural features such as boulders should maintain connectivity between most treated and untreated units across most of the planning area immediately after treatment. Fuel breaks would retain less of these features and could present barriers that may restrict fisher movement. Retention of larger trees, large trees in decline or with desirable characteristics (which's brooms, mistletoe platforms), all oaks, snags and large downed woody debris would serve to maintain key structural components required for fisher denning and resting[69]. Canopy cover across treatment units would increase to 60% within 10-40 years after treatment.

Long-term benefits across the planning area are expected for dispersing fisher and are described under the late succession species effects section and in the Terrestrial Wildlife BE prepared for this project.

Sensitive Bat Species – Pallid bat (*Antrozous pallidus*), Townsend's big-eared bats (*Corynorhinus townsendii*), Western red bats (*Lasiurus blossevillii*)

Though there are no documented occurrences of any of these Forest Service Sensitive bat species, the planning area is within their current ranges. Suitable roosting sites for pallid bats such as snags, live trees with crevices, cavities or other desirable characteristics occur across the planning area. Townsend's big-eared bats can also utilize these structures though it is rare. There are some buildings and other man made structures (bridges) within the planning area that are used more often by Townsend's and may serve as single or maternal roosting sites. Suitable roosting sites for western red bats such as willows and cottonwoods occur across the planning area in riparian corridors.

Direct and Indirect Effects

Because western red bats typically roost in riparian vegetation, and no treatments are expected to reduce riparian vegetation, no reduction in habitat availability is expected from this project.

Suitable pallid bat foraging habitat such as grasslands and meadows also occurs across the planning area. Townsend's foraging habitat, which includes forest edges and vegetated stream corridors, also occurs across the planning area. Red bats typically forage above the tree canopy; therefore, no effects to foraging habitat are expected.

Potential direct effects from the proposed action to bats in and near the planning area include: 1) exposure to noise disturbance from thinning, biomassing, and shredding treatments, and 2) exposure to smoke/fire from prescribed burning. Individuals may be temporarily disturbed at diurnal roosting sites during mechanical activities. Prescribed burning activities may displace individuals from roost sites; however, burning is expected to be of low intensity. Because of the mobility of these species, effects are considered minor and injury and/or death as a result of project implementation is considered unlikely.

A highly unlikely but possible exception to this would be the harvest of a tree being used as a pallid bat maternal roost. Limited mobility of young pallid bats (May-August) may render them susceptible to injury and/or death should a tree serving as a maternal roost be harvested.

Potential indirect effects to bats in and near the planning area include: 1) potential redistribution of roosting sites available, 2) reduced risk of high severity wildfire and potential habitat loss, and 3) improved flight conditions in the understory. Although pallid bats may forage in the planning area, they utilize grasslands and meadows to hunt for prey. Because no treatments are scheduled in these areas,

[69] Zielinski, W.J., R.L. Truex, G.A. Schmidt, F.V. Schlexer, K.N. Schmidt, and R.H. Barrett. 2004. Resting habitat selection by fishers in California. Journal of Wildlife Management 68(3):475-492.

foraging habitat would not be affected by this project. Townsend's bats may also forage in the planning area, but utilize vegetated stream corridors and forest edges to hunt for prey. While units 2245 and 2246 are located along a riparian corridor and thinning of some conifers is proposed, it is unlikely to effect foraging conditions for this species. Thinning treatments are primarily "thinning-from-below"; therefore, existing forest edges should not be significantly changed or new ones created, and thus no effect is expected to Townsend's foraging habitat from this project.

Conifer removal to release riparian vegetation (units 2245 and 2246) would increase the health and vigor of riparian shrubs and trees, improving habitat conditions for western red bats using this area. Proposed treatments are expected to reduce the risk of high severity wildfire resulting in retention and improved defensibility of the riparian corridors required by red bats.

Pallid bats may roost in snags that would be removed or lost because of safety issues or prescribed burn treatments. They may also roost in live trees that would be lost due to thinning operations or prescribed burning treatments. While some roosting structures may be lost, it is expected that prescribed burn treatments would result in recruitment of new snags which can provide roosting opportunities. Retention of large trees, trees with defects (broken tops, wood rot, etc.) and all snags, as well as promotion and retention of all oaks, with a few exceptions, would provide for immediate and future roosting opportunities. Proposed treatments are expected to reduce the risk of high severity wildfire resulting in retention of oak woodland and forested habitat. Biomass, shredding and prescribed burn treatments are expected to reduce obstructions to flight by opening up the understory.

In summary, individual pallid bats may experience temporary disturbance during project implementation; however, most effects from this project are expected to be beneficial in and near the planning area. Individual Townsend's bats may experience temporary disturbance during project implementation; however, indirect adverse effects to Townsend's and western red bats from this project are expected to be negligible and beneficial effects are considered minor.

Management Indicator Species (MIS)

In accordance with the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (ROD) of 2007, an MIS report[70] (summarized below and incorporated by reference) was prepared to examine the effects of this project's alternatives on the habitat of selected indicator species (Appendix C, Table C-6). The current bioregional status and trend of populations and/or habitat for each of the MIS is discussed in the Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report[71].

The following species do not have MIS designated habitat in or adjacent to the project area, and would not be affected either directly or indirectly by this project (Category 1): **Black-backed woodpecker** (*Picoides arcticus*).

The following species have MIS designated habitat in or adjacent to the project area, but would not be affected either directly or indirectly by this project (Category 2): **Yellow warbler** (*Dendroica petechia*), **Mountain quail**-early seral forest (*Oreortyx pictu*), **Sooty (blue) grouse** (*Dendragapus obscurus*), **Mule deer** (*Odocoileus hemionus*)

The MIS whose habitat would be either directly or indirectly affected by the Phase II Fuel Reduction, Forest Health and Road Management Project (Category 3) are: aquatic macroinvertebrates, **fox sparrow**

[70] USDA Forest Service. 2009 Draft Management Indicator Species Report. Phase II Fuel Reduction , Forest Health and Road Management Project. Stanislaus National Forest, Mi-Wuk Village, CA. Prepared by Marcie L. Baumbach and Steven J. Holdeman.

[71] USDA Forest Service. 2008. Sierra Nevada Forests Bioregional Management Indicator Species (MIS) Report: Life history and analysis of Management Indicator Species of the 10 Sierra Nevada National Forests: Eldorado, Inyo, Lassen, Modoc, Plumas, Sequoia, Sierra, Stanislaus, and Tahoe National Forests and the Lake Tahoe Basin Management Unit. Pacific Southwest Region, Vallejo, CA. January 2008.

(*Passerella iliaca*), **Pacific tree frog** (*Pseudacris regilla*), **mountain quail** (*Oreortyx pictu*) representing mid seral coniferous forest; **California spotted owl** (*Strix occidentalis occidentalis*), **American pine marten** (*Martes americana*), **northern flying squirrel** (*Glaucomys sabrinus*), and **hairy woodpecker** (*Picoides villosus*).

Aquatic macroinvertebrates – Riverine and Lacustrine habitat

Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition. They are sensitive to changes in water chemistry, temperature, and physical habitat. Aquatic factors of particular importance are: flow, sedimentation, and water surface shade. Flow and water surface shade are not included in the effects discussion because the extent of the vegetation treatments would not result in a measurable increase in streamflow and streamside buffers would effectively limit any meaningful reduction in stream shading.

There is no naturally occurring lacustrine habitat in the project area. There are two small ponds that formed upon construction of a dam on small tributary streams; however, these lentic features are artificial and have no reference condition for which a comparison can be made. The Phase II Project area lies within two major watersheds, the North Fork Tuolumne River and the Clavey River. The majority of the project area drains in a westerly direction to the North Fork Tuolumne River (North Fork). Wrights Creek and Basin Creek are the two primary tributary streams to the North Fork. Wrights Creek has approximately three miles of perennial channel and there are approximately 2.5 miles of perennial streams in the Basin Creek watershed inside of the planning area. For the North Fork and its small tributaries, there are approximately 18 miles of the mainstem North Fork and three miles of perennial tributaries. The remaining portion of the project lies within the Hull Creek watershed which drains in an easterly direction to the Clavey River. There are approximately five miles of perennial stream in the Hull Creek watershed inside of the planning area.

Direct and Indirect Effects

Under Alternatives 1 and 3 there is a very low likelihood that detectable increases in fine sediment would occur in the North Fork Tuolumne River or Basin Creek. The North Fork is a large river system and the small amount of sediment potentially reaching the channel as a result of project activities would not be detectable or easily traced back to project activities. In Basin Creek, only a small part of the watershed would be affected and the potential for sediment increases would be very low. Wrights Creek and Hull Creek have the greatest potential for measurable increases in fine sediment because a greater percentage of their watersheds would have management activities in them, primarily in the intermittent tributaries. There would be a minor increase in fine sediment in these two streams with a very localized consequence to aquatic macroinvertebrate habitat. An increase of 1 – 5% is possible over the existing condition, but this small increase would still be within a range suitable for the habitat supporting a diverse and abundant macroinvertebrate assemblage. Project associated road maintenance, road decommissioning, and headcut stabilization would result in a longer-term decrease in sedimentation to the perennial streams in the project area.

Under Alternative 2, there would be little change from the existing condition in the short term (<1 years). In the longer term, the road maintenance, road decommissioning, and headcut stabilization would not occur and there would be a small increase in sedimentation. Pool tail fines may increase by 1 to 2% and pool bed sediments may increase by a similar fraction.

Under all alternatives, change in sedimentation would be too small to be measured in the Phase II Project and would not alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion.

Black-backed woodpecker (*Picoides arcticus*) – Snags in burned forest

Direct and Indirect Effects

There is no MIS designated habitat for the black-backed woodpecker in or adjacent to the project area, nor would it be affected either directly or indirectly by either action alternative. Furthermore, because this project is not a fire salvage or fire restoration project, no further analysis for the black-backed woodpecker is required.

Yellow warbler (*Dendroica petechia*) – Riparian habitat

Direct and Indirect Effects

Although riparian habitat occurs throughout the project area, no changes to the deciduous canopy cover would occur. No riparian vegetation would be treated under this project. There would be some conifer removal in units 2245 and 2246 to release the riparian vegetation; this would not lead to a change in CWHR designation, therefore, no further analysis would be required for yellow warbler.

Pacific tree frog (*Pseudacris regilla*) – Wet meadow

This broadly distributed species requires standing water for breeding; tadpoles require standing water for periods long enough to complete aquatic development, which can be as long as 3 or more months at high elevations in the Sierra Nevada[72].

There are approximately 137 acres of wet meadow habitat in the planning area. There are three meadows that account for 96% of the wet meadow habitat: Fahey Meadow – 24 acres, Hulls Meadow – 31 acres, and the meadow on lower Lily Creek – 76 acres. The entire area of wet meadow is in the short herb (<12") height class on average. Portions of all three meadows are tall herb, but overall are short. Fahey Meadow and the Lily Creek meadow are in the "Dense" ground cover class and Hulls Meadow is very close to the demarcation between "Moderate" and "Dense". Meadow hydrology is compromised in Fahey and Hulls Meadow because there has been stream incision in the past. The meadow in the Lily Creek meadow is privately owned and hydrology is believed to be good.

Direct and Indirect Effects

Neither Alternative 1 nor 3 would change the amount of wet meadow acreage in the project area. Neither action alternative would result in a change of the herbaceous height class of the meadows nor would it change the ground cover classes. The vegetation management would not be extensive enough to measurably increase stream flow and there would be no meadow restoration activities in those meadows. Therefore, there would be no changes to meadow hydrology to the majority of Pacific tree frog habitat within the planning area. Meadow restoration activities are proposed surrounding Sam Williams Spring on ~1 acre. Treatments surrounding this meadow would remove encroaching conifers, restore headcuts and subsoil compacted areas, which would improve wet meadow condition in the longer-term.

Under Alternative 2, there would be little change from the existing condition in the short- or mid-term. In the longer term, there is the potential that the two headcuts in the meadows would become active and begin to degrade the meadows. If this occurs, then there could be a change in herbaceous cover class from Dense to Moderate and meadow hydrology could become altered. The alteration in hydrology would likely include a lowering of the water table which would have negative implications relative to the standing water habitats the tree frog requires.

There are currently 66,000 acres of wet meadow habitat on National Forest System lands in the Sierra Nevada. Within the last decade, the trend is stable (SNF BMIS Report). Since there would be no change

[72] CDFG (California Department of Fish and Game). 2005. California Department of Fish and Game and California Interagency Wildlife Task Group. California Wildlife Habitat Relationships (CWHR) version 8.1. Sacramento, California. On-Line version. http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp. (Accessed: January 3, 2008).

in the amount of wet meadow acreage, herbaceous height classes, herbaceous ground cover classes, or meadow hydrology, the Phase II Project would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of Pacific tree frogs across the Sierra Nevada bioregion.

Mountain quail (*Oreortyx pictu*) - Early seral coniferous forest

Direct and Indirect Effects

Although early seral coniferous forest habitat occurs in and adjacent to the project area, this habitat would not be affected by the project; therefore, no further analysis will be required for mountain quail related to early seral forest.

Sooty (blue) grouse (*Dendragapus obscurus*) – Late seral open canopy forest

Direct and Indirect Effects

Although late seral open canopy coniferous forest habitat occurs in and adjacent to the project area, this habitat would not be affected by the project; therefore, no further analysis will be required for sooty (blue) grouse.

Mule deer (*Odocoileus hemionus*) – Oak-associated hardwood and hardwood/conifer

Direct and Indirect Effects

Approximately 570 acres of habitat representative of montane hardwood and montane hardwood conifer occur in the project area and are proposed for shredding, hand cut and/or prescribed burn treatments. The hardwood component and canopy cover of all oaks at least 12” dbh (diameter at breast height) would remain. Some smaller hardwoods would be retained to the extent feasible while still meeting fuels objectives. The shrub, seedling and sapling component would be shredded, retaining a minimum of ten percent cover in understory vegetation. There would be no changes in the hardwood canopy cover or size class and the CWHR habitat type would remain unchanged; therefore, no further analysis will be required for mule deer.

Fox sparrow (*Passerella iliaca*) – Shrubland (west-slope chaparral type)

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). There are ~315 acres of shrubland habitat throughout the project area. Specific ground cover size classes are unknown (not designated in CWHR, no stand data available). There are ~3,270 acres of shrubland habitat within the analysis area. Most of these shrubland acres are mixed in with forested stands and it is difficult to quantify how many of these acres have been or would be affected by shredding treatments associated with past, present and future Forest Service SFA projects.

Direct and Indirect Effects

Up to 10% of the shrubland habitat within the analysis area could be affected by either action alternative in the short-term.

There are currently 922,000 acres of west-slope chaparral shrubland habitat on National Forest System lands in the Sierra Nevada, and within the last decade, the trend is stable (SNF BMIS Report). The change in shrub ground cover of ~ 315 acres out of 922,000 acres of habitat would not alter the existing trend in the habitat.

Under Alternative 2 (no action) there would be no change in CWHR designation; however, the potential for large-scale, stand-replacing fire would increase. This could potentially result in a short-term loss of habitat, as well as a mid-to long-term increase in total habitat available unless burned areas are reforested.

Mountain quail (*Oreortyx pictu*) - Early seral coniferous forest

Direct and Indirect Effects

Although early seral coniferous forest habitat occurs in and adjacent to the project area, this habitat would not be affected by the project; therefore, no further analysis will be required for mountain quail related to early seral forest.

California spotted owl, American pine marten and northern flying squirrel (*Glaucomys sabrinus*) – Late seral closed canopy coniferous forest

Direct and Indirect Effects

Effects to these species and/or their habitat are addressed previously in the document under the Terrestrial Wildlife discussion (p. 61-63), and in the MIS report prepared for this project.

At the Bioregional scale there are currently 994,000 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. The trend is slightly increasing (from 7% to 9% within the last decade on National Forest System lands)[59].

The change in canopy closure of 868 acres out of 994,000 acres of late seral closed canopy coniferous forest habitat in the Phase II Fuel Reduction, Forest Health and Road Management Project Area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of California spotted owl, American marten, or Northern flying squirrel across the Sierra Nevada.

Hairy woodpecker (Picoides villosus) – Snags in green forest

The hairy woodpecker was selected as the MIS for the ecosystem component of snags in green forests. Medium (diameter breast height between 15 to 30 inches) and large (diameter breast height greater than 30 inches) snags are most important. The hairy woodpecker uses stands of large, mature trees and snags of sparse to intermediate density; cover is also provided by tree cavities[73].

Direct and Indirect Effects

The retention of all snags $\geq$ 15” dbh, except where they occur in or adjacent to fuel breaks and subdivisions or where they pose a threat to human safety, would be implemented throughout the project area. The project design also calls for the retention of some mid and large diameter trees ($\geq$15” dbh) across treatment units that are currently in decline or have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole, mistletoe platforms, witch’s brooms). These types of trees would serve as future snags.

Prescribed burn treatments may result in snag loss; however, new snags and additional downed logs would likely be recruited. Live tree loss may also occur, which would result in snag recruitment.

While some snags may be lost, as mentioned above, the majority are expected to be retained and additional recruitment is expected as a result of the various treatments proposed.

Under Alternative 2, no treatments would occur. Wildfire has been a major cause of loss of snags across the Stanislaus National Forest, especially in the last 20 years. Under the No Action alternative, the risk of high severity wildfire would not be reduced, and the likelihood of stand replacing wildfires may be higher than under the other alternatives.

[73] CDFG (California Department of Fish and Game). 2005. California Department of Fish and Game and California Interagency Wildlife Task Group. California Wildlife Habitat Relationships (CWHR) version 8.1. Sacramento, California. On-Line version. http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp. (Accessed: January 3, 2008).

Bioregional monitoring data indicate that the hairy woodpecker continues to be present at these sample sites, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of hairy woodpecker populations in the Sierra Nevada is stable[74].

The small change in medium and large snags per acre on ~ 5,600 acres out of 17,600 acres in the Phase II Fuel Reduction, Forest Health and Road Management Project Area would not alter the existing trend in the ecosystem component, nor would it lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

Soil Quality

Three principles provide the basis for describing environmental consequences and actual on-the-ground risk[75] (USDA 2001). The following principles guide the maintenance of long-term soil productivity and are fundamental to the Soil Quality Analysis Standards and Soil Management Practices.

- Maintain adequate cover to protect the soil from erosion.
- Maintain levels of organic matter on the soil surface and within the soil that are sufficient for nutrient cycling and maintaining soil organisms.
- Limit the amount of area (or restore areas) where detrimental compaction or displacement of soil occurs.

A soil evaluation was prepared for this project and is hereby incorporated by reference. The following discussion describes the effects identified in that report.

Direct and Indirect Effects

Under alternatives 1 and 3, direct effects on the soil resource include soil compaction, soil displacement, soil cover alteration, and possibly some change in down log frequency (increase or decrease) for burn units. The direct effects of harvest and fuels reduction operations are variable depending on site factors (soil type, slope), and treatments (methods and equipment). Effects in order of increasing impact to soils range from Rx burning, to shred/burn, to thin/shred/burn with aerial harvest, to thin/shred/burn with tractor harvest methods.

Soil Cover for Erosion Control and Nutrient Cycling

Cover to protect the soil from erosion is expected to be more than adequate under all alternatives. Mechanical thinning would reduce cover temporarily. Soil cover, on average decreased after logging, from 93% to 83% in HFQLG thinning units[76]. Prescribed burning would reduce ground cover also, although the underburning treatments are expected to result in cool burns given the desire to avoid damage to overstory trees.

Post treatment cover is expected to be within this range on all units given the additional input of annual leaf/needle fall. A return to pre-treatment levels is likely within 2 to 3 years. This post treatment cover would also leave sufficient fine organic matter for soil nutrient cycling. Downed logs and snags are present in adequate quantity except in plantations. Frequency of downed logs may increase or decrease after Rx burning.

[74] USDA Forest Service. 2008. Sierra Nevada Forests Bioregional Management Indicator Species (MIS) Report: Life history and analysis of Management Indicator Species of the 10 Sierra Nevada National Forests: Eldorado, Inyo, Lassen, Modoc, Plumas, Sequoia, Sierra, Stanislaus, and Tahoe National Forests and the Lake Tahoe Basin Management Unit. Pacific Southwest Region, Vallejo, CA. January 2008.
[75] USDA 2001. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement. Pacific Southwest Region, USDA Forest Service, Vallejo, California.
[76] McComb, D. and R. Westmoreland. 2006. 2006 HFQLG Soil Monitoring Report. Unpublished Forest Service Report. Tahoe National Forest. Truckee Ranger District. Truckee, CA

Detrimental Compaction or Displacement of Soil

Soil compaction and displacement can be a consequence of ground-based operations. Based on monitoring of past projects and studies, approximately 15% of a thinning/biomass treatment unit is expected to be directly impacted or disturbed by skid trails[77,78,79]. In general, only a portion of the skid trail network is detrimentally compacted or disturbed. The more lightly used skid trails are typically not detrimentally compacted or displaced.

