

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Sugar Pine Adaptive Management Project. It describes both alternatives considered in detail and those eliminated from detailed study. The end of this chapter presents the alternatives in tabular format so that the alternatives and their environmental impacts can be readily compared.

Alternatives Considered in Detail

Based on the issue identified through public comment on the proposed action and comments received through the SNAMP Integration Team collaboration, two additional action alternatives were considered in detail. In addition, the Forest Service is required to analyze a No Action alternative. These alternatives including the proposed action and no action alternative are described in detail below.

Alternative 1 – No Action

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

Alternative 2 – The Proposed Action

Treatment areas within the project area boundary were delineated to include those areas where some form of treatment was necessary to meet the purpose and need. First treatment areas were designed to create SPLATs to reduce the intensity and spread of wildfires in and around WUI. Treatment areas near key transportation corridors (for egress and ingress into the community) and within the defense zone of the WUI were designed next. These treatment areas are designed to not only focus on those treatments needed to meet fire and fuel objectives (lower and limited mid-level canopy treatments), but the forested stands within the project area that are also considered overstocked with conifers (basal area and stand densities that are greater than can be sustained with changing environmental conditions). Treatment areas were further designed to address these areas. A treatment area map, Map 1, displays these treatment areas and can be found in the Map Package in the Appendix. Of the 5,416 total acres within the project boundary, approximately 2,920 acres were analyzed as areas where some form(s) of treatment are proposed (so named as treatment areas). The remaining 2,496 acres have no treatments proposed due to slopes greater than 35 percent, standards and guidelines limitation on treatment and/or no treatment is needed to meet the purpose and need.

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

- Commercial and biomass thinning an estimated 850 acres of approximately 90-110 year old natural conifer stands (within T areas);
- Commercial and biomass thinning an estimated 65 acres of approximately 45 year old ponderosa pine plantations (within T areas);

- Biomass thin an estimated 150 acres of approximately 70-90 year old natural 4 to 10 inch dbh (diameter at breast height) conifer stands (within T areas);
- Pre-commercial hand thin and remove fuel ladders, hand pile and burn on approximately 17 acres (within T 5 and M2);
- Pre-commercial thin, tractor pile and burn approximately 30 acres of natural conifer stands (within T areas);
- Masticate brush fields and masticate pre-commercial thin reproduction areas on approximately 245 acres (within T areas);
- Masticate brush fields, masticate fuel ladders, and masticate pre-commercially thin reproduction areas on approximately 395 acres (M areas);
- Perform fuelbreak maintenance on approximately 40 acres (M4);
- Pre-commercial thin/release plantations on approximately 115 acres (M10 (part), M11, 16, 24, and 25, portions of T6, 7, and 35);
- Plant and hand release site prepared openings on approximately 40 acres;
- Prescribed understory burn, as a primary fuels treatment, approximately 215 acres;
- Maintenance on approximately 28.2 miles of NFTS road;
- Reconstruction on approximately 9.8 miles of NFTS road;
- Construct approximately 0.5 miles of temporary road;
- Construct approximately 0.2 miles of new system road;
- Prescribed burn and/or manually treat infestations of noxious weeds, where located within the project treatment areas, with the goal of eradication and prevention of their spread.

Though a total of 2,920 acres are analyzed for treatments listed above, design criteria and standards and guidelines from SNFPA ROD (USDA-FS 2004) dictate areas where treatment can not occur to reduce and/or eliminate adverse effects on particular resources. These can include, but are not limited to heritage resources, botanical species, wildlife habitat, aquatic species and/or slopes greater than 35 percent. It is estimated that excluding these control areas from the treatment areas, a total of 1,908 acres will remain for treatment as proposed.

Alternative 3 – Lower and Limited Mid-Level Canopy Treatments within Known Den Site Buffer

In Alternative 3, treatment areas and the types of treatments would remain the same for all areas, as in Alternative 2, except for those portions of treatment areas T-4 and T-3 that are designated within the 700-acre Pacific Fisher den site buffer (as established by SNFPA ROD 2004, S&G #85 and #86) for known den sites. Treatments would be altered within the den site buffer to treat the lower and limited mid-level canopy (surface and ladder fuels) to address fire and fuels objectives within WUI (see Map 2, Map Package in Appendix A). There would be no additional treatment of the mid-level canopy (stand density) within the den site buffer. All other treatment areas would continue to have treatments similar to those listed in Alternative 2, which includes treatment of lower and middle level canopies. This alternative is being analyzed in detail to measure the effects as they relate to the implementation of the SNFPA ROD (2004) Standards and Guidelines

and is in response to the issue listed on page 6. There would continue to be approximately 2,920 acres treated under Alternative 3. In Alternative 3 the treatments would include:

- Commercial and biomass thin an estimated 760 acres of approximately 90-110 year old natural conifer stands (within T areas, except T4);
- Commercial and biomass thin an estimated 65 acres of approximately 45 year old ponderosa pine plantations (within T areas);
- Biomass thin an estimated 240 acres of approximately 70-90 year old natural 4 to 10 inch dbh conifer stands (within T areas);
- Pre-commercial hand thin and remove fuel ladders, hand pile and burn on approximately 17 acres (within T 5 and M2);
- Pre-commercial thin, tractor pile and burn approximately 30 acres of natural conifer stands (within T areas);
- Masticate brush fields and masticate pre-commercial thin reproduction areas on approximately 245 acres (within T areas);
- Masticate brush fields, masticate fuel ladders, and masticate pre-commercially thin reproduction areas on approximately 395 acres (M areas);
- Perform fuelbreak maintenance on approximately 40 acres (M4);
- Pre-commercial thin/release plantations on approximately 115 acres (M10 (part), M11, 16, 24, and 25, portions of T6, 7, and 35);
- Plant and hand release site prepared openings on approximately 40 acres;
- Prescribed understory burn, as a primary fuels treatment, approximately 215 acres;
- Maintenance on approximately 28.2 miles of NFTS road;
- Reconstruction on approximately 9.8 miles of NFTS road;
- Construct approximately 0.5 miles of temporary road;
- Construct approximately 0.2 miles of new system road; and
- Prescribe burn and/or manually treat infestations of noxious weeds, where located within the project treatment areas, with the goal of eradication and prevention of their spread.

Alternative 4 – Lower and Limited Mid-Level Canopy Treatments, All Treatment Areas

In Alternative 4, treatment areas would remain the same as in Alternative 2, but the treatments within these areas would include only those needed to reduce the surface and ladder fuels (within the lower and limited mid-level canopy levels) needed to achieve fire and fuels objectives. Under Alternative 4 there would be no additional treatments (i.e. additional thinning in the mid-level canopy) to fully address stand density and forest health objectives.

This alternative would, in effect, assume the entire project area as a Pacific Fisher den site, whereby, it would be treated to achieve fire and fuels objectives for the urban wildland intermix zone and limit treatments to mechanical clearing of ladder and surface fuels. As such, all design criteria and SNFPA ROD (2004) standards and guidelines associated with Pacific Fisher den sites would be implemented with this alternative.

This alternative is brought forward for detailed study based on current information provided from SNAMP study of the detection and movement of Pacific fisher within the project area, Conservation Biology Institute (CBI) modeling and the document entitled “Baseline Evaluation of Fisher Habitat and Population Status and Effects of Fires and Fuels Management on Fishers In the Southern Sierra Nevada” (Spencer 2008).

This alternative was developed to address the issue listed on page 6. As well, this alternative is being analyzed in detail to measure the effects as they relate to focusing treatments on fire and fuels objectives without additional treatment for forest health (stand density). There would be approximately 2,920 acres treated under Alternative 4. In Alternative 4 the treatments would include:

- Biomass thin (fuel ladder reduction) an estimated 1,065 acres of approximately 70-90 year old natural conifer stands (within T areas);
- Pre-commercially hand thin and remove fuel ladders, hand pile and burn on approximately 17 acres (within T 5 and M2, see map);
- Pre-commercially thin, tractor pile and burn approximately 30 acres of natural conifer stands (within T areas, see map);
- Masticate brush fields and masticate pre-commercial thin reproduction areas on approximately 245 acres (within T areas, see map);
- Masticate brush fields, masticate fuel ladders, and masticate pre-commercially thin reproduction areas on approximately 395 acres (M areas, see map);
- Perform fuelbreak maintenance on approximately 40 acres (M4, see map);
- Pre-commercially thin/release plantations on approximately 115 acres (M10 (part), M11, 16, 24, and 25, portions of T6, 7, and 35, see map);
- Plant and hand release site prepared openings on approximately 40 acres;
- Prescribed understory burn, as a primary fuels treatment, approximately 215 acres;
- Maintenance on approximately 28.2 miles of NFTS road;
- Reconstruction on approximately 9.8 miles of NFTS road;
- Construct approximately 0.5 miles of temporary road;
- Construct approximately 0.2 miles of new system road;
- Prescribe burn and/or manually treat infestations of noxious weeds, where located within the project treatment areas, with the goal of eradication and prevention of their spread.