Direct effects from the Phase II action alternatives are expected to be similar – with some exceptions on the steep tractor ground. Soil displacement is expected to occur over a somewhat larger footprint; however, corrective measures or practices are called for to limit the impacts. Soil disturbance (compaction and displacement) is expected to meet percent area standards (Stanislaus Forest Plan) by applying Soil Management Practice 2, 3, and 4 to all ground-based units. Units with a high compaction and displacement hazard are identified in Table B-1 (Appendix B).

The Stanislaus NF has met Soil Quality Analysis Standards by 1) operating on high strength soils; 2) having an effective Forest subsoiling program in place; and, 3) using monitoring to refine practices and management requirements.

Both Alternatives 1 and 3 should have an indirect beneficial effect on the soil resource. Future wildfires are likely to result in fewer acres of high severity burn, compared with Alternative 2 (primarily because Alternatives 1 and 3 increase tree spacing and reduce the overall fuel profile).

The long term view is that the action alternatives (including future fuels treatments) should bring fuel loading and vegetation types more in balance with the natural fire regime, compared to no treatment. These differences are important to consider and place within ecological context, because the Stanislaus Forest has a history of large complex fires and would continue this pattern unless the nature of the forest changes.

Soil productivity at the landscape scale would probably not be maintained by options that keep fire regime and potential natural vegetation out of balance (no matter what the direct effects of logging are).

Watersheds and Water Quality

Uses of water for the Tuolumne River from its source to New Don Pedro Reservoir are municipal and domestic, irrigation, stock watering, power[80], contact and non-contact recreation, canoeing and rafting, warm and coldwater freshwater habitat, and wildlife habitat according to the Water Quality Control Plan (Basin Plan) for the Central Valley Region [81]. The uses that are relevant to project area watersheds are municipal and domestic supply, contact and non-contact recreation (i.e., swimming, fishing), freshwater habitat (coldwater fisheries), and wildlife (amphibian and aquatic reptile species).

Water quality parameters with the most likely potential to be affected by this project are water temperature and the sediment-related measures (sediment, settleable material, suspended material and

[77] Johannson, W. 2005. Soil Monitoring using GPS Measuring "footprint" of HFQLG operations. Unpublished Forest Service Report. Plumas National Forest. Quincy CA.
[78] Janicki, A. 2006. Soil Compaction Monitoring, Granite Thinning and Biomass Stewardship Contract, Unit 12-13A. Unpublished Forest Service Report. Stanislaus National Forest. Sonora, CA.

[79] Jimenez, J. 2007. Soil Compaction Monitoring, Granite Thinning and Biomass Stewardship Contract, Unit 5-78 and 5-79. Unpublished Forest Service Report. Stanislaus National Forest. Sonora, CA.
[80] Power is included as a use in the Basin Plan; however, power is not generated within the North Fork Drainage.
[81] California Regional Water Quality Control Board (CVRWQCB). 1998. The Water Quality Control Plan (Basin Plan) for the Central Valley Region. Fourth Edition. The Sacramento River Basin and the San Joaquin River Basin. Revised September 2004 (with Approved Amendments). Sacramento, CA.
http://www.swrcb.ca.gov/rwqcb5/water_issues/basin_plans/sacsjr.pdf

turbidity) in the Basin Plan. Ground disturbing activities could initiate sedimentation, and reduction of vegetation in near-stream areas could raise water temperatures. The Forest Service is responsible for meeting Basin Plan water quality objectives for these parameters.

The Hydrology Report prepared for this project (on file at the District office) describes the existing condition of affected watersheds and the potential project-related effects. All HUC 7th level watersheds are generally in good condition. At this scale, the North Fork Tuolumne River and Hull Creek have satisfactory stream morphology, riparian vegetation and aquatic habitat features. Water quality is excellent, supporting a viable resident trout fishery throughout the entire section of the river in the project area. Based on data from repeated observations of the project area watersheds and stream and riparian condition surveys, beneficial uses of water are being sufficiently met in all project area watersheds.

Despite previous timber and fuel reduction entries within these watersheds, by both private and Forest Service, conifer cover in the project area still ranges from dense to moderate with corresponding fire hazard ratings. Vegetative cover maintains soil stability and reduces sediment yield; however, dense vegetative conditions in the project area could produce severe fire effects, high tree mortality, and result in exposed and hydrophobic soils. Reducing vegetative fuels can decrease the potential severe post wildfire conditions that accelerate watershed erosion processes.

The following areas have some watershed conditions that, while not substantial at the 7th level watersheds, represent site-specific concerns:

In 1950 the Wrights Creek fire burned over 25,000 acres (~ 4,000 within the planning area); ~10 years later the Flora fire burned over 2,000 additional acres (entirely within the planning area). Following the Wrights and Flora fires, roads and railroad grades were constructed over most of the burned area to harvest burned timber and for reforestation and fire suppression enhancement purposes. Today, this landscape has road densities and stream crossings in excess of the desired condition as identified in the Central Stanislaus Watershed Assessment (CSWA 2002). Other existing sources of sediment contributory areas were identified as the Pinecrest Area, and Browne's Meadow (on private land).

Some reforestation ground-disturbing activities (i.e. windrows) are still evident throughout the affected area. Site preparation for reforestation involved large-scale ground clearing efforts during which cover was reduced to less than 20%. Although the area is showing signs of recovery, alteration of channel morphology is still evident in nearly all of the low gradient sensitive reaches within the sub-watersheds due to the effects of the fires and post-fire management activities. This is also evident on tributaries of the North Fork Tuolumne River (NFTR) within the Merrill Spring and North Fork Day Use, 8th level watersheds. These tributaries have been altered by runoff following the fires and still show some effects.

Within the project area, two headcuts were identified approximately 100 meters southwest of Sam Williams spring in unit 3282/3283. These headcuts are located within a small spring/meadow area and are being caused by upland runoff due to the effects of the fires and post-fire management activities which have altered runoff and ephemeral stream flow patterns. Although there is no evidence that the headcuts are materially advancing, they remain a threat to the meadow. In addition, there is some conifer encroachment occurring in the meadow indicating saturation conditions are changing.

Road drainage problems occur where design and/or maintenance of culverts are inadequate. Grading problems, wet season use, inadequate fill slope protection, and inadequate design of culverts and drainages increase sediment transport. Roads with inadequate drainage showed evidence of gullies and ruts in the Basin Creek watershed, specifically on Road 2N93.

Forest Road 2N93 is in a poor location. This road runs parallel to an ephemeral tributary of Basin Creek for approximately 1,300 meters and also crosses four small ephemeral streams without any developed road crossing. It was assessed that approximately 700 meters were hydrologically connected, which is 54% of the entire segment. This road has areas of chronic surface erosion.

Direct and Indirect Effects

Under Alternatives 1 and 3, localized changes in soil ground cover, duff, and litter are expected. Increases in ground cover are likely following shredding, hand cutting and some thinning operations. A decrease in ground cover and/or duff is likely following controlled underburns and pile burn operations. Due to the reduction of vegetative and litter cover that intercepts rainfall, both surface and rill erosion have the potential to increase after a prescribed fire. Although prescribed fire would be allowed to burn down towards the intermittent and ephemeral streams within the project area, ~75% of ground cover is expected to remain within 100 feet of the intermittent streams and within 50 feet of the ephemeral streams. Since most ground cover would be retained near the streams, any increased erosion from prescribed fire has the potential to be filtered out before reaching surface water.

There is a higher potential for increased runoff and sediment delivery for one to two years following all of the vegetation treatments; this potential is extended in units with tractor operations. The potential for sediment production resulting from the project is limited, primarily because implementation typically occurs and is completed before the wet season. Existing skid trails and landings would be re-used, minimizing new feature construction. As a result, the lack of infiltration on compacted landings and skid trails retained from previous timber removal activities would be improved through sub-soiling. Following operations and mitigation implementation (BMPs), these ground-disturbing processes would be minimized and mitigated to move the landscape toward recovery.

There would be hydrologic changes in canopy throughfall, plant transpiration and uptake processes from removing, shredding and burning vegetation. Canopy openings and reduced fuel loading are expected to occur in SMZs under the constraints of the BMP's Mechanized Equipment Operations in Riparian Conservation Areas (RCAs) (Appendix A). The creation of canopy openings in SMZs may favor riparian vegetative species and potentially increase available soil moisture, during otherwise high transpiration periods.

The current high fuel loading would be reduced and the current threat of large and damaging wildfire would be minimized over time. Wildfire severity would likely be reduced to the extent that watershed condition would be maintained, and adverse water quality effects would be minimal and short-term (i.e., 1-2 winters after a fire). Reduction of fuel loading in the project area may also moderate fire behavior in surrounding areas if this area is part of a larger fire, since it may help to minimize rate of spread and resistance to control.

Road condition would be improved by project-related activities designed to restore drainage function and maintain roads during the life of the project. This would reduce the threat of sedimentation to streams in and downstream of the project area during and shortly after project harvest activities occur. Also, as an indirect effect, there would be a gain of short-term and long-term benefit from improved roads and closure of non-system (user created) roads proposed within the project area.

Beneficial uses would continue to be sufficiently met in project watersheds by implementation of Region 5 Water Quality Best Management Practices and Soil Quality Standards. At both scales, 7th and 8 th Level HUCs, impacts are expected to be low with no cumulative effects degrading beneficial uses. Watershed management goals and objectives would be met as a result of this project, especially a reduction of the existing fire hazard. Compliance with CVRWQCB Water Quality Plan objectives and protection of beneficial uses of water would continue to be met. The goal to maintain watershed condition and integrity of waters and habitat would be met. Road improvements associated with the project would result in decreased sediment inputs to streams, which is a positive effect.

The District will submit a conditional waiver of waste discharge according to the California Regional Water Quality Control Board, Resolution No. R5-2005-0052 for actions implemented under this EA for timber related activities (including prescribed burns). Waivers will be applied to the following California

project watersheds (Calwater v. 2.2): Basin Creek #6536.400703, Johnnie Gulch #6536.400602, Brownes Meadow #6536.400603, Sugar Pine Creek #6536.400601, and Hull Creek #6536.400202.

Under Alternative 2 (no action), watershed management goals for this project – maintenance of water quality and watershed condition – will be met until a wildfire occurs; however, the no action alternative perpetuates the current high fire hazard. This represents a much higher risk of degradation to water quality and watershed condition than management activities that can be implemented to prevent or minimize large and damaging fires. Compliance with CVRWQCB Water Quality Plan objectives and protection of beneficial uses of water will continue to be met until a severe fire occurs. Minimizing the risk of water quality degradation by reducing the fire hazard will not be met if the "no action" alternative is selected. Additionally, the poor conditions of some road segments (e.g., 2N93, 2N47), plugged culverts and existing sediment sources are an additive adverse effect on watershed condition which will most likely continue under this alternative.

2. The degree to which the proposed action affects public health and safety.

No significant adverse effects on public health and safety are expected to result from implementation of alternatives 1 or 3. Forest Service inspectors would monitor all aspects of implementation to ensure OSHA safety regulations are being met and public safety is provided for.

Posting of cautionary signs and the temporary closing of roads, routes or treatment areas would mitigate potential safety concerns regarding recreationists and project activities.

Prescribed burning would be conducted in accordance with a smoke management plan approved by the Tuolumne County Air Pollution Control District, mitigating potential adverse health related impacts related to burning. Signs would be posted and burning would occur during favorable weather conditions, mitigating the potential for smoke to impair visibility to the extent where safety would become an issue. Under Alternative 2 (No Action), in the event of a wildfire, live and dead fuels would burn unregulated releasing particulate matter far in excess of a prescribed burn. Health concerns and visual quality could not dictate appropriate timing under a wildfire scenario, and impacts to health and visibility would substantially greater due to the increase in available fuels.

Under Alternatives 1 and 3, road treatments would provide for improved road conditions improving visibility and would mitigate potential reduction in visibility due to dust caused by treatment related activity.

The treatments anticipated in the proposed action (timber harvesting and hauling, biomassing, shredding, prescribe burning, etc.) have historically occurred on roads and near developed properties, both within the project area and more recently in areas along the Highway 108 corridor more heavily populated and heavily trafficked than the project area (Cold Springs, Long Barn, Pinecrest, South Fork area), without creating significant health/safety related problems. Given the history of forest management in the area (both public and private) it is unlikely that this project would measurably affect human health or safety.

Under Alternative 2, fire suppression capabilities would not be increased, leaving firefighters at greater risk when attempting suppression efforts relative to the proposed action. Residents and recreationists would also experience an elevated risk relative to Alternative 2 due to the more intense fire behavior expected under a wildfire scenario.

3. Unique Characteristics of the Geographic Area

Cultural Resources

A Cultural Resource Management Report (# 05-16-1293) was prepared for this project.. To summarize, this project was conducted in accordance with the provisions set forth in the "Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation, Regarding the Identification, Evaluation and Treatment of Historic Properties Managed by the National Forests of the Sierra Nevada, California"

('Sierra PA'), signed October 1996 and the *Interim Protocol for Non-Intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Projects* (annex to Stipulation IX of the Sierra PA). Protection measures identified in the Design Elements section of Chapter 2 would be applied to both historic and prehistoric sites. Due to the implementation of these measures, the District Archaeologist has made a NO EFFECT RECOMMENDATION; therefore, there would be no potential adverse effect on the cultural nature of the area.

Parklands, prime farm lands, wetlands, and wild and scenic rivers, and ecologically critical areas

This project does not contain nor would it adversely affect any parklands, prime farmlands, wild and scenic rivers, or ecologically critical areas. Wetlands are protected through implementation of the BMPs outlined in Chapter 2 and would not be noticeably adversly affected. While the project area does not contain areas designated as critical ecological areas, consideration of habitat utilized by Federally Threatened, Endangered or Forest Service sensitive species is important to determining the significance of effects and is discussed in other sections of this chapter.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

While there may be some disagreement about aspects of Alternatives 1 and 3 due to the fact that they authorize the commercial harvest of trees, the effects of the treatments described in the proposed action and the determinations of Forest Service resource specialists are not considered to be highly controversial. Treatments are within the scope of those effects examined in the Sierra Nevada Ecosystem Project Final Report[82] (SNEP) to Congress (1996) and the Sierra Nevada Forest Plan Amendment FEIS[83] (2001) and SFEIS[84] (2004). The scientific basis behind fuel reduction projects of this type is substantial, and recent analyses of the effects of completed fuels treatments support the theory. There were comments raised concerning the necessity of removing larger trees to reduce fire behavior; however, reducing fire behavior is not the sole purpose of the project. Improving forest health is also a project goal, as well as Regional direction[85]. Prescriptions designed to reduce susceptibility to drought- and insect-related mortality are consistent with the best available science[86]. Alternative 1 is similar to other projects proposed and implemented on the forest that were not appealed or litigated, and there were no issues raised during scoping to indicate that the degree to which this project may affect the human environment is likely to be highly controversial. Alternative 3 is similar to alternative 1 but less intensive.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

Silvicultural and fuel treatments as well as road treatments similar to those proposed in alternatives 1 and 3 have been implemented on the Mi-Wok and Summit Ranger Districts (which is immediately northeast of the Mi-Wok Ranger District along the Highway 108 corridor) over the past ten years, in projects such as Whiskers, Beehart, Pinecrest, Upper Cow, Fraser, Sammy, Expressway, and South 108. Based on past projects, the effects of the proposed action are neither highly uncertain nor involve unique or unknown

[82] Sierra Nevada Ecosystem Project (SNEP), Final Report to Congress, Volumes I, II, and III. 1996. Davis: University of California, Centers for Water and Wildland Resources, 1996.
[83] USDA Forest Service Pacific Southwest Region. 2001a. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement. Sacramento, CA, 95814.
[84] USDA Forest Service Pacific Southwest Region. 2004 Sierra Nevada Forest Plan Amendment. Supplemental Environmental Impact Statement. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.
[85] Blackwell, J. A. 2004. Sierra Nevada Conifer Forest Density Management for Multiple Objectives. Letter to Forest Supervisors and Directors July 14, 2004. Pacific Southwest Region, USDA Forest Service, Vallejo, CA.
[86] USDA Forest Service 2008. Silviculture/Forest Health Report – Phase II Fuel Reduction, Forest Health and Road Management (Unpublished). Stanislaus NF, Mi-Wok Ranger District, Mi-Wuk Village, CA. Prepared by Michael Jow, District Planning Forester.

risk. The design elements of the proposed action have been successfully implemented on past projects to mitigate potential adverse effects associated with these types of treatments. Limiting the thinning in Spotted Owl PAC to trees 12 inches dbh and smaller further reduces the potential impact. Given determinations in the Aquatic Wildlife BA/BE, Terrestrial Wildlife BA/BE, and Botany BA/BE, the risk associated with this project would be that it may affect individual Forest Service Sensitive species, but is not likely to lead to a trend toward federal listing. Federally listed species may be affected but not likely adversely affected. These determinations, along with past experience indicate that this project doesn't involve uncertain, unique or unknown risks.

6. The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about a future consideration.

Alternative 1 or 3 would not establish a precedent for any future actions with significant effects. The treatments proposed under the action alternatives are not new or unique in type, size or intensity and are consistent with all laws, regulations and policy including the Forest Plan as amended. This decision only applies to the project area and does not represent a decision in principle about a future consideration. All future actions except those analyzed and incorporated into the proposed action would be analyzed on their own prior to implementation.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

Effects of past, present and reasonably foreseeable future actions (both private and public) were considered along with the effects of the alternatives to determine if any cumulatively significant effects may exist. The Biological Assessments and Biological Evaluations (botany and wildlife) considered cumulative impacts to Threatened, Endangered, and Forest Service Sensitive species. These reports are incorporated by reference and available by request. The determinations were that both action alternatives – taking into consideration past, present and reasonably foreseeable future actions – may affect individual Forest Service sensitive species, but are not likely to lead to a trend toward federal listing. Cumulative effects were also analyzed and described in other resource reports referenced earlier in the discussion of effects (Sec. 3.2.2). Below is a summary of those reports with respect to cumulative impacts.

Cumulative Effects to Air Resources

All burning activities are coordinated with the state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion of emissions. Therefore, although burning would contribute to cumulative effects, the effects are not expected to exceed state and local air quality standards.

Cumulative Effects to Global Climate Change

As greenhouse gas (GHG) emissions are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with any number of particular projects. Nor is it expected that such disclosure would provide a practical or meaningful effects analysis for project-level decisions.[87]

[87] USDA Forest Service. 2009. Climate Change Considerations in Project Level NEPA Analysis. National Direction on Considering Climate Change in Land Management and Project Planning. January 13th 2009. http://www.fs.fed.us/emc/nepa/climate_change/index.htm. (Last Accessed 03/11/2009)

Cumulative Effects to Soil Resources

Cumulative effects are primarily focused on how the proposed ground-based treatments would add to existing or legacy disturbance: effects of proposed ground-based activities plus existing condition minus corrective/restoration requirements equals cumulative effects. [88]

In general, the proposed ground-based treatments would increase levels of compaction and displacement. If the cumulative impact is greater than 15% areal disturbance and is it considered detrimental, a cumulative soil effect is likely.

Plantation units were found to have the highest level of past disturbance, followed by some existing fuelbreak units. The natural stands that were selective cut and are now proposed for thinning have less soil disturbance in general. Many of the plantations (although not all) are close to threshold or over threshold relative to a cumulative soil effect. The soil mitigation practice 4 (EA p. 34-35) is designed to reduce further impacts on the units with steeper slopes and thinner soils.

The Wrights Creek plantation units were windrowed in the 1950s and 1960s to clear brush and woody debris in preparation for planting trees. Although this practice was successful in establishing a forest of trees, topsoil was stripped and piled along with the brush and woody debris. The cumulative soil effect would be variable depending on original soil quality and amount of topsoil removed. The overall disturbance (impact on soil productivity) is considered to be less on sites with deeper soils.

While legacy impacts would remain, application of soil mitigations practices described in Chapter 2 (p. 33-35) would ensure that there would not be a substantial increase in detrimental impacts. These practices, along with the Stanislaus NF soil monitoring program should ensure that Soil Quality Standards are met on the forest.

Cumulative Effects to Water Resources

Watersheds were evaluated at the 7th and 8th level HUC (Hydrological Unit Code) in order to analyze potential impacts at the appropriate scale (Appendix A, figure 1 and 2). All past, present and reasonably foreseeable actions (public and private) potentially affecting watersheds within the analysis area were evaluated. A default threshold of 12-14% was used to determine the threshold of concern[89]. As noted previously, given the size and intensity of the treatments, effects at a larger watershed level are hard to perceive and potential impacts may be lost due to analysis at those scales. Alternatives 1 and 3 were considered to have the same cumulative watershed effects based on the ERA (equivalent roaded acreage) methodology (Appendix A).

Upper North Fork Tuolumne River

Within the 7th and 8th level HUC watersheds analyzed, the ERA index is elevated to a maximum of 10.53% in the Upper North Fork Tuolumne River – Pinecrest (7th Level HUC) in 2011. This is the maximum ERA value within the UNFTR. Although the ERA value is approaching the threshold of concern, repeated observations of the North Fork Tuolumne River main stem show satisfactory stream morphology, bank stability, riparian vegetation, and aquatic habitat features. Repeated observations of this watershed are showing that beneficial uses of water are being sufficiently met. ERAs gradually decrease after 2011 as all the proposed and future project treatments are being completed. Also, there are no known activities in this watershed that would noticeably increase ERAs in the future.

[88] There are no foreseeable future actions impacting the soil resource.

[89] USDA Forest Service 2008. Hydrology Report – Phase II Fuel Reduction, Forest Health and Road Management (Unpublished). Stanislaus NF, Mi-Wok Ranger District, Mi-Wuk Village, CA. Prepared by Fernando Perez, District Hydrologist.

Lower North Fork Tuolumne River

ERA values are well below the threshold of concern (12-14% ERA) at the 7th Level HUC scale (highest level is ~60% of the threshold of concern). Although the ERA value is a little more than half of the threshold of concern, the planned vegetation treatments are well distributed over time and space. ERAs gradually decrease after 2014 as all the proposed and future project treatments are being completed. Also, there are no known activities on the private land in these watersheds that would noticeably increase ERAs in the future.

West Clavey River

ERA values are below the threshold of concern (12-14% ERA) at the 7th Level HUC scale (about 77% of the threshold of concern). Although the ERA value is high related to the threshold of concern, the planned vegetation treatments are well distributed over time and space. ERAs gradually decrease after 2010 as all the proposed and future project treatments are being completed. The four 8th Level HUCs within the Hull Creek – West Clavey River (7th Level HUC) have ERA values between 8.69% and 10.63%. There are no known activities in these watersheds that would noticeably increase ERAs in the future.

Summary

In summary, none of the watersheds analyzed for this project are currently approaching the threshold of concern (TOC). Results of the field evaluation validate the ERA model prediction that the action alternatives, in conjunction with other past and reasonably foreseeable future activities in the project watersheds, are not expected to result in adverse cumulative watershed effects. Planned vegetation treatments have been well distributed over time and space in order to have a low risk in triggering a cumulative response. Additional information on watershed cumulative effects related to this project can be found in the Hydrology Report prepared for this project (on file at the District office).

Cumulative Effects to Aquatic Species

Cumulative effects of alternatives were evaluated for federally Listed or Forest Service Sensitive species, and Forest Management Indicator Species (MIS), and documented in the Aquatics BA/BE prepared for this project. Cumulative effects and determinations by the Forest Aquatics Biologist are summarized below. Alternatives 1 and 3 are considered to have equivalent impacts on aquatic resources.

California red-legged frog

Since the four essential habitat elements of the **California red-legged frog** do not occur in the project area or within the project impact zone, there would be no direct, indirect, or cumulative effects to individuals or to habitat under Alternative 1 or 3

Foothill yellow-legged frog

In the North Fork Tuolumne River, implementing the Phase II project would have a negligible cumulative impact to the foothill yellow-legged frog or its habitats. There would be no direct impact to individuals or habitat. There would be negligible indirect impact to habitat in the North Fork resulting from increased sedimentation. At the 7th level HUC, the only other Forest Service action occurring within the analysis area is the South 108 Fuel Reduction, Forest Health and Road Management Project (South 108). South 108 is being implemented on the west side of the North Fork and there are numerous treatment units that drain into the North Fork. It was anticipated that this project would contribute minor amounts of fine sediment to the river during thinning and prescribed fire treatments. The potential for effects of the South 108 project was accounted for in the CWE modeling, and the existing condition for fine sediment in the North Fork indicates there is enough assimilative capacity to sort this fine sediment without having a detrimental impact to the habitat elements required by the frog.

A portion of the Upper Hull Allotment (livestock grazing) overlaps with the small tributaries that feed the North Fork Tuolumne River. Livestock grazing is likely contributing negligible amounts of sediment to the 7th level HUCs.

In the Basin Creek watershed, there are several Forest Service vegetation management projects in an early planning phase. The Murphy Peak Project and Walton Cabin Springs/Bear Springs/Hunter Project are scheduled for planning and analysis in 2010, but there has been no extensive initial planning that would guide an analysis of effects.

The portion of the Basin Creek watershed affected by the Phase II Project overlaps the Duckwall Allotment which permits livestock grazing. Livestock tend to congregate in the vicinity of the breeding habitat that has supported documented recruitment of frogs in Basin Creek. Livestock impacts to habitat were moderate in a very small area; however, this area coincides with the breeding habitat. At the occupied watershed scale, this impact is negligible but at the very local scale of frog breeding habitat, the impact is moderate. The life stages potentially affected by livestock include tadpoles and post-metamorphic frogs that have begun their semi-aquatic life phase.

There is moderate recreational use of Basin Creek in the vicinity of the breeding habitat. Basin Creek has been stocked with hatchery trout by California Department of Fish and Game and the availability of catchable trout encourages camping and fishing at the breeding habitat. The use is seasonal, but occurs during breeding and while tadpoles are present. Personal observations indicate the tadpoles are fairly effective at avoiding direct impact by a wading angler, but some mortality may be incurred as anglers step on substrates that are being used as a refuge by the tadpoles. There is a possibility that the presence of people during the active breeding season (visitation primarily on the weekends) may have an effect on breeding success; however, little is known about how the frog reacts to physical disturbance during breeding. Since there is some unknown, it is assumed that recreational use of this area has a minor to moderate effect on the frog.

Overall, there would be a negligible to minor cumulative effect on the frog and its habitats in the North Fork Tuolumne River. There would be a moderate cumulative effect on individuals in Basin Creek and a minor cumulative effect on habitat in Basin Creek.

Mountain yellow-legged frog

In the Wrights Creek and Hull Creek watersheds, the past and future vegetation management actions were reviewed and none were considered likely to contribute cumulative effects to the stream. These watersheds include portions of the Upper Hull and Lower Hull Allotments. The impact to frog habitat is minor to moderate with the primary impact being increased fine sediment associated with unstable streambanks. The impact of the grazing in these reaches of mountain yellow-legged frog habitat is having little impact on suitability due to the low elevation and presence of non-native, predatory fish.

Overall, implementation of the Phase II Project would add little cumulative effect to the habitat of the mountain yellow-legged frog. The very long term (>20 years) trend in habitat is expected to be upward as the rest – rotation grazing system continues to be implemented.

Western pond turtle

The past and future vegetation management projects were reviewed and none of the projects were identified as having a potential to cumulatively impact western pond turtle habitat in either the North Fork Tuolumne River or Basin Creek. As with the foothill yellow-legged frog, there is no indication from CWE modeling that the integrity of the stream would be compromised because the threshold of concern would not be approached. The South 108 Project is being implemented on the west side of the North Fork, but the activities associated with that project would have negligible impact on aquatic, nesting, or overwintering habitat. The projects proposed in Basin Creek are too early in the planning process to

allow for meaningful analysis. The habitat suitability in Basin Creek is low due to natural factors and the cumulative stressors would not be sufficient to further reduce the suitability of the habitat.

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)

As documented in the Phase II Project MIS report, the Forest Aquatics Biologist has determined that, based on the existing condition, the extent of impact anticipated from the vegetation management portion of the proposed action, and the benefits achieved through road maintenance, there would be no meaningful increase in fine sediment in the streams in the project area. There is the potential that fine sediment values would decrease over a longer term (>10 years). The existing condition suggests there is additional capacity for these streams to assimilate small increases in fine sediment without adversely compromising aquatic macroinvertebrate habitat.

Cumulative Effects to Terrestrial Wildlife Species

The analysis area for considering cumulative effects to wildlife (~44,000 acres) was based on a circular "home range" buffer of 3,600 acres created around all California spotted owl PACs within the planning area (see Appendix C). The extensive network of spotted owl PACs throughout the planning area provides a biologically meaningful buffer of the planning area. This boundary provides an approximate one-mile buffer from the most recent active nest stands within occupied northern goshawk territories in the planning area. We have no documented occurrences of American marten or Pacific fisher in or near the planning area and therefore nothing to anchor an additional analysis boundary. Due to the mobility of wildlife, some species considered herein will use habitat outside this analysis area; however, this boundary is considered reasonable and will allow for meaningful analysis of effects to all species.

Cumulative Effects Common to Old Forest Associated Species

Phase II treatments under Alternatives 1 and 3 would affect ~3,800 acres or 8.6% of CWHR habitat types 4M, 4D, 5M, 5D, and 6 available across the analysis area (for map see Appendix C, Figure C-1). Past, present, and reasonably foreseeable activities in the Phase II area and which have the potential to affect the species considered in this analysis are mechanical treatments on public and private land, prescribed burns, grazing, and recreational activities. These activities have occurred, are occurring, or would occur whether the Phase II project is implemented or not. Natural events such as wildfire have occurred in this area in the past, and some level of wildfire is likely in the future.

There are three fuel reduction projects on National Forest System land within the analysis area that are currently or will soon be under contract. These projects, Sampson, Strawberry and South 108, are primarily located within the WUI. Approximately 2,100 acres (only a portion of the total planning areas for these projects) would be treated within the analysis area for Phase II. Treatments include thinning, biomass, shredding and prescribed burning. Potential general effects from these projects on the habitat for the species using late succession forests (goshawk, spotted owl, great gray owl, fisher, and marten) are: a reduction in habitat quality for 10 to 50 years; an opening up of the understory, possibly increasing foraging efficiency for the spotted owl and goshawk; and, more rapid development of late seral conditions; increased protection/defensibility from high severity wildfire. These types of effects are discussed in the previous section analyzing direct and indirect effects of the Phase II proposed action.

For projects planned for 2009 and beyond, units and prescriptions have not yet been determined. A step in the SFA process was to develop Strategically Placed Area Treatments (SPLAT's) within planning areas. While the locations SPLAT's will change as planning proceeds, the acreage of the SPLAT's reflects to some extent the amount of land that could be treated. Table 3-4 shows the projects that overlap with the Phase II analysis area, and the acreage proposed within each of those projects. (NOTE: Some planning areas extend outside the analysis boundary. The total acres proposed for treatment listed here will likely extend beyond the analysis boundaries as well.)

Table 3-4. Future SFA projects on National Forest System land in the wildlife analysis area.

Year	Project	SPLAT Acres
2009	Two Mile	~2100
2010	Murphy, Matsen, Paper Cabin	~2200
2011	Dodge Meadow	~600
2013	Faust	~1500
2013	Basin	~500

While the prescriptions have not been determined, the mix of treatments would be similar to that proposed in the Phase II project: pre-commercial and commercial thinning, biomassing, shredding, and prescribed burning. The effects are expected to be similar to those from the Sampson, Strawberry, South 108 and Phase II projects.

There are several Forest Service projects recently completed or scheduled within the analysis boundary. Table 3-5 lists the types of treatments similar to Phase II, and acres associated with those treatments.

Table 3-5. Summary of activity on Forest Service System land within the analysis area.

Year Completed	Project Name	Type of Activity	Acres Treated
In Progress	Sammy	Commercial Thinning, Biomass	870
2004	South Dodge	Commercial Thinning	210
2003	West Sheer	Commercial Thinning	440
1996	Tract 50	Commercial Thinning	250
Total Acres			**1770**

Private lands on the District have undergone past harvesting of differing intensities. Timber harvest activities on private land have resulted in a reduction in mature forest habitat available in the Phase II analysis area. Table 3-6 summarizes private timber operations, treatment types, and acres harvested within the analysis area from 1992-2007.

Table 3-6. Summary of past, present and future private timber harvest plans, within the Phase II analysis area from 1992-2007.

Year	THP #	Harvest Type	Total Acres Harvested
1992	27, 56, 57, 88, 91	CMTH, SLCN, TRAN	634
1993	55, 68, 72, 77, 96, 98	CMTH, SLCN, STSC	1,280
1994	4, 5, 29, 211	ALPR, SHRC, SLCN, STSC	501
1995	107, 129, 169	CLCT, SASV, SLCN, STRC	803
1996	6	CLCT, CMTH, SASV, SLCN	406
1997	115, 122	CLCT, CMTH, SHRC, SHSC, SLCN, STRC, TRAN	1,465
1998	12, 100, 128	CLCT, SHRC, SLCN, TRAN	153
1999	13, 63	CFB, SLCN	199
2002	25, 94	ALPR, CFB, SLCN	119
2003	69	ALPR, SLCN, STSC	131
2005	1, 27, 50	CFB, SLCN	135
2007	36	ALPR, CMTH, SLCN, STRC	537
Total acres			**6,363**

Prescription types[90]: ALPR=Alternative Prescription, CMTH-Commercial Thin, CLCT-Clear-cut, CFB=Commercial Fuel break, SHRC=Shelter wood Removal Cut, SHSC=Shelter wood Seed Cut, SLCN=Selection, STSC=Seed tree seed cut, STRC=Seed tree removal cut, TRAN= Transition

Commercial timber operations affect the species that use forested habitats, especially when that type of habitat is removed or its quality reduced. Approximately 14% of the analysis area (1992-2007) has or will be treated under existing THP's. Similar timber harvest activities are expected to continue in the future. Where the harvest is other than thinning (i.e., clear-cut), future harvests are expected to further fragment late-seral habitat, making National Forest System land increasingly important from the standpoint of maintaining late succession habitat and connectivity across the landscape for associated species.

Prescribed burning has and will continue to occur within the analysis area. Burning can create snags and so contribute to the downed woody debris component of habitat. The burns can open up stands, increasing forage efficiency and speed up the growth of trees, thus improving habitat for the species using the late succession habitats. Burning can also eliminate habitat if the burn is hotter than prescribed. Because of the conditions under which the burns take place, little habitat is normally lost.

Wildfire has been a major cause of loss of late succession forested habitat on the Stanislaus National Forest, especially in the last 20 years. A few examples of potential habitat loss for species that use mature forest habitat from wildfire in untreated stands lie within and adjacent to the project area; the Wrights Creek and Flora fires, which were stand replacing events, eliminated mid and late succession forested habitat across ~14,000 acres of the North Fork Tuolumne within the analysis area. Conditions aren't expected to return to mid-late succession for 75+ years.

There are ~10 miles of roads/trails proposed to be closed and/or decommissioned as a part of this project. This would result in a reduction of road miles per square mile across the analysis area. The Stanislaus National Forest is currently in the process of route designation. The proposed road/trail closures are consistent with the proposed action in the route designation DEIS. There are ~8 miles of road to be closed/decommissioned under the South 108 project. Closing and/or decommissioning roads/trails across the analysis area is expected to benefit sensitive wildlife species considered herein. The closure/decommissioning of ~18 miles of roads/trails across the planning area would reduce the miles of total road per square mile from ~7.3 (across all ownerships) to ~7.0, or from ~5 (Forest Service roads only) to ~4.7. While these numbers are still well above those recommended for some late seral species such as the fisher and marten, the Phase II project would contribute to the reduction of some of the disturbance and fragmentation caused by roads across the analysis area

When combined with effects of past, present and foreseeable projects similar to the proposed action, the Phase II project would contribute cumulatively to a local reduction in the quality and quantity of available habitat for northern goshawk, California spotted owl, Pacific fisher, American marten and great gray owl breeding habitat on an estimated 3,800 acres or 13% within the analysis area. Generally, effects such as a reduction of some old forest habitat components (canopy cover, shrub and small tree densities, downed woody debris) would result from management treatments designed to reduce fuels densities. These treatments are expected to reduce the risk of high severity, stand replacing fire while increasing stand health and vigor.

The beneficial effects to late succession species of this project may be cumulative to the beneficial effects achieved for species since the application of California Spotted Owl Interim Guidelines[91] (1993). The result has been retention of larger trees and denser stands across the landscape. Our current Forest Plan continues to require retention of these habitat aspects as well.

[90]California Dept of Forestry and Fire Protection. 2008. California Forest Practice Rules. p41-56. http://www.fire.ca.gov/resource_mgt/resource_mgt_forestpractice.php

[91] USDA Forest Service. 1993. California Spotted Owl Sierra Province Interim Guidelines. Pacific Southwest Region, USDA Forest Service, San Francisco, California USA.

This project may cumulatively and adversely affect habitat for species using late succession, moderate to dense canopied habitat in the short term; however, Zielinski[92] states, "If canopy closure is reduced below an acceptable threshold it can recover relatively quickly". The short-term reduction in quality of this type of habitat would be largely offset by the expected benefits such as increased defensibility against wildfire, improved stand health, and a reduction in insect infestation in and near the project area which reflects desired conditions set forth in our Forest Plan direction (2005). The cumulative effects of this project over the long term are expected to be beneficial to late succession species.

In summary, the combination of past Forest Service timber harvests, past and future private timber harvest and wildfires have cumulatively reduced the amount of late succession habitat available across the Stanislaus National Forest, including private in-holdings. The Phase II project and other past, present and proposed projects that are a part of the SFA fuels treatment plan are designed to prevent further, large-scale loss of mature forest. These are also designed to retain and develop those key components important to and required by species dependent on this habitat. These projects generally reduce suitability, adversely affecting individuals in the short term to attain benefits for these species in the long term.

Cumulative Effects to Sensitive Bat Species

Past, present and foreseeable future Forest Service projects in the analysis area are summarized in tables 15 and 16 and effects from these projects are likely similar to those described above. The incremental contribution of this project combined with effects from other projects in the analysis area is expected to be mostly beneficial although minor. Beneficial cumulative effects include unobstructed flight paths in the understory and the reduced risk of high severity wildfire, which would serve to maintain suitable habitat for bat species into the future.

Timber harvests on private land have and will continue to eliminate long-term habitat for the pallid bat. Wildfires have and will continue to reduce roosting habitat opportunities while simultaneously creating foraging opportunities for pallid bats. Cumulative effects to the pallid bat associated with the Phase II project are expected to be minor.

Cumulative effects to the Townsend's associated with the Phase II project are also expected to be minor. Beneficial cumulative effects include unobstructed flight paths in the understory and the reduced risk of high severity wildfire, which would serve to maintain foraging habitat for this species and make manmade structures used for roosts more defensible against wildfire.

Past, present and foreseeable future Forest Service projects in the analysis area may improve riparian conditions by removing encroaching conifers. The incremental contribution of the Phase II project would be minor, but is expected to benefit this species. Wildfires have and will continue to threaten riparian corridors; however, this project should increase defensibility of riparian habitat important to this species. Cumulative effects to the western red bat associated with the Phase II project are expected to be minor.

8. The degree to which action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

As discussed previously, a Cultural Resource Management Report (# 05-16-1293) was prepared for this project. That report determined that implementation of the proposed project (with its design elements) would have no adverse effect on historical resources. Pursuant to the Sierran PA and 36 CFR 800, several historic-era sites were evaluated and determined by the Forest to be ineligible for inclusion on the National Register of Historic Places. Therefore, the implementation of this project would have no adverse effect, including cumulative effect, on these historic properties.

[92] Zielinski, W.J., R.L. Truex, G.A. Schmidt, F.V. Schlexer, K.N. Schmidt, and R.H. Barrett. 2004a. Resting habitat selection by fishers in California. Journal of Wildlife Management 68(3):475-492.

The Tuolumne band of the Me-Wuk Indians was informed of the Proposed Action during annual tribal consultation meetings and again during scoping. No cultural issues, concerns or comments were brought forth.

There are no scientific research sites that may be affected by the proposed action, nor is there any indication that this project would affect any scientific resource.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the endangered Species Act of 1973.

Aquatic Wildlife

An official list of Federal Endangered and Threatened Species was obtained from the Sacramento U. S. Fish and Wildlife Office website (http://www.fws.gov/sacramento/es/spp_lists.htm) on April 22, 2008. The document number is 080422100956 and covers the following quadrangles: Duckwall Mountain (457A), Tuolumne (457B), Twain Harte (474C), and Hull Creek (474D). An aquatic wildlife Biological Assessment/Biological Evaluation[93] was prepared for this project and is on file at the District office. The following determinations were made by the Forest Aquatics Biologist and documented in the Aquatics BA/BE:

The Phase II Fuel Reduction, Forest Health and Road Management Project will have **no effect** on **Central Valley steelhead**, **delta smelt**, and **Lahontan cutthroat trout** because the project area is **not** within the geographic **and** elevation range of these species. The California red-legged frog does contain habitat within or near the project area and was considered.

California red-legged frog

The project area lies in an area previously determined to be Critical Habitat (Federal Register volume 66, number 49), but this designation was exempted in subsequent Critical Habitat final determinations (Federal Register, Volume 71, Number 71). Four distinct habitat elements were identified as comprising suitable habitat for the frog (Federal Register 2001, USFWS 2002, Federal Register 2004, Federal Register 2006) which included aquatic breeding habitat, aquatic non-breeding habitat, upland habitat and dispersal habitat. The Phase II project analysis area lacks breeding and dispersal habitat. For the suitable non-breeding aquatic habitat in the North Fork adjacent to the project area, there would be no project activities that could directly or indirectly affect the non-breeding aquatic habitat or the upland habitat next to the river. Project activities in units encompassing or adjacent to the small tributaries would have negligible impact on non-breeding aquatic habitat in the North Fork Tuolumne.

The Phase II project is consistent with Forest Plan Direction and the Aquatic Management Strategy and would not destroy or adversely modify critical habitat. Regulations at 50 CFR 402.2, define destruction or adverse modification as ‘‘a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to: Alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.’’ Therefore, it was the Forest Aquatics Biologist’s determination that the Phase II Fuel Reduction, Forest Health, and Road Management Project would have **no effect on the California red-legged frog nor will the project adversely affect or destroy its habitat**.