Design Criteria Common to All Action Alternatives

The Forest Service has developed the following design criteria to be used for all action alternatives. These are listed by resource area and are intended to minimize potential environmental impacts of the activities listed for each alternative.

Cultural Resources

Procedures and standard protection measures from 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 (the Sierran PA) will be utilized for the protection of Heritage Resources within the project area. The primary protection measure will be avoidance, but additional measures, such as directional felling and monitoring can be used to minimize potential effects.

Botany

Project design criteria for protection of Forest Service sensitive plants:

- a. All known lady's slipper orchid populations will be flagged for avoidance unless they occur in streamside management zones where no management activities will occur.
- b. Populations of short-leaved hulsea that occur along Forest Roads 5S22Y and 5S06 will be flagged for avoidance prior to project implementation.

Project design criteria for prevention of spread of noxious weeds:

- a. All heavy equipment used for implementing the project will be washed before arriving on site to remove soil and seeds of noxious weeds so that they are not transported into the project area.
- b. Infestations of foxglove, klamathweed, oxeye daisy, broom, and bull thistle will be removed prior to project implementation, and a buffer zone will be flagged for avoidance to prevent heavy equipment from transporting seeds in the soil to other areas within the project boundary and beyond.
- c. Any plantings or straw used for erosion control will be approved by the Forest Botanist to minimize the likelihood of accidental introduction of noxious weeds and to ensure compliance with the FS Pacific Southwest Region Native Plant Policy.

Geology/Soils

1. Leave a 100-foot wide buffer of 100 percent soil cover below large rock outcrops. These areas have a high potential to generate runoff that can cause accelerated erosion on soils down slope.
2. Conduct mechanical equipment operations (mechanical thinning and biomass removal equipment, log skidders and tractor-piling operations) when the soil is sufficiently dry in the top 12 inches to prevent unacceptable loss of soil porosity (soil compaction). Field checking by a soil scientist would be done to determine if operations could continue under **moist** soil conditions. "Maintain 90% of the soil porosity over 85% of an activity area (stand) found under natural conditions."
3. Subsoil and water bar skid roads and trails in areas where soil compaction exceeds 15% of a treatment area.
4. Limit mechanical operations, where sustained slopes exceed 35%, except where supported by on-the-ground interdisciplinary team evaluation.
5. Maintain 50% soil cover over all treatment areas. Where shrub species predominate, attempt crushing before piling to create small woody fragments left scattered over the site for soil cover and erosion protection.
6. Maintain at least five well-distributed logs per acre as large woody debris (LWD) representing the range of decomposition classes defined in the Regional Soil Quality Standards and Guidelines (S&G).

7. Provide for road surface stabilization (gravel) on roads over 5% that are located on sensitive soils, including Holland and Musick soils (LRMP S&G #129) and are affecting soil productivity and/or water quality.

Lands/Special Uses

There are numerous land type special uses authorized under permit in the project area including water systems (spring developments, water lines and storage tanks), buried fiber optic and telephone lines, a telephone carrier site near Sugar Pine, the Madera Irrigation District gauging station, overhead and buried electrical lines, roads, and apiary sites.

- a. To provide a measure of protection, permit holders will be responsible for identifying the location(s) of their authorized improvements and/or right-of-ways so they are clearly visible during project implementation. Holders shall identify their improvements by using a combination of flagging and surveyors stakes; holders shall print their name and contact phone numbers on the flagging/stakes with indelible ink that is capable of lasting several years.
- b. Roads authorized under permit that are damaged by project activities will be repaired by the operator(s) to pre-project condition.
- c. The Madera Irrigation District Ditch is located in Treatment Areas T15 and M5 where mastication would occur. The Ditch has been in use for over 150 years, and a riparian vegetation type has developed along the banks of the ditch. There should be a minimum setback of 25 feet on either side of the ditch where the use of mechanical equipment should be restricted, or project activities are limited to the hand removal of brush. All slash that enters the ditch resulting from project activities will be removed by the end of the days operating period by the operator to prevent blockage of the ditch.

Recreation special uses authorized under permit in the project area include the Yosemite Mountain Sugar Pine Railroad (YMSRR) and Yosemite Trails Pack Station (YTPS). The YMSRR improvements located within their permit area including the railroad right-of-way, office, parking areas, amphitheater, bathroom, seating areas, etc. They are easily identifiable and should be avoided during project activities. The YMSRR operates the railroad 6 months a year between March and October; however, their peak visitor season is between June and mid-August. Project activities would occur adjacent to and within the permit area.