Terrestrial Wildlife

On January 17, 2008, the USDI Fish and Wildlife Service website (http://sacramento.fws.gov) was accessed to obtain a list of threatened and endangered species and species proposed for listing that may

[93] USDA 2009. Aquatics: Biological Assessment/Biological Evaluation for the Phase II Fuel Reduction, Forest Health and Road Management Project. Prepared by Steven J. Holdeman, Forest Aquatics Biologist.

occur in or be affected by projects in the Phase II project area. The list is dated January 17, 2008, and can be found in the project record for Phase II (Document Number 080117022559). The terrestrial species list includes the valley elderberry longhorn beetle, a threatened species and the Pacific fisher, a candidate species.

Valley elderberry longhorn beetle

Informal consultation was initiated on February 20, 2008; the USFWS was contacted regarding project design criteria to protect the valley elderberry longhorn beetle. There is no designated critical habitat within the project area (Federal Register 1980). It was the District wildlife biologists determination that the Phase II project will not likely adversely affect the valley elderberry longhorn beetle because: surveys were conducted in potential longhorn beetle habitat and areas with elderberry shrubs below 3,000' elevation have avoidance measures in place to minimize risk to the beetle and its habitat during project implementation and to ensure retention of elderberry shrubs within the project area.. A biological assessment was submitted to the Service to review the project design criteria and finding of not likely to adversely affect, and a letter of concurrence was received April 7, 2008 from the Service supporting the finding of **not likely to adversely affect the valley longhorn elderberry beetle**.

Pacific Fisher

Effects to the Pacific Fisher are discussed in sections 2 and 7 of this chapter, and in the Terrestrial Wildlife BE in which the District Wildlife Biologist determined that the Phase II project may reduce the quantity and quality of suitable habitat for the Pacific fisher; however, this project is not located within a fisher conservation area and fisher do not currently occupy the Stanislaus National Forest. In the long term, this project is expected to improve the quality of habitat available by improving long-term tree growth rates and stand health while reducing the risk of stand replacing wildfire. For these reasons, the Phase II Fuel Reduction, Forest Health and Road Management **project may affect individual Pacific fishers, but is not likely to result in a trend toward Federal listing or loss of viability of this species.**

Botany

There are no federally listed botanical species potentially affected by this project.

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the environment.

Alternatives 1 and 3 were developed in accordance with and do not threaten to violate any Federal, State, or local laws or requirements imposed for the protection of the environment (i.e. National Forest Management Act, Endangered Species Act, National Historic Preservation Act, Federal Clean Water Act, Executive Order 11988 for Floodplain Management, or the Clean Air Act). The Forest Service has obtained concurrence with USFWS, is awaiting concurrence from SHPO, and would obtain required permits from the appropriate county, state, and federal regulatory agencies prior to implementation.

CHAPTER 4: CONSULTATION AND COORDINATION

The Forest Service contacted/consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this project and its Environmental Assessment.

Interdisciplinary Team Members

Ann Denton – District Ranger, Forest Supervisor Representative

Anna Payne – District Fuels Officer

Alex Janicki – Soil Scientist

Beth Martinez – Internal/External, Public Service Program Area Leader

Chuck James – Recreation Specialist

Fernando Perez – Hydrologist

Marcie Baumbach – Wildlife Biologist

Margaret Willits – Botanist; District Noxious Weed Coordinator

Michael Jow – Planning Forester, IDT Leader, Writer/Editor

Stacy Lundgren – District Archaeologist

Steve Holdeman – Aquatic Wildlife Biologist

Tom Durston – Transportation Planner/ Logging Systems Engineer

Additional Forest Service Employees

Dave Horak (Timber Management Officer), Jim Frazier (Forest Hydrologist) , John Maschi (Forest Planner), John Schmechel, (Forest Silviculturist), Kathy Aldrich (Forester), Marty Gmelin, (Resource Management Program Area Leader), Norm Carlton (Engineering Technician (contractor))

Federal, State and Local Agencies

US Fish and Wildlife Service (USFWS), California Department of Fish and Game, Tuolumne County Board of Supervisors, State Historic Preservation Organization (SHPO)

Tribes

Tuolumne Band of the Me-Wuk Indians

Others

Chris Conrad (Sierra Pacific Industries), Craig Thomas (Sierra Forest Legacy), Darca Morgan (Sierra Forest Legacy), Highway 108 Fire Safe Council, Jerry Jenson (American Forest Products Council), John Buckley (Central Sierra Environmental Resource Center), Jon Sturtevant (Sierra Club), Mike Albrect (Sierra Resource Management). Steve Brink (California Forestry Association), Susan Britting (Sierra Forest Legacy)

A. HYDROLOGY

Riparian Conservation Areas (RCAs)

Riparian Conservation Areas (RCAs), as defined in the SNFPA, are areas 300 feet on each side of perennial streams and around special aquatic features, 150 feet on each side of seasonally flowing streams, and to the top of the inner gorge for streams in the inner gorge. The RCAs are divided into 3 streamside management zones (SMZs) – exclusion, transition and outer. Based on several years of monitoring timber harvest operations, the Stanislaus National Forest has developed guidelines to ensure the Riparian Conservation Objectives defined in the SNFPA ROD (pp 62-66) are met. Design elements utilizing BMPs (Best Management Practices) are discussed in Table B-1.

Table A-1 Management requirements for mechanical equipment operations within Riparian Conservation Areas (RCAs). Maps containing locations unit specific items referenced in the table can be found in the project file.

Mechanized Equipment Operations in Riparian Conservation Areas (RCAs)		
Aquatic Feature	**SMZ**	**Management Requirement**
Perennial and Intermittent Streams	Exclusion Zone	The exclusion zone begins at: a. The edge of the active channel where slopes rise uniformly from the stream, or at the outer edge of the following features, whichever is the furthest from the stream. b. The first slope-break adjacent to the stream (e.g., stream bank, inner gorge) c. Flat or nearly flat ground adjacent to the channel (e.g., floodplain or terrace) d. Obligate riparian shrub and/or tree communities associated with any of the above • Skidding equipment excluded within 50 feet of the start of the exclusion zone. • Mechanical harvesting and shredding equipment[94] excluded within 15 feet of the start of the exclusion zone.
	Transition Zone	Skidding • Skidding equipment is allowed 50-100 feet from the start of the exclusion zone. • Retain a minimum of 50% evenly distributed ground cover in the area utilized by tires or tracks. • Use existing skid trails except where unacceptable impact would result. (Re-using skid trails minimizes new disturbances and allows restoration of drainage features and/or soil porosity as a condition of project use). Do not construct new skid trails within 100 feet of the stream. • The number of crossings should not exceed an average of 2 per mile. Mechanized harvesting and shredding equipment • Mechanized harvesting and shredding equipment are allowed 15-50 feet from the start of the exclusion zone. • Operate only when 90% of the tracked area is less than 4” deep between the surface

[94] Including but not limited to feller-bunchers and masticators that have the following attributes: tracked machines with an articulating arm that has an operating radius of at least 20 feet.

Mechanized Equipment Operations in Riparian Conservation Areas (RCAs)		
Aquatic Feature	**SMZ**	**Management Requirement**
Perennial and Intermittent Streams (cont.)	Transition Zone (cont.)	of the undisturbed litter/duff layer and the duff in the footprint ("duff-to-duff"). Mechanized harvesting and shredding equipment (cont.) • Operate only when continuous ground cover can be retained in 90% of the tracked area. • Remove operation-created debris from stream channels. • Retain obligate riparian shrubs and trees (i.e., willows, alders, aspens). Do not damage stream banks with equipment and retain all vegetation that is maintaining stream bank stability.
Ephemeral Stream Channels	Exclusion Zone	The exclusion zone begins at the edge of the channel where slopes rise uniformly or at the edge of the stream bank, whichever is furthest from the stream. • Skidding equipment excluded within 25 feet of the start of the exclusion zone. • Mechanical harvesting and shredding equipment excluded within 15 feet of the start of the exclusion zone. Between 25 and 50 feet of these streams retain a minimum of 50% soil cover evenly distributed cover in project-created tire or tracked vehicle footprints • The number of crossings should not exceed an average of 3 per mile.
	Transition Zone	There is no transition zone for ephemeral channels.
Wet meadows, Bogs, Fens, Wetlands, Vernal pools and springs	Exclusion Zone	The exclusion zone begins at: a. The outer edge of obligate trees, shrubs or herbaceous plants in wet meadows, bogs, fens and springs, or the high water line of lakes and vernal pools b. The top of the first slope-break immediately adjacent to the special aquatic feature if further than the obligate vegetation or high water line The exclusion zone width adjacent to these features is the same as for perennial streams. **See Perennial and Intermittent Streams' Exclusion Zone requirement.**
	Transition Zone	The transition zone width and operating requirements are the same as for perennial streams. **See Perennial and Intermittent Streams' Transition Zone requirements.**

Applicable Best Management Practices (BMPs):

- 1-4 – Use of Sale Area Map or Project Maps for designating Water Quality Protection needs.
- 1-5 – Limiting operating period of Timber Sale Activities
- 1-8 – Streamside Zone Designation
- 1-10 – Tractor Skidding Design
- 1-18 – Meadow Protection During Timber Harvesting
- 1-19 – Streamcourse and Aquatic Protection
- 5-3 – Tractor Operation Limitation in Wetlands and Meadows
- 5-6 – Soil Moisture Limitations for Mechanical Equipment Operations
- 7-3 – Protection of Wetlands

Applicable Locations: All mechanized harvesting, shredding and skidding equipment units.

Mechanized Equipment Operations in Riparian Conservation Areas (RCAs)		
Aquatic Feature	**SMZ**	**Management Requirement**

Special Design Elements:

- **Unit 2245, 2246**: Thin work should be done by any combination of these treatments: End lining, Cable or helicopter. Preferably helicopter. This site has a callout number # 1 in the map provided.
- **Unit 3281**: There are two wet areas above road 3N08 with characteristics of a seep (spring). These areas will be marked as non-work areas. Equipment will maintain machines tracks on stable, dry soils, as far from the seep or spring as possible. This site has callout numbers # 2 and # 3 in the map provided.
- Units **3271, 3282, 3283**. These units contain or are near to meadows or spring areas. Consult with a Watershed Specialist prior to approving landing locations or skid trail layout. Consult with Soil Scientist about soil moisture and strength for an early season starting if operating near wet meadow. Where feasible directional falling will be used to avoid falling trees into these areas and avoid gauging. The southern part of unit **3271**, near road 3N39Y, should be considered to use as a maximum end lining to the road. These sites have callout numbers # 4, # 5, # 6, # 7, and # 8 in the map provided.
- **Unit 3271**: In the southern part of this unit, near road 3N39Y, there is an old skid trail that leads from road to creek. This trail should be decommissioned. It could be re-used if it is needed, but make sure to maintain the skidding equipment excluded within 50 feet of the start of the exclusion zone. This site has callout number # 9 in the map provided.
- **Unit 2075**: There is an intermittent stream in the western portion of this unit. The area between just above Road 2N07 and the stream right bank, and the area between Road 2N49 and the stream left bank should be done by end lining to the road or preferably by helicopter. Low ground pressure equipment would be allowed in the rest of the unit in areas designated by the Sale Administrator, after consulting with the Soil Scientist about soil moisture and strength. This site has a callout number # 10 in the map provided.
- **Unit 2073**: There is an old skid trail which practically runs parallel to the right bank of an intermittent stream. Do not re-use this skid trail. Protect spring in unit by applying management requirements for special aquatic features. Callout number # 11 in the map provided.
- **Unit 3170**: Near road 4N09B, there are two skid trails near to the left bank that get together at the stream-road crossing. Do not re-use them unless the portions near to the stream crossing can be realigned. Callout number # 12 in the map provided.
- **Unit 3230**: At the crossing of Wrights Creek with Road 3N69, there is an old skid trail which practically runs parallel to the left bank of Wrights Creek. Do not re-use this skid trail. Callout number # 13 in the map provided.
- **Unit 2243**: In the eastern part of this unit at Road 2N07, there is a spring area localized at the road cut bank. Follow the management requirements for special aquatic features listed above. Callout number # 14 in the map provided.
- **Unit 2249**: There is a flat area where Road 2N93 cross an ephemeral stream. Do not put a landing in this location. Callout Number # 15 in the map provided.
- **Unit 2242**: In the southwest part of this unit, there is a seasonal wet meadow and spring area below Road 2N93. No mechanized equipment within this area. Callout number #16 in the map provided.

Table A-2 Applicable Best Management Practices (BMPs). Refer to Water Quality Management for Forest System Lands in California: Best Management Practices[95] for implementation of BMPs. Maps containing locations unit specific items referenced in the table can be found in the project file.

Applicable BMPs	Management Requirement
Erosion Control Practices	
• 1-17 (Erosion Control on Skid Trails) • 1-19 – (Streamcourse and Aquatic Protection) • 1-20 (Erosion Control Structure Maintenance) • 1-21 (Acceptance of Timber Sale Erosion Control Measures before Sale Closure)	• Install and maintain erosion control measures, and ensure adequacy of these measures at the completion of the project. • Skid trails on slopes should have occasional breaks in grade or logging slash that disperse water. • Where skid trails cross streams install waterbars or turnouts to divert all runoff away from stream channel. **Applicable Locations:** All mechanized harvesting, shredding and skidding equipment units.
Log Landings	
• 1-12 – Log Landing Location • 1-16 – Log Landing Erosion	• Re-use log landings to the extent feasible. • New landings should not be constructed within ~100 feet of perennial or intermittent streams and ~50 feet of ephemeral streams. • Subsoil all landings when harvest/biomass operations are complete. **Applicable Locations:** All units.
Roads	
• 2-1 – Guidelines for the Location and Design of Roads • 2-7 – Control of Road Drainage • 2-12 – Servicing and Refueling of Equipment • 2-21 – Water Source Development Consistent with Water Quality Protection • 2-22 – Maintenance of Roads • 2-23 – Road Surface Treatment to Prevent Loss of Materials • 2-24 – Traffic Control During Wet Periods • 7-3 – Protection of Wetlands	• Service and refuel equipment outside of RCAs. • Road watering for dust abatement and road surface protection should be conducted using existing water source locations. • If it is not available and surface water is used instead, the water use should not adversely deplete pool volume. • Screens should be installed on water intake lines to prevent entrainment of fish and amphibians. • Maintain roads during the life of the project and control road use during wet periods to prevent or minimize entrainment of sediment into stream courses. **Applicable Locations:** All roads that might be used during wet weather. The North Fork Tuolumne River at 3N01 is recommended as drafting areas. Conduct roadwork at all sites in the Roads Package for the project.

[95] USDA Forest Service. 2000. Water Quality Management for Forest System Lands in California. Best Management Practices. Pacific Southwest Region. Vallejo, CA.

(Table A-2 continued)

Slope Limitations	
Applicable BMPs	**Management Requirement**
• 5-2 – Slope Limitations for Mechanical Equipment Operation	• See Soils Report for slope requirements. **Applicable Locations:** All mechanized harvesting, shredding and skidding equipment units.
Prescribed Burning	
• 6-3 – Protection of Water Quality from Prescribed Burning Effects	• Avoid damage to obligate riparian vegetation (e.g., willows, alders, cottonwoods). • Retain 75% ground cover within ~100 feet of perennial and intermittent streams and ~50 feet of ephemeral streams. • New dozer lines should not be constructed within ~100 feet of perennial and intermittent streams and ~50 feet of ephemeral streams. • Constructed fire lines should be restored upon completion of prescribed burning and/or prior to each winter when fire lines are exposed to the potential for erosion. • Restoration should consist of water barring hand and dozer lines, re-contouring of benched trails, and subsoiling of detrimentally compacted dozer lines. • No debris or soil that might impede water flow or cause stream bank degradation will be placed in any stream. • Do not bulldoze the surface within SMZs or near streams. Hand tools and equipment should be favored on steep slopes, fragile soils and in sensitive areas such as Streamside Management Zones approaches. • Install fire lines on the contour as much as possible. **Applicable Locations:** All units that are planned for prescribed burning. Unit 2250, below Road 1N04, is considered a sensitive area due to the amount of ephemeral channels and the soil sensitivity to erosion. Maintain a 60% ground cover out of SMZs. Callout # 17. There is an area that comprises units 3282, 3270, and 3283 that is considered sensitive area due to soils sensitivity to erosion: Maintain 60% ground cover out of SMZs in the delineated area of the map provided. Do not burn over the gully.
Burn Piles	
• 6-3 – Protection of Water Quality from Prescribed Burning Effects	• Burn piles should be placed a minimum of ~50 feet away from perennial or intermittent streams and ~25 feet away from ephemeral streams unless otherwise approved by a hydrologist and/or soil scientist. • They should be located outside of areas that may receive road runoff. **Applicable Locations:** All units that are planned to have hand pile and burn.

(Table A-2 continued)

Protection of Unstable Lands	
Applicable BMPs	**Management Requirement**
• 1-6 – Protection of Unstable Lands	• Layout of skid trails will be located away from areas adjacent to and above unstable road cuts. **Applicable Locations:** Units 3061 and 3064 along Road 4N32. Callout # 18.
Monitoring	
Applicable BMPs	**Management Requirement**
• 7-6 – Water Quality Monitoring	• Conduct implementation and effectiveness monitoring using the Best Management Practices Evaluation Program (BMPEP) (USDA Forest Service, 2002b). • Focus evaluations on mechanized equipment operations in sensitive watershed locations.

Analysis Watersheds

For the watershed effects analysis of this project, the Upper and Lower North Fork Tuolumne and the West Clavey River have been divided into 7 th and 8th Level HUC (hydrological unit code) watersheds. Eighth level HUC watersheds with less than 120 acres of proposed treatment are considered to have a relatively low percentage of the total watershed acres affected, and therefore are too small for consideration in this analysis. The project treatment unit acres are broken down by watershed (Table A-3).

These 7th level watersheds are the smallest scale watershed in which nearly all of the treatment acres are located. Larger watersheds (6th and 5th level) are too large to adequately analyze effects of the project. These 8th level watersheds are the smallest scale at which direct, indirect and cumulative watershed effects can be optimally analyzed since each contains a substantial amount of project treatment acres. HUC 7 and 8 watersheds analyzed for this project are displayed in the Analysis Watershed Maps 1 and 2 (figures A-1 and A-2).

Table A-3. Acres of treatments by watershed. Vegetative treatments in this project are concentrated in the 7th and 8th level watersheds.

HUC7 Name	HUC8 Name	Total Acres
Upper North Fork Tuolumne River - Bald Mountain	Bald Mountain - Cold Springs	447
	Bald Mountain - Jenesse Park	0
	Bald Mountain - North Fork Day Use	233
	Bald Mountain - Brownes Meadow	0
Upper North Fork Tuolumne River - Bald Mountain Total		680
Basin Creek - Lower North Fork Tuolumne River	Basin Creek - Murphy Peak	64
	Basin Creek - Summit Ridge	598
	Basin Creek - Deadwood Spring	0
	Basin Creek - Duckwall Mountain	0
Basin Creek- Lower North Fork Tuolumne River Total		662
Hull Creek - West Clavey River	Hull Creek - Headwaters Hull Creek	537
	Hull Creek - Hulls Meadow	312
	Hull Creek - Lily Creek	489
	Hull Creek - Rush Creek	225
Hull Creek - West Clavey River Total		1563
Upper North Fork Tuolumne River - Long Barn	Long Barn - Faust Cabin	235
	Long Barn - Merrill Spring	443
	Long Barn - Sierra Village	59
	Long Barn - Mi-Wuk Village	0
	Long Barn - Sugarpine Creek	0
Upper North Fork Tuolumne River - Long Barn Total		737
Upper North Fork Tuolumne River - Pinecrest	Pinecrest - Lost Book Creek	418
	Pinecrest - Pinecrest	21
	Pinecrest - Sheering Creek	0
Upper North Fork Tuolumne River - Pinecrest Total		439
Lower North Fork Tuolumne River - Riverside	Riverside - Johnnie Gulch	116
	Riverside - Mount Provo	85
	Riverside - Nelles Gulch	0
	Riverside - Dyer Creek	0
	Riverside - Cedar Gulch	0
	Riverside - Mount Eaton	0
Lower North Fork Tuolumne River - Riverside Total		201
Wrights Creek - Upper North Fork Tuolumne River	Wrights Creek - Lower Wrights Creek	698
	Wrights Creek - Upper Wrights Creek	637
Wrights Creek - Upper North Fork Tuolumne River Total		1335
Grand Total		**5617**

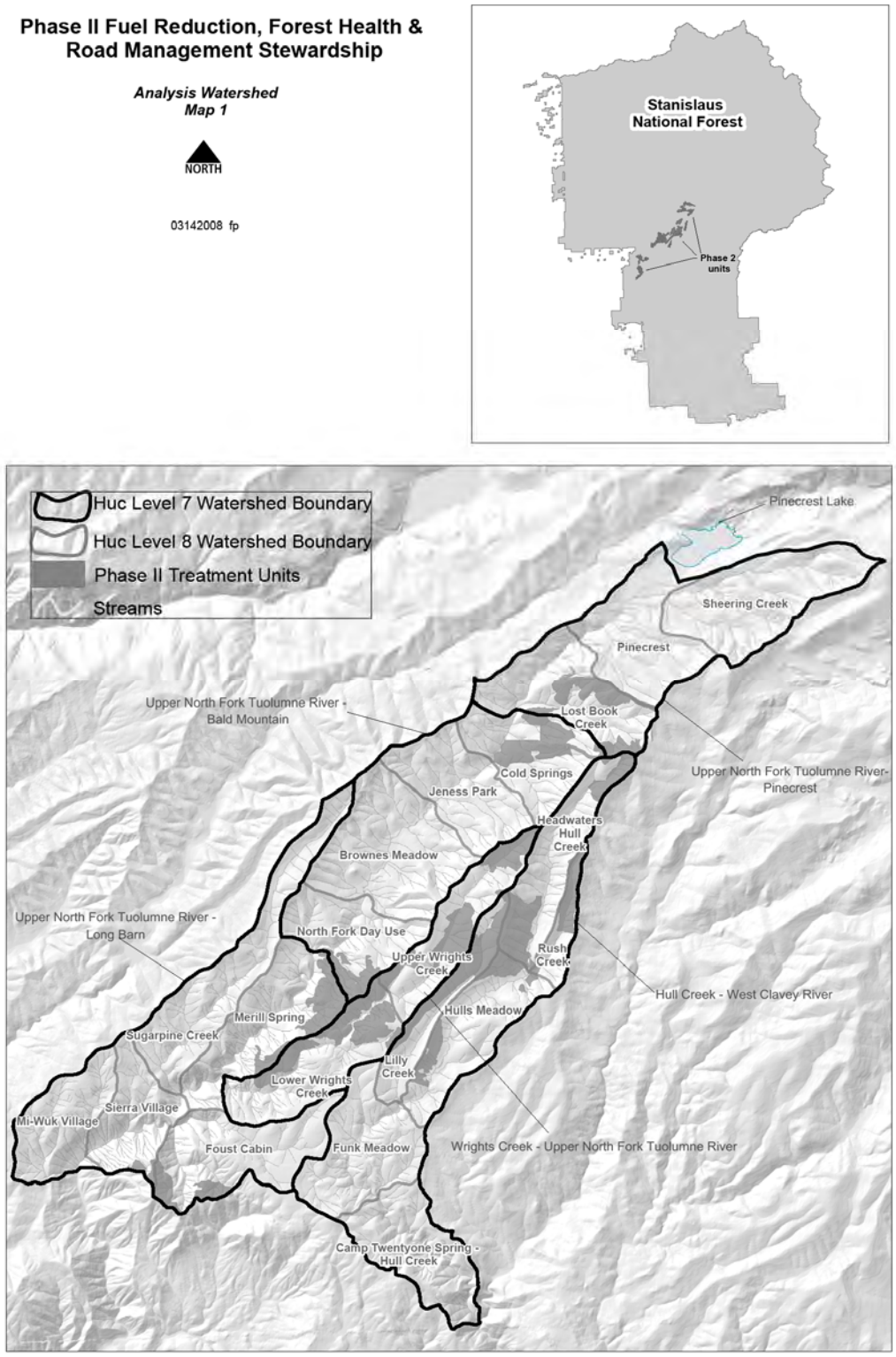

Figure B-1. Seventh and eighth level hydrologic unit code (HUC) analyzed for the Phase II Project (upper watersheds).

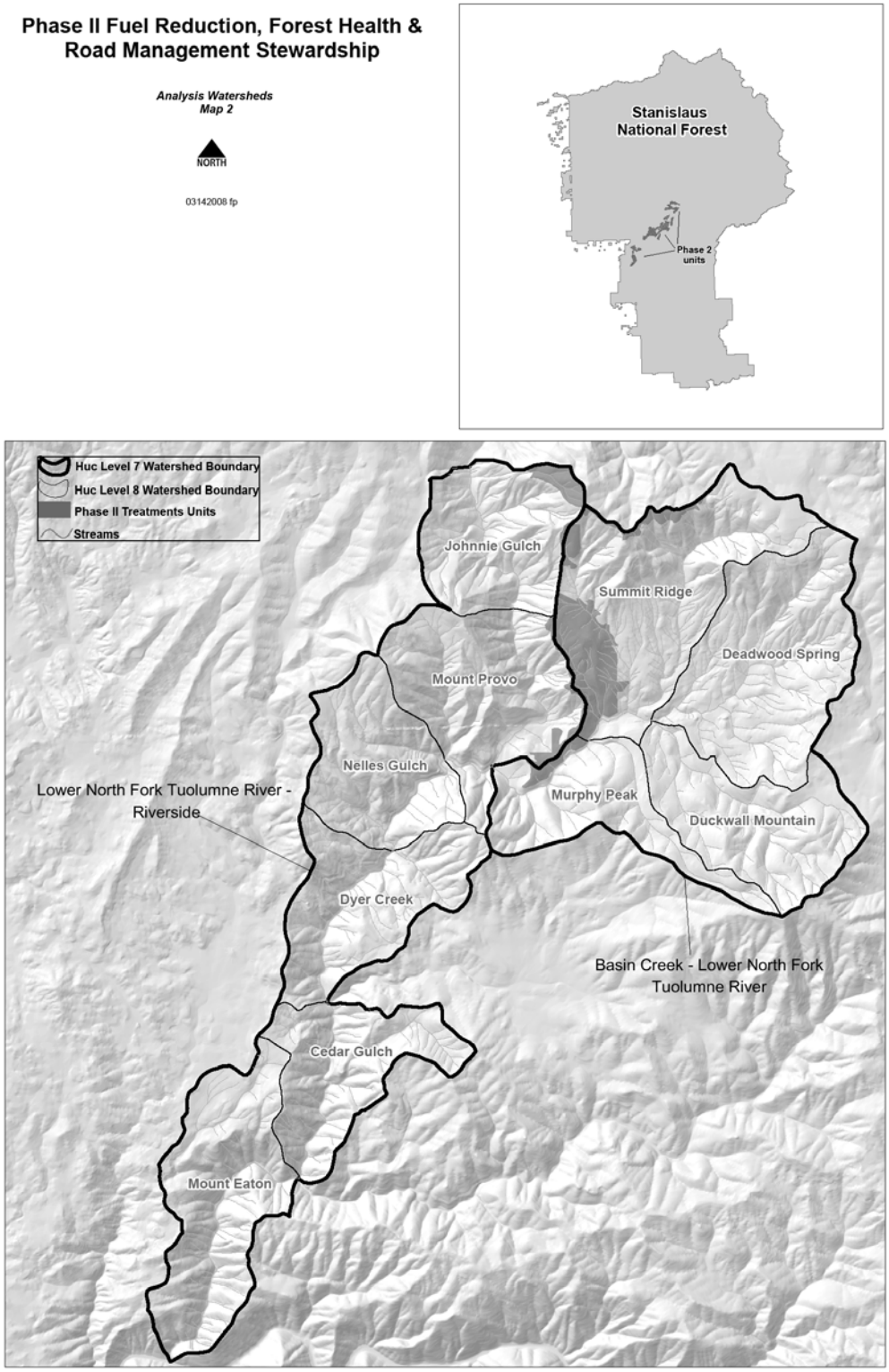

Figure B-2. Seventh and eighth level hydrologic unit code (HUC) analyzed for the Phase II Project (lower watersheds).

Cumulative Watershed Effects Analysis

The Cumulative Watershed Effect (CWE) uses the Equivalent Roaded Area (ERA) analyses to comply with Forest Service direction. The CWE considers two action alternatives and a “no action” alternative. Alternatives 1 and 3 (action alternatives) were considered to have the same CWE based on the ERA methodology.

The ERA index results are presented in percent ERA and include constant features, pre-existing activities, proposed activities, and probable future actions within the Cumulative Effects Analysis Area. Assumptions and methods applied are presented in the following sections. Additional information can be found in the Hydrology report prepared for this project and on file at the District office.

The assumptions included in the analyses are: 1) only herbicide treatments for the previous 2 years were considered to have a continued effect on the ERA; 2) only burn treatments for the previous two years were considered to have continued effect on the ERA; 3) the co-efficient values used were based on numbers provided from the Forest Hydrologist and adjusted as deemed appropriate; 4) hand thinning units were assumed to have no effect on the ERA; 5) the threshold of concern was set at the program default of 12-14% ERA; 6) constant features such as roads, trails, buildings, power lines, etc., were assessed using information in the Forest GIS database; and, 7) information in the GIS database is assumed to be accurate and up to date.

Conservative approaches in this analysis included the following: 1) positive adjustments were not made for ripped landing areas or road closures, 2) for units with proposed multiple treatments the total acreage is analyzed for each action - this overestimates the impact because it is likely that within the treated acres primarily one treatment will be conducted over each section of ground; however, some double tracking for access is likely, 3) burn prescription analysis assumes total coverage of the proposed burn area; however it is more likely that the underburns will be patchy and discontinuous over most of the prescription area, 4) Machine Pile and Saw Log/Biomass treatments are assumed that won’t be completed in one year, therefore, the treatment total acres have been divided in two consecutive years, 4) fuel breaks and fuel break maintenance proposed for retention are similarly considered within the treatment units.

The default value of 12 - 14 percent ERA was selected as the threshold of concern for each of the watersheds as a conservative measure. All watersheds are expected to remain under thresholds of concern based on the analysis for cumulative watershed effects (Table A-4).

Table A-4. ERA Summary - Percent ERA for the Action Alternatives (Alternatives 1 and 3). The default value of 12 - 14 percent ERA was selected as the threshold of concern for each of the watersheds as a conservative measure. All watersheds are expected to remain under thresholds of concern based on the analysis for cumulative watershed effects.

Upper North Fork Tuolumne River										
Watershed	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Lost Book Creek (8th Level HUC)	8.92	10.12	9.22	8.32	7.36	6.65	6.01	5.54	5.12	4.70
Cold Spring (8th Level HUC)	5.62	7.08	6.54	6.01	5.53	5.12	4.85	4.62	4.39	4.17
North Fork Day Use (8th Level HUC)	5.84	6.14	5.34	4.51	3.86	3.23	2.89	2.59	2.28	2.07
Merrill Spring (8th Level HUC)	4.54	5.52	4.98	4.54	4.13	3.82	3.60	3.42	3.26	3.08
Faust Cabin (8th Level HUC)	2.37	3.26	3.09	2.88	6.16	9.62	8.70	7.79	7.71	6.39
Upper Wrights Creek (8th Level HUC)	5.68	9.19	8.47	7.63	6.70	5.90	5.24	4.70	4.17	3.63
Lower Wrights Creek (8th Level HUC)	5.60	8.68	8.00	7.21	7.47	7.87	7.03	6.30	5.84	4.97
Upper North Fork Tuolumne River- Pinecrest (7th Level HUC)	7.66	10.27	10.53	9.68	9.13	8.42	7.42	6.62	6.07	5.52
Upper North Fork Tuolumne River- Bald Mountain (7th Level HUC)	3.45	3.80	3.50	3.22	3.03	2.84	2.68	2.54	2.39	2.29
Upper North Fork Tuolumne River- Long Barn (7th Level HUC)	9.42	9.36	8.79	8.31	8.74	9.24	8.74	8.30	8.05	7.62
Wrights Creek- Upper North Fork Tuolumne River (7th Level HUC)	5.63	8.90	8.20	7.39	7.12	6.98	6.23	5.58	5.08	4.36
Lower North Fork Tuolumne River										
Watershed	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Summit Ridge (8th Level HUC)	2.67	3.98	3.87	3.50	4.20	5.10	4.63	4.20	4.05	3.51
Basin Creek- Lower North Fork Tuolumne River (7th Level HUC)	3.78	4.78	5.35	4.81	5.82	7.21	6.38	5.56	5.22	4.32
West Clavey River										
Watershed	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Headwaters Hull Creek (8th Level HUC)	3.97	6.34	7.80	9.24	8.22	7.27	6.88	5.87	4.86	4.11
Hulls Meadow (8th Level HUC)	6.25	9.79	8.98	8.10	7.65	6.54	5.56	4.91	4.26	3.61
Lilly Creek (8th Level HUC)	5.83	8.69	7.89	6.99	6.15	5.41	4.90	4.48	4.06	3.65
Rush Creek (8th Level HUC)	6.54	10.63	10.18	9.61	8.42	7.37	6.59	5.83	5.06	4.34
Hull Creek- West Clavey River (7th Level HUC)	5.54	9.26	8.87	8.43	8.03	6.87	5.85	5.05	4.24	3.49

B.SOIL MANAGEMENT REQUIREMENTS

The R-5 Soil Quality Analysis Standards (USDA, 1995b), and the Stanislaus National Forest Plan Direction (USDA, 2005) provide standards that guide soil management. These standards provide threshold values that indicate when changes in soil properties and soil conditions would result in significant change or impairment of the productivity potential or hydrologic function of the soil.

The Soil Quality Analysis Standards are used to judge when (or how much) disturbance may be detrimental and to recommend soil management practices (SMPs) to minimize potential impacts. It is assumed that long-term soil productivity will be maintained in all treatment units when project-level SMPs are implemented.

Description of Soil Management Practices

The following soil management practices are to be applied project-wide:

1. Maintain Soil Organic Matter and Cover

Objective: Maintain organic soil cover for erosion control and nutrient cycling.

Explanation: Soil cover consists of litter, fine woody debris, and downed logs (LWD). In general, maintain at least 50 percent well distributed soil cover post treatment. Soil cover should be in place prior to seasonal precipitation to avoid a high EHR condition (R-5 Erosion Hazard Rating method). Litter about an inch thick will provide effective cover (will remain intact through the winter storm season).

1.1 Maintain the following cover:

- 50% cover on slopes <35%
- 60% cover on slopes >35%
- 75% cover in RCAs (see Water Quality section and Table B-1 in Appendix B)

1.2 *Large Woody Material (LWM)* – Retain downed logs in the range of 3 to 6 tons per acre (16 to 20 plus inch diameter, retain the largest log) outside of defense zones and fuelbreaks.

1.3 *Masticated fuels* – Limit the depth of masticated fuels to a maximum of 4 inches, if burning on dry soils. This will avoid sterilizing the soil (Busse, et al., 2005).

2. Determination of Soil Compaction Hazard for Ground-based Equipment

Objective: To identify high compaction hazard soils or conditions in order to adjust treatment measures to prevent detrimental compaction.

Explanation: This is a preventive practice to maintain soil porosity above 90% of its natural condition on at least 85% of the treatment unit including RCAs. A loss of 10% porosity is considered significant and detrimental.

2.1 Ground based equipment will operate on relatively dry soils of high soil strength or bearing capacity.

2.2 Dry soil conditions will be determined by use of a modified Froehlich equation that predicts soil compaction on skid trails (Heath and Alexander, 1982) or other reliable field techniques. This requirement is particularly important in plantations where it is very difficult to subsoil to reduce overall levels of compaction.

Areas will be monitored on a sample basis by soil type, to assure favorable soil moisture and operating conditions. Winter shredding operations will also be monitored. A Soil Scientist can help the Sale Administrator monitor such operations.

3. Subsoil Detrimentally Compacted Areas: Subsoil landings, main skid trail, and temporary roads.

Objective: To ameliorate compaction resulting from ground-based equipment operations. Soil porosity is maintained on at least 85% of the treatment area.

Explanation: This is a corrective treatment that limits the cumulative amount of ground compacted. Ground-based operations will be mitigated by a combination of managing the timing of operations and subsoiling of compacted areas. Identify soils with low and high compaction hazard and adjust the amount of subsoiling accordingly. See bulleted statements below.

3.1 Coordinate with Soil Scientist during project implementation to determine final subsoiling needs.

3.2 Landings should be subsoiled in most cases, including skyline landings.

3.3 Tractor units, with low compaction hazard and low existing compaction - Subsoil the first 100 yards of skid trail from landings or as determined by Soil Scientist.

3.4 Tractor units with high compaction hazard or high existing compaction - Subsoil all main skid trails. Main skid trails typically have 20 passes or more, the litter layer is removed, bare soil is exposed and a compacted soil structure is evident, soil displacement has lowered the trail surface below natural grade, and berms are usually present.

3.5 Tractor units, inappropriate to subsoil: These are units dominated by thin or rocky soils, or thinned plantations (high frequency of stumps in skid trail).

3.6 A Soil Scientist experienced with subsoiling may advise the Sale Administrator on soil-site conditions (i.e. rock content, slope gradient, moisture conditions, depth to restricting layer, erosion hazard). This is particularly important on trail gradients approaching 15% to 20%.

3.7 Subsoiling Provision: Ensure that contract specifications or operating plans include the required depth of subsoiling; the maximum depth of furrowing; a requirement for backblading when the depth of furrowing is exceeded; winged ripper tool design specifications (example of approved equipment). The original Johannson tool design is used as an example of approved equipment. Acres or miles of subsoiling will be provided.

4. Determination of Surface Disturbance Hazard and Slope Limitations for Ground-based Equipment

Objective: To identify high disturbance hazard soils or conditions in order to adjust treatment measures to prevent excessive soil displacement.

Explanation: This is a preventative practice designed to avoid excessive soil displacement during tractor harvest, tractor piling, or shredding operations. The practice is also applied to fuelbreak areas and dozer line construction for Rx burns. Several factors are considered when accessing potential for soil disturbance. Soil, slope and type of equipment are key factors. The presence of “legacy” disturbance and “thin” soils is also considered.

Generally the surface disturbance hazard is high for equipment operating on steep slopes (i.e., tractor piling on 25-30% slopes, tractor skidding on slopes steeper than 35%, tractor fireline construction on slopes steeper than 35%, tracked shredding equipment on 40%, feller-bunchers on 45%). Soil

displacement can occur on flatter ground on sensitive soils or where adverse skidding is necessary. There are a number of treatments that will prevent or reduce disturbance.

4.1 Treatments on steep slopes (steeper than 35% for more than 100 feet) are (1) exclude area from treatment; (2) aerial harvest; (3) the feller-buncher may be used to "pac" wood to less than 35% slopes to minimize detrimental soil displacement; (4) use corrective measures to return as much displaced soil to its original location, insofar as practicable, without creating additional disturbance (correct disturbance footprint to less than 15% of area).

4.2 The need to "adverse skid" a unit sets up similar requirements to avoid detrimental soil displacement.

4.3 If low disturbance yarding equipment is available (FMC, KMC, Morgan), generally no re-contouring or backblading of displaced soil is required.

4.4 Tractor piling should generally be done on slopes less than 25%. Steeper pitches may be piled if the operation can retain a ground cover (duff and woody debris) of 50% and excessive furrowing can be avoided. Excessive furrowing will be corrected by backblading, without creating additional disturbance. Consider shredding treatment on high disturbance hazard areas.

4.5 Construct Rx fire dozer lines on slopes less than 35%. Avoid blading into bare mineral soil, creating detrimental soil displacement (trenched trails). Prior to winter storms, pull any soil berm back into control lines and waterbar according to EHR spacing guidelines to prevent erosion. Recommend backblading to line of sight firelines in close proximity to OHV activity.

4.6 Consult with Soil Scientist and monitor selected units considered to have a high disturbance hazard (i.e., steep tractor slopes, thin soils, high "legacy" disturbance).

Table B-1 Treatment Unit Soil Concerns and Management Requirements. Based on treatment type and site-specific conditions. Additional information on soil concerns and treatment effects can be found in the Phase II Soil Evaluation (2009).

Treatment Type	Treatment Unit	Soil Concern / Site Characteristics	Management Requirements [1]
Prescribed Burn (primary treatment)	2071, 2074, 3060, 3232, 3240, 3270	No special soil concerns other than maintaining Rx ground cover	Practice 1.0
Shred/Burn (primary treatment)	2240, 2250, 3040, 3280,	High displacement hazard on steep slopes (>35%) or thin soils	Practice 4.0
	2076, 2122, 3081, 3281, 3352	Little to no steep ground or thin soils	Practice 1.0
Fuelbreak (thin, shred, hand-cut, pile, burn)	2251, 3022, 3044, 3065	High displacement hazard primarily on thin soils	Practice 4.0
	2070, 2121, 2141, 2247, 3322, 4321, 4323	Few soil concerns	Practice 1.0
Fuelbreak (shred, handcut, pile, burn)	2130, 2182, 4330	High displacement hazard on steep slopes (>35%) or thin soils	Practice 4.0
	2246, 2251, 3066	Little to no steep ground or thin soils	Practice 1.0
Cable/Helicopter **(**Thin, shred, burn)	2073, 2245, 2247, 2249, 3063, 3064, 3210	High displacement hazard on steep slopes (>35%). Prefer no or limited shredding on 3064. (90% of unit is steep).	*Practice 4.0* *Avoid spring in 2073.*
(Thin, handcut, pile, burn)	2246	Few soil concerns	Practice 1.0
Tractor-Natural Stands (Thin, biomass, shred, burn)	2072, 3041, 3043, 3170, 3171, 3190, 3201, 3250, 3251, 3301, 4320, 4324, 4325	Parts of unit have steep slopes (>35%) or thin soils. Equals high displacement hazard.	Practice 4.0
	2075	Much of unit is RCA. High soil moisture. Some steep slopes.	Practice 2.0 and 4.0 Soil LOP; Consider helicopter.
	2074, 2241, 2242, 2243, 2244, 3061, 3062, 3080, 3200, 3211, 3283, 3300, 3350, 4311, 4326	Average tractor units (little to no steep ground). Highlighted units have high compaction hazard.	Practice 2.0
Tractor-Plantations (Thin, biomass, shed, burn)	2072, 2120, 3190, 3193, 3260, 3320, 3341	Units have a combination of thin soils and/or steep slopes (>35%). Legacy disturbance (windrows) present Legacy disturbance is greatest in units 3260, 3320, and 3341	Practice 4.0 Restore legacy disturbance as practical.
	2242, 3040, 3221, 3231, 3271, 3282, 3283, 3340, 3342, 3352	Plantations with deeper soils and average slopes Many of these units have windrows but the overall disturbance is less on deeper soils Highlighted units have high compaction hazard	Practice 2.0

[1] Practices 1.0, 2.0, 3.0, and 4.0 are project-wide and will apply to all units. The single practice listed is for emphasis only.