- a. During project implementation various contractors and/or operators may need to cross the railroad tracks to gain access to treatment units. The Bass Lake Ranger District will identify the locations where rail crossings need to occur; and will work with the owner of YMSRR to design and construct the crossings to ensure heavy equipment does not damage the rail system during project implementation.
- b. The district will work with the owner of YMSRR to minimize interruptions to YMSRR operations during Project implementation.
- c. Contractors and/or operators will provide advance notification to the YMSRR when Project activities occur adjacent to the right-of-way and/or permit area, and advise the YMSRR when Project activities may result in a delay of YMSRR operations.
- d. Contractors and/or operators will remove all activity slash generated from project activities that land on the railroad tracks and/or within the railroad right-of-way. The contractor and/or operator will provide a spotter, whose responsibility is to remove slash

from the tracks and right-of-way concurrent with the operation, or as soon as project activities cease, and the right-of-way is safe to enter.

The YTPS offers horseback rides three seasons of the year from their pack station headquarters adjacent to Big Sandy road, and offers horse driven sleigh rides from a secondary location south of Tenaya Lodge during winter months when snow conditions are favorable. The YTPS is authorized to use and maintain many of the horseback riding trails they take their clients on.

Trails used by YTPS and the Lewis Creek Recreation Trail may need to be crossed with equipment by operators to gain access to units. These trails are identified in the project folder and on the map entitled “Special Uses” within the Sugar Pine Project.

- a. All project-related equipment will cross at locations perpendicular to identified recreation trails.
- b. All slash will be pulled out of and away from trails. Activity fuels and slash will not be piled or treated within 5 feet of those trails.

Wildlife – Terrestrial

1. **Limited Operating Periods (LOPs):** Should surveys locate activity centers or active nests for California spotted owls or Northern goshawks, LOPs will be applied within a ¼ mile radius of the activity center or nest. Should a great gray owl nest be located, nesting location will be protected by an LOP. LOPs will also apply to nests discovered during project implementation in un-surveyed areas. The district biologist will be notified when a nest or den of any TES or sensitive species is discovered within or adjacent to a treatment area.
2. **Snags and Down Woody Material** (USDA-FS 2004, Pg. 51-52):

Down Woody Material: “Determine down woody material retention levels on an individual project basis, based on desired conditions. Emphasize retention of wood in the largest size classes and in decay classes 1, 2, and 3. Consider the effects of follow-up prescribed fire in achieving desired down woody material retention levels.” Typically 10 to 20 tons of down woody material per acre is acceptable from a fuel loading standpoint, and will retain sufficient material to provide for post-treatment habitat for down woody utilizing species, based on extrapolation of pre-European stand conditions.

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

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

Westside mixed conifer and ponderosa pine types – four of the largest snags per acre.

Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI. When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider

these potential losses during project planning to achieve desired snag retention levels.”

Since the Sugar Pine project area is all within the WUI, where possible, snags and wildlife leave trees will be retained in untreated areas (such as riparian management zones), and clumped in areas not in proximity to structures, access routes, fuel breaks, or private property.

3. **Protected Activity Centers (PACs) and Home Range Core Area (HRCA) treatments:**

Where treatments will occur within PACs aim to maintain >70% canopy closure where available. Where treatments will occur within HRCAs aim to maintain >60% canopy closure where available.

4. **Pacific Fisher Habitat:**

A 700-acre den site buffer of the best available habitat will be designated for known den site locations with a Limited Operating Period established within the den site buffer. If a new den site (s) should be located during implementation, a 700-acre den site buffer of the best available habitat will be designated and a Limited Operating Period established for that buffer area.

From the “Sierra NF Interim Pacific Fisher Habitat Maintenance and Improvement Approach” (see Appendix C) the following design criteria will be applied to all action alternatives to address portions of the issue listed on page 6.

- Maintain highest canopy cover possible to meet the prescription within stands, aim for 50-60% immediately post-harvest.
- Thinning will not remove any trees larger than 30-inch dbh.
- Retain groups of larger trees (greater than 20-inch dbh) at the rate of approximately one group per 2.5 to 3.5 acres. Ideally these groups would contain “defect” trees, those that have cavity and platform creating defects (mistletoe, rot, fork topped, broken limbs and tops) for den and rest sites.
- Retain largest snags and logs. Do not remove snags unless it is safety concern (project does not propose to remove snags). Retain largest logs to maximum allowed by fuel loading standards.
- Maintain habitat connectivity with Old Forest Linkages which consist of buffers of 300 feet on either side of perennial streams where canopy closure is retained at >60%, 150-foot buffers on either side of perennial streams where no trees >12-inch dbh are removed, and 50-foot buffers on either side of perennial streams where no fuels treatments will occur.