C. WILDLIFE

Aquatics

Aquatics BA/BE Definitions

The following definitions are intended to articulate the potential levels of intensity and duration of effects.

Negligible – An action that may cause a change to a resource, but the change would be so small that it would not be of any measurable consequence to the resource. Negligible impacts would not cause impairment of a resource.

Minor – An action that may cause a change to a resource, but the change would be small and, if measurable, it would cause a small and localized consequence. Minor impacts would not cause impairment of a resource.

Moderate – An action that would cause some change to a resource and the change would have a definite and measurable consequence, but it is localized.

Major – An action that would cause a definite change to a resource. The change would be readily measurable and would have a substantial consequence to the resource. Major impacts may be significant, and might constitute impairment.

Short-term – Impacts that would last one year or less.

Mid-term – Impacts that would last between one year and five years.

Long-term – Impacts that would last five or more years.

Effects Analysis

The initial approach for analysis of effects included a review of the treatment units and their proximity to aquatic features that provide habitat to the species considered in the BA/BE. Units were stratified into three broad categories that reflect the risk or potential for impact and categorization was based on the life history of the species and the type of treatment proposed in the unit. The three categories are no concern, limited concern, and moderate concern. Units of no concern are those that have discountable potential to affect individuals and negligible potential to affect habitat. Units of limited concern have negligible potential to impact individuals, but there may be a limited potential to impact habitat primarily through temporary increases in sedimentation. Units of moderate concern have a low potential to impact individuals and/or a low to moderate potential to impact habitat.

Table C-1 presents the treatment units, their location by general watershed, and level of concern. Overall, the Phase II Project has a low potential to impact any or all of the species addressed or the habitats that they rely upon.

Table C-1. Phase II Project treatment units, type of treatment and the level of concern for aquatic species.

Units and Watershed	Treatment	Level of concern
North Fork Tuolumne River small tributaries		
2070-1, 2074-5, 2120-1, 3041, 3044, 3065, 3211, 3221, 3282, 4311, 4321-3	Thin, Biomass, Shred, Burn	No concern
3043, 3061-2, 3283, 4320, 4324-6		Low
NFTR – Wrights Creek		
3340, 3341, 3342	Thin, Biomass, Shred, Burn	No
3180, 3230-1, 3271, 3320, 3322		Low
NFTR – Basin Creek		
2072, 2241-4, 2248	Thin, Biomass, Shred, Burn	No
Hull Creek and tributaries		
3200, 3301, 3350-1, 3250, 3190, 3193-4	Thin, Biomass, Shred, Burn	No
3042, 3080, 3170-1, 3191, 3241, 3251, 3260		Low
3300		Moderate
North Fork Tuolumne River small tributaries		
2073, 2247, 2249, 3064	Thin, handcut, shred, pile, and/or burn	No
3063, 3210		Low
NFTR – Basin Creek		
2245, 2246	Thin, handcut, shred, pile, and/or burn	No
North Fork Tuolumne River small tributaries		
3040, 3066, 3280, 3281, 4330	Shred, handcut, pile, and/or burn	No
2122		Low
NFTR – Basin Creek		
2076, 2130, 2182, 2240, 2251	Shred, handcut, pile, and/or burn	No
2250		Moderate
Hull Creek and tributaries		
3352	Shred, handcut, pile, and/or burn	No
3081		Low
North Fork Tuolumne River small tributaries		
3060	Prescribed burn	No
3270		Low
NFTR – Wrights Creek		
3232	Prescribed burn	No
Hull Creek and tributaries		
3240	Prescribed burn	Low
3195	Handcut, burn, and pile	Low

CWHR Classification

Table C-2 CWHR Descriptions. Classification is based on crown diameter and/or diameter at breast height (DBH) and Canopy cover. Species composition is also part of the description. Information in table IV was taken from A Guide to Wildlife Habitats of California. 1988. Edited by Kenneth E. Mayer and William F. Laudenslayer, Jr., State of California, Resources Agency, Department of Fish and Game. Additional information on CWHR System can be found on the California Department of Fish and Game website (http://www.dfg.ca.gov/bdb/html/wildlife_habitats.html)

Code	Description	Crown Diameter	DBH
1	Seedling	N/A	< 1”
2	Sapling	N/A	1 to 6”
3	Pole	<12’	6 to 11”
4	Small Tree	12-24’	11 to 24”
5	Medium/Large	>12’	> 24”
6	Multi-Layered	Size 5 over size 3 or 4; Total CC > 60 %	

Code	Description	Percent Canopy Closure (CC)
S	**Sparse**	10-24 % Cover
P	**Open**	25-39 % Cover
M	**Moderate**	40-59 % Cover
D	**Dense**	60-100 % Cover
		Not Determined

Wildlife Analysis Area

The cumulative effects analysis area for all terrestrial species considered in the Terrestrial Wildlife biological evaluation and assessment is ~44,000 acres. Approximately 5,600 treatment acres of National Forest System lands is located in both the North Fork Tuolumne and Clavey Watersheds. The analysis area (Figure C-1) was chosen using the following logic: A circular “home range” buffer of 3,600 acres was created around all California spotted owl PACs within the planning area; averaged between documented home ranges in the Sierra NF (2,500ac mixed conifer type) and the Tahoe and El Dorado NF (4,700 ac mixed conifer type)[96]. The extensive network of spotted owl PACs throughout the planning area provides a biologically meaningful buffer of the planning area. This boundary provides an approximate one-mile buffer from the most recent active nest stands within occupied northern goshawk territories in the planning area. We have no documented occurrences of American marten or Pacific fisher in or near the planning area, therefore, nothing to anchor an additional analysis boundary. Due to the mobility of the wildlife species analyzed, some species considered herein would use habitat outside this analysis area; however, this boundary is reasonable and will allow for meaningful analysis of effects to all species. Bounding of this analysis area in time is as follows: first, the existing condition incorporates all past activities, present activities include those projects currently under contract or nearly so, and foreseeable future actions considered include timber harvest plans through 2007, Forest Service proposed projects through 2013, and looking at the action alternatives up to 50 years post-treatment.

[96] USDA 2001. Sierra Nevada Forest Plan Amendment Environmental Impact Statement, Record of Decision, and Chapter 3, part 4. Pacific Southwest Region, USDA Forest Service, Vallejo, CA.

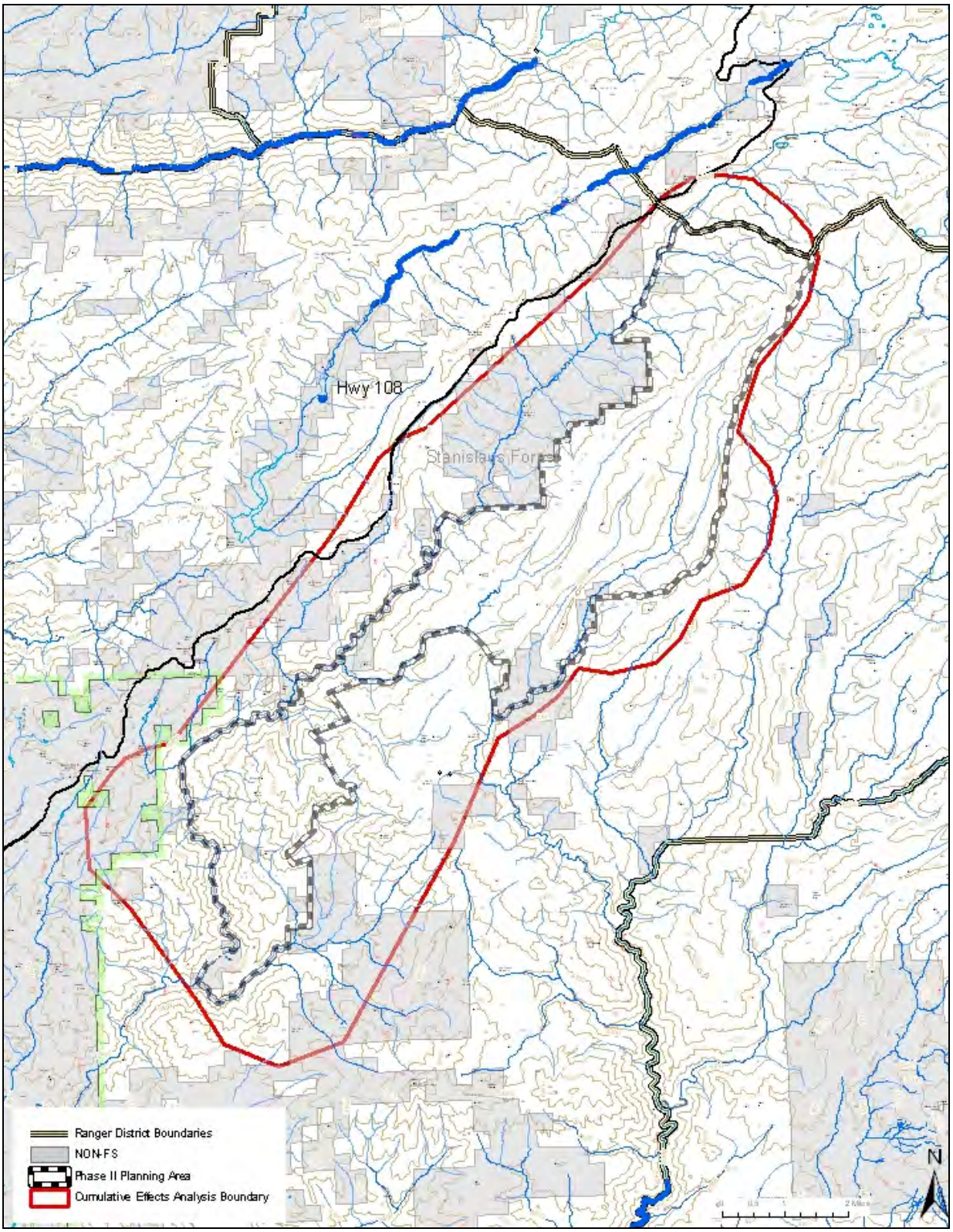

Figure C-1. Area of consideration for terrestrial wildlife cumulative effects

California Spotted Owl

Home Range Core Areas (HRCAs)

There are twelve spotted owl HRCAs located partially or wholly within the planning area. Ten have proposed treatments associated with them. There are ~3,200 HRCA acres within the planning area. Treatments are proposed on ~1,850 acres (58%) of HRCA acres outside spotted owl PACs.

Table C-3. Summary of proposed HRCA treatments in the Phase II project planning area.

California Spotted Owl HRCA	Unit/s	Acres	Canopy Cover*			% HRCA
			Before (Alt.2)	Alt.1	Alt. 3	treated**
TL133 High Sierra North	3043, 3061, 3062, 3063, 3064, 4310, 4311, 4324, 4325, 4326	337	70%	50%	52%	34%
TL156 High Sierra South	3061	53	76%	56%	55%	5%
	3060, 3066	145	N/A (Shred and/or Rx understory)	N/A	N/A	15%
TL164 Dodge Ridge	3180	126	77%	50%	50%	13%
TL132 Hull Creek Camp	3170, 3190, 3191, 3200, 3241	198	62%	51%	51%	20%
	3195	2	N/A (hand cut/pile/Rx understory)	N/A	N/A	0.2%
TL035 Hull Creek	3191, 3194, 3250, 3300, 3301	48	57%	48%	50%	5%
TL214 Camp Ida	3210, 3211, 3221, 3230, 3231, 3283	197	47%	41%	44%	20%
	3232, 3270	25	N/A (Rx understory)	N/A	N/A	3%
TL165 Fahey Cabin	3320, 3271, 3283, 3340, 3342	161	53%	44%	45%	16%
	3270, 3280, 3281	27	N/A(Shred/hand cut/ pile and/or Rx understory)	N/A	N/A	3%
TL260 Lily Creek	3260	139	38%	36%	36%	14%
TL068 Mount Lewis	2071, 2073, 2074, 2075, 2120, 2121	143	58%	44%	49%	14%
	2076, 2122, 2182	60	N/A(Shred/hand cut/ pile and/or burn understory)	N/A	N/A	6%
TL069 Basin Creek	2241, 2242, 2243 2246, 2247, 2248, 2249	103	64%	58%	59%	10%
	2240, 2250, 2251	95	N/A(Shred/hand cut/pile and/or burn Understory)	N/A	N/A	10%

*Weighted Average
** Percents are calculated using 1,000 total HRCA acres (300-PAC, 700-HRCA)

Protected Activity Centers (PACs)

Of the twelve spotted owl territories located partially or wholly within the planning area, three have proposed mechanical treatments associated with them; TL164 (Dodge Ridge), TL260 (Lily Creek), and TL156 (High Sierra South). Table C-4 summarizes proposed treatments, acres and percent of PAC being treated.

Table C-4. Comparison (by alternative) of PAC: treatment methods, acres and percent of PAC affected, and CWHR designation before and after treatments.

Spotted Owl PAC	WUI Zone	Treatment Unit	Treatment Method	Acres Affected (% PAC Treated)	CWHR Designation Existing (Alt.2)	Post-Treatment (Alt.1)	Post-Treatment (Alt.3)
Dodge Ridge (TL164)	Threat	3180	Thin (12" dbh limit), Biomass, Shred, Burn	7acres (2%)	4D	4M	4M
Lily Creek (TL260)	Defense	3351	Thin (12" dbh limit), Biomass, Shred, Burn	80acres (26%)	5M	5M	5M
North Marble Mtn (TL141)	N/A	2076	Shred, Burn	9.6 acres (3%)	4D	4D	4D
High Sierra South (TL156)	Threat	3060	Rx Burn only	64 acres (20%)	5D	5D	5D
Camp Ida (TL214)	Threat	3232	Rx Burn only	11acres (4%)	5M	5M	5M

Road/Trail Treatments

Approximately 4.44 miles of ohv route and road segments will be closed and/or decommissioned as a part of this project. The reduction of these segments would reduce ohv/motorized access to these PACs and HRCAs which may benefit the individuals in these territories by reducing noise disturbance. The following table summarizes trail/road segments and individual spotted owl PACs or HRCAs directly affected.

Table C-5. Summary of trail and road segments proposed for closure and/or decommissioning under the proposed action that intersect California spotted owl PACs or HRCAs.

PAC/HRCA ID	PAC/HRCA NAME	OHV/ROAD SEGMENT	MILES
TL260	LILY CREEK PAC	17EV50	2.26
		31735J	0.18
TL133	HIGH SIERRA SOUTH PAC	31806C	0.21
TL133 and TL156	HIGH SIERRA NORTH and SOUTH HRCA	41832E1	0.07
		41831B	0.08
		41831C	0.10
		41831D	0.05
		31805H	0.11
TL164	DODGE RIDGE HRCA	18EV112	0.45
		31818E2	0.10
TL126 and TL214	MERRILL SPRINGS and CAMP IDA HRCA	31721J	0.09
TL069	BASIN CREEK	2N07D	0.05
		2N93	0.82
		16EV299	0.40
		16EV299B	0.26
TOTAL MILES			**4.44**

Management Indicator Species (MIS)

Table C-6. Selection of MIS for Project-Level Habitat Analysis for the Phase II Fuel Reduction, Forest Health and Road Management Project.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component[1]	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis [2]
Riverine and Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	3
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow *Passerella iliaca*	3
Oak-associated Hardwood and Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer *Odocoileus hemionus*	2
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler *Dendroica petechia*	2
Wet Meadow	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree frog *Pseudacris regilla*	3
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierra mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail *Oreortyx pictus*	2
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierra mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail *Oreortyx pictus*	3
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierra mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse *Dendragapus obscurus*	2
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierra mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	California spotted owl *Strix occidentalis occidentalis*	3
		American marten *Martes americana*	
		northern flying squirrel *Glaucomys sabrinus*	
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker *Picoides villosus*	3
Snags in Burned Forest	Medium and large snags in burned forest (stand-replacing fire)	black-backed woodpecker *Picoides arcticus*	1

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

[2]**Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3 – MIS whose habitat would be either directly or indirectly affected by the project.

D. TREATMENT UNITS AND STAND CHARACTERISTICS

Treatment Units

Table D-1. Acreage, land allocation and treatment types by unit. Units are separated into northern, middle and southern units which correspond with treatment unit maps 2, 3 and 4 respectively.

Unit	Acres	Land Allocation	Treatment	Harvest System	Notes
Northern Units					
3040	36.8	Gen. Forest/part CAR (3 ac.)	Shred/burn	NA	Plantation (1968)
3041	25.7	WUI TZ, part CAR (7 ac.)	Thin/biomass/shred/burn	Tractor	Part (~4 ac.) plantation (1968)
3042	9.1	CAR	Thin/biomass/shred/burn	Tractor	Plantation (1968)
3043	61.5	part WUI TZ (36 ac.), HRCA	Thin/biomass/shred/burn	Tractor	
3044	8.5	WUI TZ	Thin/biomass/shred/burn	NA	Fuelbreak
3060	154.1	WUI DZ, CASO PAC, NG PAC	Rx burn only	NA	
3061	138.3	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
3062	14.7	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
3063	15.1	WUI TZ, HRCA	Thin/shred/burn	Helicopter	
3064	10.7	WUI TZ, HRCA	Thin/shred/burn	Helicopter	
3065	23.4	WUI TZ	Thin/biomass/shred/burn	Tractor	Fuelbreak - existing
3066	22.4	WUI TZ, Part HRCA	Shred/handcut/pile/burn	NA	Fuelbreak
3080	122.0	CAR	Thin/biomass/shred/burn	Tractor	Includes ~5 acres of brushy plantation (1968)
3081	20.3	CAR	Shred/handcut/pile/burn	NA	Plantation (1968)
4310	57.0	WUI DZ, part HRCA (10 ac)	Thin/biomass/shred/burn	Tractor	Mixed-age plantation (1979, 1984) and natural stand (~27 ac.)
4311	22.4	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
4320	11.7	part WUI TZ	Thin/biomass/shred/burn	Tractor	Part of West Shear.
4321	47.2	General Forest	Thin/biomass/shred/burn	Tractor	Fuelbreak-existing. part of West Shear timber sale (1999)
4322	16.1	WUI TZ	Thin/biomass/shred/burn	Tractor	
4323	7.1	General Forest	Thin/biomass/shred/burn	Tractor	
4324	64.3	part WUI TZ (37 ac.)	Thin/biomass/shred/burn	Tractor	Part of West Shear timber sale (1999)
4325	96.6	HRCA	Thin/biomass/shred/burn	Tractor	Tractor. Part of unit out of HRCA
4326	41.7	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
4330	24.7	General Forest	Shred/handcut/pile/burn	NA	Fuelbreak
Middle Units					
3170	40.1	HRCA, CAR	Thin/biomass/shred/burn	Tractor	
3171	97.3	CAR	Thin/biomass/shred/burn	Tractor	
3180	234.6	WUI TZ (110 ac), Gen. For., PAC (7 ac)	Thin/biomass/shred/burn	Tractor	Scattered groups of plantation (1968) (~ 50 acres)
3190	235.5	part WUI TZ (128 ac), part HRCA (142 ac), CAR	Thin/biomass/shred/burn	Tractor	
3191	14.8	HRCA, CAR	Thin/biomass/shred/burn	Tractor	Hull Creek campground unit
3193	53.7	WUI TZ, CAR	Thin/biomass/shred/burn	Tractor	Mixed age plantation (1960, 1971)
Middle Units (continued)					
3194	9.7	WUI TA, part HRCA	Thin/biomass/shred/burn	Tractor	Part plantation (~5 ac.)

Unit	Acres	Land Allocation	Treatment	Harvest System	Notes
		(3.5 ac), CAR			
3195	2.2	WUI TZ, HRCA, CAR	Handcut/pile/burn	NA	No mechanized equipment
3200	25.9	HRCA, CAR	Thin/biomass/shred/burn	Tractor	
3201	60.7	CAR	Thin/biomass/shred/burn	Tractor	Plantation thinned in 1997 (North Fahey MP)
3210	25.8	WUI TZ, HRCA, OFEA	Thin/shred/burn	Helicopter	
3211	21.3	WUI TZ, HRCA, OFEA	Thin/biomass/shred/burn	Tractor	Thinned in 2001(Sammy Timber sale)
3221	15.4	WUI TZ, part HRCA (2 ac), part OFEA (2 ac.)	Thin/biomass/shred/burn	Tractor	mostly plantation (1962) thinned in 1992 (Wrights I)
3230	302.0	WUI TZ	Thin/biomass/shred/burn	Tractor	
3231	24.2	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	Plantation (1962) partially thinned in 1992 (Wrights I)
3232	11.3	WUI TZ, CASO PAC	Rx burn only	NA	
3240	275.2	part WUI TZ (128 ac.), CAR	Rx burn only	NA	Part (~ 150 ac) plantation (1959) thinned in 1992 (Wrights I,)
3241	14.4	HRCA, CAR	Thin/biomass/shred/burn	Tractor	
3250	33.0	WUI TZ, CAR	Thin/biomass/shred/burn	Tractor	
3251	41.8	WUI TZ, CAR	Thin/biomass/shred/burn	Tractor	
3260	333.3	WUI TZ, CAR	Thin/biomass/shred/burn	Tractor	Plantation (1959-1962)
3270	160.6	WUI TZ, part HRCA (25 ac.), Part OFEA (75 ac.)	Rx burn only	NA	Part (~ 40 acres) plantation (1963) thinned in 1992 (Wrights I)
3271	306.7	WUI TZ, part OFEA (64 ac.)	Thin/biomass/shred/burn	Tractor	Plantation (1962, 1968)) with small natural stands (~45 ac.)
3280	52.9	WUI TZ, part OFEA (30 ac.)	Shred/burn	NA	Shred plantation. Many small trees w/ brush
3281	84.1	WUI TZ, part HRCA (15 ac.), part OFEA (50 ac.)	Shred/handcut/pile/burn	NA	Natural stand and thinned plantation (40 ac.) mix under North Fahey MP (1997)
3282	67.8	WUI TZ, OFEA	Thin/biomass/shred/burn	Tractor	Plantation (1963) thinned in 1992 (Wrights I)
3283	178.5	WUI TZ, HRCA, OFEA	Thin/biomass/shred/burn	Tractor	Plantation (1963) thinned in 1992 (Wrights I)
3300	39.9	HRCA, CAR	Thin/biomass/shred/burn	Tractor	
3301	7.7	part HRCA (1 ac.), CAR	Thin/biomass/shred/burn	Tractor	
3320	237.2	WUI TZ, part HRCA (15 ac.)	Thin/biomass/shred/burn	Tractor	Plantations (1952, 1964), partially thinned in 1995 (Wrights II))
3322	40.8	WUI TZ	Thin/biomass/shred/burn	Tractor	Plantations (1952, 1964), Fuelbreak - part is existing
3340	22.6	WUI TZ, Part HRCA (18 ac.)	Thin/biomass/shred/burn	Tractor	Plantation (1962)
3341	123.3	WUI TZ	Thin/biomass/shred/burn	Tractor	Plantation (1962) thinned in 1997 (North Fahey MP
3342	76.5	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	Plantation (1962) thinned in 1997 (North Fahey MP
3350	53.0	WUI DZ, CAR	Thin/biomass/shred/burn	Tractor	
3351	80.6	WUI DZ, CASO PAC, CAR	Thin/biomass/shred/burn	Tractor	12 inch DBH limit
3352	20.4	WUI DZ, CAR	Shred/handcut/pile/burn	NA	Some small plantation patches
Southern Units					
2070	22.8	General Forest	Thin/biomass/shred/burn	Tractor	Fuelbreak (existing), Thinned in 1996 (Basin timber sale)
2071	25.1	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
2072	30.4	General Forest	Thin/biomass/shred/burn	Tractor	
2073	15.2	WUI TZ, HRCA	Thin/shred/burn	Helicopter	
2074	25.6	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
2075	9.4	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	

Unit	Acres	Land Allocation	Treatment	Harvest System	Notes
2076	9.6	CASO PAC	Shred/burn	NA	
2120	160.0	WUI TZ, part HRCA (53 ac.), part OFEA (22 ac.)	Thin/biomass/shred/burn	Tractor	Mostly plantation (1970) w/ scattered patches of natural stand
2121	31.7	WUI TZ, part HRCA (5 ac.)	Thin/biomass/shred/burn	Tractor	Fuelbreak
2122	96.2	WUI TZ, part HRCA (40ac.), OFEA	Shred/burn	NA	Shred ridges, RX burn through whole unit
2130	67.2	WUI TZ	Shred/handcut/pile/burn	NA	Fuelbreak on ridges. Young plantation (1998-2000) inclusions
2182	40.0	WUI TZ, part HRCA	Shred/handcut/pile/burn	NA	Fuelbreak (existing)
2240	23.4	WUI DZ/TZ, HRCA	Shred/handcut/pile/burn	NA	
2241	20.3	WUI DZ, HRCA	Thin/biomass/shred/burn	Tractor	Thinned in 1999 (Camp 8 sale)
2242	43.9	WUI TZ, part HRCA (3 ac.)	Thin/biomass/shred/burn	Tractor	Small portion in southern part is HRCA
2243	20.8	WUI TZ, HRCA	Thin/biomass/shred/burn	Tractor	
2244	46.1	WUI TZ	Thin/biomass/shred/burn	Tractor	
2245	16.5	WUI TZ	Thin/handcut/pile/burn	Helicopter	Release riparian vegetation
2246	17.8	WUI DZ/TZ, HRCA	Thin/handcut/pile/burn	Helicopter	Release riparian vegetation
2247	7.1	WUI TZ, HRCA	Thin/shred/burn	Helicopter	Plantation
2248	58.7	WUI TZ, part HRCA (5 ac)	Thin/biomass/shred/burn	Tractor	Fuelbreak (existing) patches of young plantation and thinned older plantation.
2249	2.6	WUI TZ, HRCA	Thin/shred/burn	Helicopter	Plantation
2249	32.2	WUI TZ, HRCA	Thin/shred/burn	Helicopter	Plantation

WUI = Wildland-Urban Intermix, DZ = defense zone, TZ = threat zone, CASO = California spotted owl, NG = northern goshawk, PAC = protected activity center, HRCA = CA spotted owl home range core area, CAR = critical aquatic refuge

Table D-2 (a) Comparison of trees-per-acre and overstory average diameter for units proposed for mechanical thinning. Some units contain multiple aggregates, which are displayed separately. Plantation units/aggregates are shaded.

Unit	Acres	Trees per Acre			Overstory QMD (Dominant/Co-dominate trees)					
		Pre-	Post-Treatment		Pre-	Post-Treatment		at 20 years		
		(Alt. 2)	Alt. 1	Alt. 3	(Alt. 2)	Alt. 1	Alt. 3	Alt. 1	Alt. 2	Alt. 3
2070	22.8	175	78	102	20.4	20.6	20.6	25.4	24.4	25.5
2071-1	25.1	241	90	76	23.2	23.4	26.3	27.4	27.5	30.0
2071-2	25.1	175	78	102	20.4	20.6	20.6	25.4	24.4	25.5
2072	30.4	465	264	263	14.5	14.7	16.8	18.4	16.1	20.4
2073	15.2	241	90	76	23.2	23.4	26.3	27.4	27.5	30.0
2074	25.6	139	95	107	17.7	17.7	17.7	23.8	21.0	23.7
2075	9.4	241	90	76	23.2	23.4	26.3	27.4	27.5	30.0
2076	9.6	241	110	110	23.2	23.4	23.4	27.4	27.5	27.4
2120-1	102.0	570	176	262	11.2	12.3	13.3	17.2	14.5	17.7
2120-2	58.0	570	228	262	11.2	11.6	13.3	15.9	14.5	17.7
2121	31.7	570	176	262	11.2	12.3	13.3	17.2	14.5	17.7
2241	20.3	83	71	66	22.0	23.2	24.4	27.2	25.5	28.3
2242	43.9	50	45	45	19.5	20.0	19.8	24.5	23.1	24.2
2243	20.8	167	80	76	15.3	17.7	17.9	23.2	18.4	23.6
2244-1	46.1	167	80	76	15.3	17.7	17.9	23.2	18.4	23.6
2244-2		46	50	45	19.5	20.0	19.8	24.5	23.1	24.2
2245	16.5	94	37	60	19.2	25.0	23.3	29.3	19.0	26.8
2246-1	17.8	94	37	60	19.2	25.0	23.3	29.3	19.0	26.8
2246-2		94	61	60	19.2	22.4	23.3	26.7	19.0	26.8
2247	7.1	173	120	111	11.9	11.6	12.2	12.6	13.3	13.1
2248-1	58.7	97	82	85	14.1	14.4	14.4	20.5	19.7	20.3
2248-2		50	45	45	19.5	20.0	19.8	24.5	23.1	24.2
2249	34.8	173	120	111	11.9	11.6	12.2	12.6	13.3	13.1
3041	25.7	257	114	147	22.4	22.7	22.6	24.1	26.1	26.2
3042	9.1	252	139	218	14.5	15.5	15.4	20.2	19.1	19.9
3043	61.5	257	157	147	22.4	22.6	22.6	25.8	26.1	26.2
3061-1	69.2	244	111	107	21.7	21.6	26.3	25.1	25.4	29.8
3061-2	69.2	328	154	153	21.2	21.2	26.1	24.9	25.1	29.7
3062	14.7	312	163	194	25.3	26.4	25.5	30.0	29.0	28.8
3063	15.1	312	163	194	25.3	26.4	25.5	30.0	29.0	28.8
3064	10.7	244	111	107	21.7	21.6	26.3	25.1	25.4	29.8
3065	23.4	439	119	189	16.6	16.6	18.7	20.2	20.2	22.1
3080	122.0	276	137	210	28.9	30.8	31.9	33.8	32.2	34.9
3170	40.1	216	93	98	24.8	29.1	25.0	29.1	28.6	28.8
3171	97.3	216	54	98	24.8	25.4	25.0	29.7	28.6	28.8
3180-1	187.7	949	151	128	19.5	19.9	21.2	24.0	21.2	25.8
3180-2	46.9	255	115	188	15.4	15.6	15.6	20.0	19.5	19.8
3190	235.5	290	92	71	26.2	26.4	30.1	29.5	28.2	33.4
3191	14.8	290	92	71	26.2	26.4	30.1	29.5	28.2	33.4
3193	53.7	120	57	85	19.4	19.6	19.6	23.7	23.3	23.5
3194	9.7	98	82	80	29.4	29.7	29.5	33.1	32.5	32.9
3200	25.9	312	70	84	19.9	27.4	26.8	30.7	24.1	29.9
3201	60.7	153	68	75	18.1	18.4	19.0	22.5	21.3	22.8
3210	21.6	390	115	113	26.4	26.7	26.6	30.6	30.4	30.6
3211	21.3	40	35	35	31.1	31.3	31.2	34.1	34.0	34.0
3221	15.4	151	61	131	18.9	19.2	19.1	23.1	22.5	22.7
3230	302.0	161	118	102	22.6	22.5	25.2	26.0	24.2	29.4
3231-1	11.4	122	70	91	16.4	17.3	17.2	21.0	18.5	20.5
3231-2	12.8	92	80	80	20.4	20.6	20.6	25.2	24.8	25.2
3241	16.9	290	92	71	26.2	26.4	30.1	29.5	28.2	33.4
3250	33.0	290	71	71	26.2	26.4	30.1	29.5	28.2	33.4
3260	333.3	397	59	59	18.2	19.5	19.5	23.6	22.2	23.6

		Trees per Acre			Overstory QMD (Dominant/Co-dominate trees)					
Unit	**Acres**	**Pre-**	**Post-Treatment**		**Pre-**	**Post-Treatment**		**at 20 years**		
		(Alt. 2)	**Alt. 1**	**Alt. 3**	**(Alt. 2)**	**Alt. 1**	**Alt. 3**	**Alt. 1**	**Alt. 2**	**Alt. 3**
3271-1	261.7	85	76	76	16.7	16.9	16.9	21.0	20.3	21.0
3271-2	45.0	129	56	56	25.4	25.8	28.4	28.7	28.5	31.2
3282	67.8	151	61	131	18.9	19.2	19.1	23.1	22.5	22.7
3283	178.5	151	71	131	18.9	19.2	19.1	23.1	22.5	22.7
3300	39.9	98	82	80	29.4	29.7	29.5	33.1	32.5	32.9
3301	7.7	98	82	80	29.4	29.7	29.5	33.1	32.5	32.9
3320-1	71.2	57	44	44	21.5	22.5	22.5	26.1	25.0	26.1
3320-2	166.0	149	68	56	19.6	20.5	22.0	24.0	22.4	25.2
3322	41.0	57	44	44	21.5	22.5	22.5	26.1	25.0	26.1
3340	22.6	132	76	76	16.0	16.7	16.7	20.8	19.4	20.8
3341	123.3	251	98	98	13.5	14.1	14.1	18.3	16.8	18.3
3342	76.5	132	76	76	16.0	16.7	16.7	20.8	19.4	20.8
3350	53.0	294	61	97	24.9	25.1	25.0	28.5	28.6	28.4
3351	80.6	169	75	75	26.6	26.8	26.8	31.1	30.6	31.1
4310-1	22.8	228	97	135	18.7	18.6	18.9	23.3	23.1	23.4
4310-2	34.2	342	116	207	14.7	16.0	16.8	20.6	10.0	20.7
4311	22.4	527	247	132	21.3	21.2	21.6	24.5	24.2	24.6
4320	11.7	142	87	77	22.5	23.4	24.6	27.1	26.2	28.3
4321	47.2	142	87	77	22.5	23.4	24.6	27.1	26.2	28.3
4322	16.1	433	131	153	19.0	22.9	23.8	28.2	21.4	28.6
4323	7.1	305	92	136	19.8	21.1	23.8	25.4	24.2	27.7
4324-1	45.0	142	87	77	22.5	23.4	24.6	27.1	26.2	28.3
4324-2	19.3	305	92	136	19.8	21.1	23.8	25.4	24.2	27.7
4325	96.6	305	121	136	19.8	20.7	23.8	24.7	24.2	27.7
4326	41.7	433	138	153	19.0	22.0	23.8	27.2	21.4	28.6

Table D-2 (b) Comparison of stand basic attributes and CWHR type for units proposed for mechanical thinning. SMC refers to Sierra mixed conifer CWHR type; PPN refers to ponderosa pine CWHR type. Jeffrey pine stands or ponderosa pine stands with a Jeffrey pine component were classified as ponderosa pine type as well. Some units contain multiple aggregates, which are displayed separately. Plantation units/aggregates are shaded.

Unit	Basal Area per Acre			Avg. Canopy Cover			CWHR Type			Snags per acre > 15" dbh		Oak - BA (sq.ft./acre)
	Pre-	Post-Treatment		Pre-	Post-Treatment		Pre-	Post-Treatment				
	(Alt. 2)	Alt. 1	Alt. 3	(Alt. 2)	Alt. 1	Alt. 3	(Alt. 2)	Alt. 1	Alt. 3	Pre-	Post-	pre/post
2070	113	103	112	41%	38%	42%	SMC4M	SMC4P	SMC4M	<1	<1	3.2
2071-1	251	196	195	62%	52%	51%	SMC4D	SMC4M	SMC4M	1.2	1.2	0.0
2071-2	113	103	112	41%	38%	42%	SMC4M	SMC4P	SMC4M	<1	<1	3.2
2072	162	141	140	82%	81%	80%	PPN4D	PPN4D	PPN4D	<1	<1	58.1
2073	251	196	195	62%	52%	51%	SMC4D	SMC4M	SMC4M	1.2	1.2	0.0
2074	111	103	112	41%	39%	41%	SMC4M	SMC4P	SMC4M	2.3	2.3	8.1
2075	251	196	195	62%	52%	51%	SMC4D	SMC4M	SMC4M	1.2	1.2	0.0
2076	251	234	234	62%	58%	58%	SMC4D	SMC4M	SMC4M	1.3	1.3	0.0
2120-1	184	103	143	61%	40%	50%	PPN4D	PPN4M	PPN4M	<1	<1	9.1
2120-2	184	131	143	61%	50%	50%	PPN4D	PPN4M	PPN4M	<1	<1	9.1
2121	184	103	143	61%	40%	50%	PPN4D	PPN4M	PPN4M	<1	<1	9.1
2241	133	110	105	57%	52%	51%	PPN4M	PPN4M	PPN4M	<1	<1	17.0
2242	77	76	77	41%	40%	40%	SMC4M	SMC4M	SMC4M	6.0	6.0	28.0
2243	219	138	135	78%	64%	63%	PPN4D	PPN4D	PPN4D	<1	<1	39.0
2244-1	219	138	135	78%	64%	63%	PPN4D	PPN4D	PPN4D	<1	<1	39.0
2244-2	77	76	77	41%	40%	40%	SMC4M	SMC4M	SMC4M	<1	<1	28.0
2245	197	128	179	56%	40%	50%	SMC4M	SMC4M	SMC4M	1.6	1.6	15.0
2246-1	197	128	179	56%	40%	50%	SMC4M	SMC4M	SMC4M	1.6	1.6	15.0
2246-2	197.0	167	179	56%	50%	50%	SMC4M	SMC4M	SMC4M	2	2	15.0
2247	139	93	96	83%	73%	73%	SMC4D	SMC4D	SMC4D	2.5	2.5	45.0
2248-1	106	93	96	69%	66%	66%	SMC4D	SMC4D	SMC4D	0.0	0.0	38.0
2248-2	77	76	77	41%	40%	40%	SMC4M	SMC4M	SMC4M	6.0	<1	28.0
2249	139	93	96	83%	73%	73%	SMC4D	SMC4D	SMC4D	2.5	2.5	45.0
3041	287	175	230	65%	40%	50%	SMC4D	SMC4M	SMC4M	10.4	10.4	<5
3042	179	114	156	57%	40%	50%	JPN4D	JPN4M	JPN4M	<1	<1	<5
3043	287	220	230	65%	50%	50%	SMC4D	SMC4M	SMC4M	10.4	10.4	<5
3061-1	302	175	193	71%	50%	50%	SMC4D	SMC4M	SMC4M	16.1	16.1	15.3
3061-2	294	152	154	82%	61%	59%	SMC4D	SMC4M	SMC4M	12.0	12.0	27.4
3062	322	227	257	66%	50%	50%	SMC5D	SMC5M	SMC5M	12.9	12.9	<5
3063	322	227	257	66%	50%	50%	SMC5D	SMC5M	SMC5M	12.9	12.9	<5
3064	302	175	193	71%	50%	50%	SMC4D	SMC4M	SMC4M	16.1	16.1	15.3
3065	304	154	171	89%	68%	68%	SMC4D	SMC4M	SMC4M	<1	<1	<5
3080	281	200	264	57%	40%	50%	SMC5M	SMC5M	SMC5M	13.3	13.3	<5
3170	249	216	221	58%	50%	50%	SMC5M	SMC5M	SMC5M	17.0	17.0	9.4
3171	249	169	221	58%	40%	50%	SMC5M	SMC5M	SMC5M	17.0	17.0	9.4
3180-1	360	206	219	77%	50%	50%	SMC4D	SMC4M	SMC4M	1.9	1.9	2.1
3180-2	164	107	143	59%	40%	50%	PPN4M	PPN4M	PPN4M	<1	<1	0.0
3190	274	219	228	61%	50%	50%	SMC5D	SMC5M	SMC5M	1.3	1.3	2.1
3191	274	219	228	61%	50%	50%	SMC5D	SMC5M	SMC5M	1.3	1.3	2.1
3193	154	116	156	51%	40%	51%	PPN4M	PPN4M	PPN4M	<1	<1	<1
3194	275	253	261	54%	50%	50%	SMC5M	SMC5M	SMC5M	14.0	14.0	0.0
3200	328	184	220	86%	64%	68%	SMC4D	SMC5D	SMD5D	9.5	9.5	27.5
3201	168	122	144	58%	45%	50%	PPN4M	PP4M	PP4M	<1	<1	5.2
3210	264.0	204.0	215.0	60	50	50	SMC6	SMC5M	SMC5M	1.0	1.0	0.0
3211	195	186	188	43%	41%	42%	SMC5M	SMC5M	SMC5M	<1	<1	0.0
3221	161	118	157	53%	40%	50%	PPN4M	PPN4M	PPN4M	<1	<1	<1
3230	189	172	172%	43%	40%	40.0	SMC4M	SMC4M	SMC4M	7.0	7.0	<1
3231-1	157	115	145	55%	42%	51%	PPN4M	PPN4M	PPN4M	<1	<1	<1
3231-2	166	158	158	39	36	36	SMC4P	SMC4P	SMC4P	<1	<1	<1
3241	274	219	228	61%	50%	50%	SMC5D	SMC5M	SMC5M	1.3	1.3	2.1

	Basal Area per Acre			Avg. Canopy Cover			CWHR Type			Snags per acre		Oak - BA
Unit	Pre-	Post-Treatment		Pre-	Post-Treatment		Pre-	Post-Treatment		> 15" dbh		(sq.ft./acre)
	(Alt. 2)	Alt. 1	Alt. 3	(Alt. 2)	Alt. 1	Alt. 3	(Alt. 2)	Alt. 1	Alt. 3	Pre-	Post-	pre/post
3250	274	184	228	61%	43%	50%	SMC5D	SMC5M	SMC5M	1.3	1.3	2.1
3260	105	107	107	38%	36%	36%	PPN4P	PPN4P	PPN4P	<1	<1	<1
3271-1	129	119	119	46%	44%	44%	PPN4M	PPN4M	PPN4M	4.7	4.7	<1
3271-2	241	192	209	58%	50%	50%	PPN5M	PPN5M	PPN5M	6.2	6.2	<1
3282	161	118	157	53%	40%	50%	PPN4M	PPN4M	PPN4M	<1	<1	<1
3283	161	123	157	53%	43%	50%	PPN4M	PPN4M	PPN4M	<1	<1	<1
3300	275	253	261	54%	50%	50%	SMC5M	SMC5M	SMC5M	14.0	14.0	0.0
3301	275	253	261	54%	50%	50%	SMC5M	SMC5M	SMC5M	14.0	14.0	0.0
3320-1	134	121	123	44%	40%	40%	PPN4M	PPN4M	PPN4M	1.6	1.6	<1
3320-2	201	125	127	64%	44%	43%	PPN4D	PPN4M	PPN4M	<1	<1	<1
3322	134	121	123	44%	40%	40%	PPN4M	PPN4M	PPN4M	1.6	<1	<1
3340	159	116	116	56%	43%	43%	PPN4M	PPN4M	PPN4M	<1	<1	0.0
3341	177	106	106	63%	42%	42%	PPN4D	PPN4M	PPN4M	<1	<1	0.0
3342	159	116	116	56%	43%	43%	PPN4M	PPN4M	PPN4M	<1	<1	0.0
3350	276	185	214	65%	46%	50%	SMC6	SMC5M	SMC5M	8.2	8.2	0.0
3351	193	186	186	42%	40%	40%	SMC5M	SMC5M	SMC5M	5.2	5.2	0.0
4310-1	284	185	240	58%	40%	50%	SMC4M	SMC4M	SMC4M	<1	<1	0.0
4310-2	202	102	152	67%	41%	51%	PPN4D	PP4M	PP4M	<1	<1	20.2
4311	318	245	60	63%	50%	50%	SMC4D	SMC4M	SMC4M	<1	<1	0.0
4320	255	181	193	67%	56%	57%	SMC4D	SMC4M	SMC5M	6.1	6.1	22.8
4321	255	181	193	67%	56%	57%	SMC4D	SMC4M	SMC5M	6.1	<1	0.0
4322	299	166	208	75%	49%	53%	SMC4D	SMC4M	SMC4M	12.2	12.2	13.6
4323	310	153	215	73%	41%	52%	SMC4D	SMC4M	SMC4M	<1	<1	2.6
4324-1	255	181	193	67%	56%	57%	SMC4D	SMC4M	SMC5M	6.1	6.1	22.8
4324-2	310	153	215	73%	41%	52%	SMC4D	SMC4M	SMC4M	12.1	12.1	2.6
4325	310	196	215	73%	50%	52%	SMC4D	SMC4M	SMC4M	12.1	12.1	2.6
4326	299	173	208	75.0	50.0	53.0	SMC4D	SMC4M	SMC4M	12.2	12.2	13.6

Table D-3. (a) Comparison of Stand Density Index (SDI) and percentage of square feet of basal area (BA) in the suppressed (sup.) and intermediate (int.) crown position for proposed thinning units. Target SDI levels differ by cover type – 230 for ponderosa pine and 300-333 for mixed conifer. Some units contain multiple aggregates, which are displayed separately. Plantation units/aggregates are shaded.

Unit	Acres	Stand Density Index					%BA - Sup and Int Crn. Class		
		Pre-	at 20 years				Pre-	Post-Treatment	
			Target	Alt. 1	Alt. 2	Alt. 3	Alt. 2	Alt. 1	Alt. 3
2070	22.8	281	300-333	204	282	224	29%	24%	30%
2071-1	25.1	405	300-333	337	432	332	36%	18%	29%
2071-2	25.1	281	300-333	204	282	224	29%	24%	30%
2072	30.4	324	300-333	232	406	230	24%	25%	25%
2073	15.2	405	300-333	337	432	332	36%	18%	29%
2074	25.6	239	300-333	200	258	217	38%	32%	37%
2075	9.4	405	300-333	337	432	332	36%	18%	29%
2076	9.6	405	300-333	381	432	381	36%	31%	31%
2120-1	102.0	374	230	228	488	302	33%	10%	26%
2120-2	58.0	374	230	279	488	302	33%	8%	26%
2121	31.7	374	230	228	488	302	33%	10%	26%
2241	20.3	241	230	215	244	204	13	13%	13%
2242	43.9	190	300-333	160	145	165	0%	0%	0%
2243	20.8	368	230	242	402	235	0%	0%	0%
2244-1	15.5	368	230	242	402	235	0%	0%	0%
2244-2	30.6	190	300-333	160	145	165	0%	0%	0%
2245	16.5	335	300-333	235	375	304	0%	0%	0%
2246-1	17.8	335	300-333	235	375	304	0%	0%	0%
2246-2		335	300-333	288	375	304	0%	0%	0%
2247	7.1	248	230	236	298	236	0%	0%	0%
2248-1	58.7	169	230	165	152	170	0%	0%	0%
2248-2		190	300-333	160	145	165	0%	0%	0%
2249	34.8	248	230	236	298	236	0%	0%	0%
3041	25.7	456	300-333	312	500	394	40%	5%	24%
3042	9.1	311	230	320	392	376	0%	0%	0%
3043	61.5	456	300-333	387	500	394	40%	21%	24%
3061-1	69.2	611	300-333	348	652	362	39%	24%	20%
3061-2	69.2	489	300-333	311	434	305	50%	19%	28%
3062	14.7	521	300-333	427	495	473	45%	32%	30%
3063	15.1	521	300-333	427	495	473	45%	32%	30%
3064	10.7	611	300-333	348	652	362	39%	24%	20%
3065	23.4	532	300-333	330	462	372	44%	18%	16%
3080	122.0	456	300-333	371	504	477	33%	12%	28%
3170	40.1	393	300-333	376	444	385	34%	24%	25%
3171	97.3	393	300-333	302	444	385	34%	8%	25%
3180-1	187.7	710	300-333	371	772	388	56%	23%	30%
3180-2	46.9	290	230	231	378	291	32%	0%	20%
3190	235.5	449	300-333	374	523	385	40%	24%	30%
3191	14.8	449	300-333	374	523	385	40%	24%	30%
3193	53.7	239	230	235	312	299	11%	0%	11%
3194	9.7	365	300-333	381	378	408	36%	30%	30%
3200	25.9	529	300-333	278	5	330	29%	4%	8%
3201	60.7	268	230	227	330	257	5%	0%	0%
3210	21.6	464	300-333	373	490	380	60.0	53	54

Unit	Acres	Stand Density Index					%BA - Sup and Int Crn. Class		
		Pre-	at 20 years				Pre-	Post-Treatment	
			Target	Alt. 1	Alt. 2	Alt. 3	Alt. 2	Alt. 1	Alt. 3
3211	21.3	232	300-333	308	334	311	4%	0%	0%
3221	15.4	258	230	230	330	286	20%	3%	16%
3230	302.0	327	300-333	331	410	331	40%	32%	36%
3231-1	11.4	243	230	226	313	275	4%	0%	0%
3231-2	12.8	240	300-333	300	315	300	19%	13%	13%
3241	16.9	449	300-333	374	523	385	40%	24%	30%
3250	33.0	449	300-333	324	523	385	40%	10%	30%
3260	333.3	155	230	204	204	204	7%	1%	1%
3271-1	261.7	193	230	252	252	234	0%	0%	0%
3271-2	45.0	347	230	305	376	327	24%	7%	20%
3282	67.8	258	230	230	330	286	20%	3%	16%
3283	178.5	258	230	240	330	286	20%	3%	16%
3300	39.9	365	300-333	381	378	408	36%	30%	30%
3301	7.7	365	300-333	381	378	408	36%	30%	30%
3320-1	71.2	183	230	223	226	229	4%	1%	4%
3320-2	166.0	309	230	232	349	231	20%	10%	2%
3322	41.0	183	230	223	226	229	4%	1%	4%
3340	22.6	249	230	232	318	232	12%	0%	0%
3341	123.3	308	230	231	370	231	16%	0%	0%
3342	76.5	249	230	232	318	232	12%	0%	0%
3350	53.0	455	300-333	306	462	352	39%	9%	5%
3351	80.6	306	300-333	319	402	319	31%	38%	38%
4310-1	22.8	442	300-333	356	474	418	35%	13%	22%
4310-2	34.2	364	230	206	451	297	18%	0%	0%
4311	22.4	571	300-333	354	579	401	29%	7%	11%
4320	11.7	412	300-333	308	428	306	32%	18%	21%
4321	47.2	412	300-333	308	428	306	32%	18%	21%
4322	16.1	497	300-333	278	553	325	30%	5%	13%
4323	7.1	502	300-333	269	453	347	42%	3%	23%
4324-1	45.0	412	300-333	308	428	306	32%	18%	21%
4324-2	19.3	502	300-333	269	453	347	42%	3%	23%
4325	96.6	502	300-333	337	453	347	42%	11%	23%
4326	41.7	497.0	300-333	263	553	325	30%	12%	13%

Table D-3 (b) Comparison of the large tree componant (trees-per-acre, or TPA, greater than 20" and 24" dbh), and volume (boardfeet). These measures were developed to display the display differences between alternatives with regard toisues raised during scoping. Some units contain multiple aggregates, which are displayed separately. Plantation units/aggregates are shaded.

Unit	TPA 20 – 24" DBH			TPA >24" DBH						Merchantable Boardfeet (in MBF)			
	Pre-	Post-Treatment		Pre	Post-Treatment		at 20 years			Pre-	Removed		
	Alt. 2	Alt. 1	Alt. 3	Alt. 2	Alt. 1	Alt. 3	Alt.1	Alt. 2	Alt. 3		Alt. 1	Alt. 2	Alt. 3
2070	4.1	4.0	4.1	9.5	9.5	9.5	12.8	13.4	12.8	13.3	0.0	0.0	0.0
2071-1	13.3	11.4	13.3	20.2	20.2	20.2	26.5	26.0	27.9	33.8	3.2	0.0	3.7
2071-2	4.1	4.0	4.1	9.5	9.5	9.5	12.8	13.4	12.8	13.3	0.0	0.0	0.0
2072	0.0	0.0	0.0	7.4	7.4	7.4	7.1	7.4	7.1	11.9	0.8	0.0	0.0
2073	13.3	11.4	13.3	20.2	20.2	20.2	26.5	26.0	27.9	33.8	3.2	0.0	3.7
2074	2.5	2.4	2.5	11.1	11.0	11.1	15.2	16.8	15.6	15.0	0.5	0.0	0.0
2075	13.3	11.4	13.3	20.2	20.2	20.2	26.5	26.0	27.9	33.8	3.2	0.0	3.7
2076	13.3	13.3	13.3	20.2	20.2	20.2	26.6	26.0	26.0	33.8	0.4	0.0	0.4
2120-1	2.4	3.7	2.4	2.4	3.5	4.3	7.2	8.2	7.9	12.6	2.8	0.0	0.0
2120-2	2.4	3.7	2.4	2.4	4.1	4.3	7.7	8.2	7.9	12.6	1.4	0.0	0.0
2121	2.4	3.7	2.4	2.4	3.5	4.3	7.2	8.2	7.9	12.6	2.8	0.0	0.0
2241	5.0	5.0	5.0	13.0	13.0	13.0	16.0	18.0	17.0	19.4	3.4	0.0	3.8
2242	7.0	7.0	7.0	7.0	7.0	7.0	12.0	14.0	12.0	12.9	0.3	0.0	0.1
2243	16.6	12.7	14.8	9.0	10.3	10.9	21.0	24.0	24.0	29.3	7.6	0.0	7.8
2244-1	16.6	12.7	14.8	9.0	10.3	10.9	21.0	24.0	24.0	29.3	7.6	0.0	7.8
2244-2	45.0	7.0	7.0	7.0	7.0	7.0	12.0	14.0	12.0	12.9	0.3	0.0	0.1
2245	9.6	1.9	9.6	19.0	16.0	19.0	16.0	25.0	24.0	28.6	4.5	0.0	0.0
2246-1	9.6	1.9	9.6	19.0	16.0	19.0	16.0	25.0	24.0	28.6	4.5	0.0	0.0
2246-2	10	8.8	9.6	19.0	19.0	19.0	25.0	25.0	24.0	28.6	1.0	0.0	0.1
2247	4.2	2.3	4.2	4.3	4.3	4.3	6.9	6.3	7.1	12.9	4.4	0.0	3.2
2248-1	0.0	0.0	0.0	11.3	11.3	11.3	10.7	10.7	10.7	14.9	1.2	0.0	0.9
2248-2	7.0	7.0	7.0	7.0	7.0	7.0	12.0	14.0	12.0	12.9	0.3	0.0	0.1
2249	4.2	2.3	4.2	4.3	4.3	4.3	6.9	6.3	7.1	12.9	4.4	0	3.2
3041	24.0	15.0	24.0	16.6	16.3	16.6	30.0	32.0	34.0	35.7	8.5	0.0	2.1
3042	0.0	0.0	0.0	0.0	0.0	0.0	11.0	9.0	10.0	17.9	6.5	0.0	2.5
3043	24.0	20.0	24.0	16.6	16.5	16.6	32.0	32.0	34.0	35.7	4.2	0.0	2.1
3061-1	19.0	9.0	19.0	22.0	16.0	22.0	25.0	36.0	38.0	44.1	14.4	0.0	9.0
3061-2	19.0	14.0	19.0	13.0	8.0	13.0	22.0	29.0	31.0	31.6	10.4	0.0	8.3
3062	10.0	9.0	10.0	26.0	25.0	26.0	29.0	26.0	31.0	51.4	9.6	0.0	3.1
3063	10.0	9.0	10.0	26.0	25.0	26.0	29.0	26.0	31.0	51.4	9.6	0.0	3.1
3064	19.0	9.0	19.0	22.0	16.0	22.0	25.0	36.0	38.0	440.8	14.4	0.0	9.0
3065	10.0	10.0	10.0	4.0	4.0	4.0	10.0	11.0	10.0	23.1	5.5	0.0	5.1
3080	14.0	11.0	14.0	22.0	20.0	22.0	29.0	31.0	32.0	51.2	7.0	0.0	0.2
3170	14.5	13.0	13.3	19.3	19.9	20.5	29.8	30.1	29.8	37.3	1.7	0.0	0.9
3171	14.5	11.1	13.3	19.3	17.1	20.5	25.8	30.1	29.8	37.3	6.5	0.0	0.9
3180-1	9.9	7.7	10.8	16.7	16.2	16.7	23.2	25.3	25.3	35.4	3.2	0.0	1.0
3180-2	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.7	1.4	11.3	1.9	0.0	0.0
3190	17.4	14.2	17.2	29.2	27.7	29.2	35.9	39.6	38.0	16.9	3.4	0.0	1.3
3191	17.4	14.2	17.2	29.2	27.7	29.2	35.9	39.6	38.0	16.9	3.4	0.0	1.3
3193	22.5	17.6	22.5	0.0	0.0	0.0	23.2	26.0	26.0	20.0	4.4	0.0	0.0
3194	19.6	16.4	19.6	29.4	28.1	29.4	34.3	36.6	36.0	50.8	2.8	0.0	1.6
3200	29.5	18.4	29.3	26.0	24.7	26.0	38.0	41.4	47.7	45.9	11.0	0.0	6.9
3201	18.6	17.3	18.6	5.4	3.5	5.4	19.4	20.3	20.3	20.9	4.9	0.0	1.9
3210	18.8	15.9	18.8	18.9	17.3	18.9	30.1	31.8	32.4	30.7	2.7	0.0	1.0
3211	64.0	6.1	6.4	29.0	28.6	28.9	29.5	30.6	29.9	43.1	0.8	0.0	0.5

Unit	TPA 20 – 24" DBH			TPA >24" DBH						Merchantable Boardfeet (in MBF)			
	Pre-	Post-Treatment		Pre	Post-Treatment		at 20 years			Pre-	Removed		
	Alt. 2	Alt. 1	Alt. 3	Alt. 2	Alt. 1	Alt. 3	Alt.1	Alt. 2	Alt. 3		Alt. 1	Alt. 2	Alt. 3
3221	18.8	15.7	18.7	3.7	4.1	4.3	18.2	18.5	18.5	19.4	3.8	0.0	0.1
3230	8.8	8.4	8.5	14.8	15.9	15.9	26.0	22.2	22.5	25.9	0.3	0.0	0.0
3231-1	16.5	13.1	16.5	1.9	1.9	1.9	14.1	14.6	13.8	18.5	4.1	0.0	0.5
3231-2	12.7	12.3	12.3	15.1	15.5	15.5	25.2	27.5	25.2	21.7	0.4	0	0.42
3241	17.4	14.2	17.2	29.2	27.7	29.2	35.9	39.6	38.0	16.9	3.4	0.0	1.3
3250	17.4	8.5	17.2	29.2	26.4	29.2	29.7	39.6	38.0	16.9	6.7	0.0	1.3
3260	7.5	9.1	9.1	4.6	5.2	5.2	14.6	14.4	14.6	14.7	0.4	0.0	0.4
3271-1	9.8	12.2	12.2	2.2	2.2	2.2	11.8	12.1	12.1	17.9	1.2	0.0	1.2
3271-2	12.1	5.1	12.1	28.9	26.9	28.8	28.5	33.9	34.4	43.1	4.1	0.0	2.8
3282	18.8	15.7	18.7	3.7	4.1	4.3	18.2	18.5	18.5	19.4	3.8	0.0	0.1
3283	18.8	15.7	18.7	3.7	4.1	4.3	18.2	18.5	18.5	19.4	3.8	0.0	0.1
3300	19.6	16.4	19.6	29.4	28.1	29.4	34.3	36.6	36.0	50.8	2.8	0.0	1.6
3301	19.6	16.4	19.6	29.4	28.1	29.4	34.3	36.6	36.0	50.8	2.8	0.0	1.6
3320-1	12.1	13.8	14.0	13.2	13.3	13.6	23.3	24.8	23.8	22.4	1.7	0.0	1.4
3320-2	18.5	15.4	18.9	9.0	7.4	9.0	19.5	23.4	23.6	30.3	9.6	0.0	7.9
3322	12.1	13.8	14.0	13.2	13.3	13.6	23.3	24.8	23.8	22.4	1.7	0.0	1.4
3340	6.7	6.9	6.9	2.2	2.2	2.2	8.6	10.9	8.6	19.2	4.0	0.0	4.0
3341	0.0	0.0	0.0	1.0	1.0	1.0	5.3	1.2	5.3	17.8	5.8	0.0	5.8
3342	6.7	6.9	6.9	2.2	2.2	2.2	8.6	10.9	8.6	19.2	4.0	0.0	4.0
3350	13.9	10.3	14.2	26.7	26.1	26.7	30.9	32.9	34.4	37.4	5.7	0.0	3.0
3351	9.9	9.8	9.8	22.0	22.0	22.0	28.6	28.2	28.6	28.6	0.3	0.0	0.3
4310-1	11.4	15.8	12.1	23.8	17.6	23.8	31.1	36.0	36.6	33.8	6.6	0.0	1.3
4310-2	7.3	7.8	7.8	5.0	5.0	5.0	11.7	12.1	11.6	18.9	4.8	0.0	0.4
4311	24.1	48.5	49.1	6.3	6.2	6.3	34.2	24.8	34.4	32.8	1.9	0.0	0.9
4320	16.1	8.8	16.0	23.3	19.6	23.3	24.7	29.0	32.5	35.7	7.6	0.0	4.9
4321	16.1	8.8	16.0	23.3	19.6	23.3	24.7	29.0	32.5	35.7	7.6	0.0	4.9
4322	18.1	7.7	18.0	29.4	20.3	29.4	25.5	36.0	38.5	43.6	12.2	0.0	4.9
4323	13.7	8.1	12.8	16.6	15.1	17.4	21.5	24.6	26.8	40.4	13.1	0.0	5.1
4324-1	16.1	8.8	16.0	23.3	19.6	23.3	24.7	29.0	32.5	35.7	7.6	0.0	4.9
4324-2	13.7	8.1	12.8	16.6	15.1	17.4	21.5	24.6	26.8	40.4	13.1	0.0	5.1
4325	13.7	10.2	12.8	16.6	17.3	17.4	24.5	24.6	26.8	40.4	8.2	0.0	2.1
4326	18.1	8.5	18.0	29.4	20.8	29.4	25.3	36.0	38.5	43.6	11.5	0.0	4.9

E. MAPS

See separate Map Package:

Map 1. Vicinity Map

Map 2. Treatment Units (North)

Map 3. Treatment Units (Middle)

Map 4. Treatment Units (South)

Map 5. Road Treatments (North)

Map 6. Road Treatments (Middle)

Map 7. Road Treatments (South)