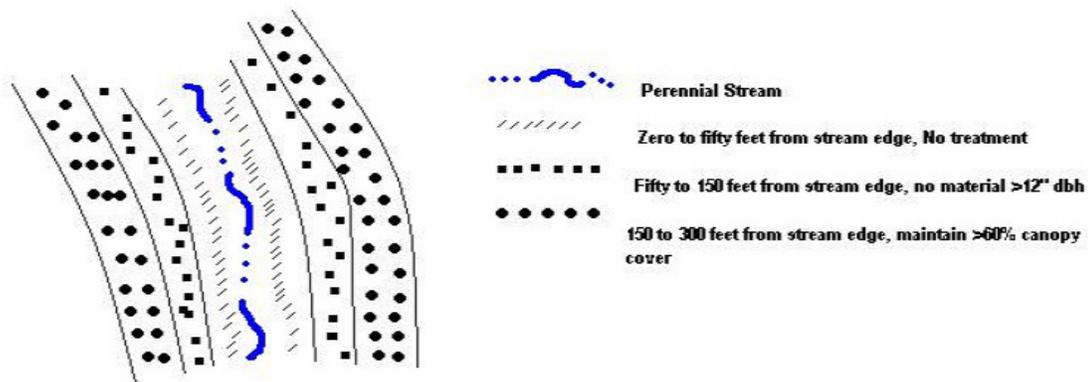


Figure 1. Associated Bounds and Treatments within Old Forest Linkages and Perennial Streams

It has been shown in the project area that black oaks tend to show cavities once they become 20 inches in diameter or greater. To maintain hiding cover for fisher and their prey, around black oaks >20-inch dbh create a buffer (35 feet from the bole or to dripline whichever is greater) where no fuels treatment will occur. This measure does not apply within fuelbreaks. This guideline is to be applied to two to three oaks per acre.

Prior to prescribed burning treatments, protect of important habitat structures such as large diameter snags and oaks, patches of dense large trees typically ¼ to 2 acres, large trees with cavities for denning/resting, well distributed clumps of small understory trees, and coarse woody material should be incorporated. For example, use firing patterns, place fire lines around snags and large logs, and implement other prescribed burning techniques to minimize effects to these attributes.

- Use mechanical treatments when appropriate to minimize effects on preferred fisher habitat elements.
- Remove unneeded roads in high quality fisher habitat.

Wildlife – Aquatics

Follow all applicable aquatic wildlife species and riparian habitat standards and guidelines from the 2004 Sierra Nevada Forest Plan Amendment, Final Supplemental Impact Statement and Record of Decision (USDA-FS 2004), the existing Sierra National Forest Land and Resource Management Plan direction (USDA-FS 1992), Forest Service handbook (FSH) 2509.22 Sierra Supplement #1 for treatments within Streamside Management Zones (SMZ, USDA 1989)), Best Management Practices and other applicable laws and regulations (USDA-FS 2000a). Generalized SMZ designation is outline in Table 1.

Table 1. Summary of Relationship between Feature Types, RCA Widths, Stream Classes, SMZ Widths, RMA Widths, and Stream Orders (and other GIS data)

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

1. Class I SMZs are within or adjacent to treatment areas: T4, T5, T7, T8, T9, T10, T11, T13, T14, T15, T23, T24, T26, T32, T33, M2, M5, M6, M7, M8, M10, M9, M11, M12, M13, M16, M24, M25, Rx 1, Rx 3, and Rx 5. Old Forest Linkage Prescriptions apply to these SMZs. No treatments within inner 50 feet from stream bank.
2. Protect any Special Aquatic Features (seeps, springs, bogs, fens, and/or wet areas) that may be found during project implementation that are not already identified on project analysis maps. Treat these areas as perennial (Class I) areas with 300 foot Riparian Conservation Areas (RCAs). This includes treatment areas: T3, T4, T7, T26, T30, T32, T33, T34, M11, and M16.
3. In the outer 50 feet of Class I SMZs, reduce fuel loading by:
 - a. Removing ladder fuels (suppressed and intermediate trees);
 - b. Removing diseased trees that will fall away from riparian areas; and
 - c. Hand-piling slash as necessary to reduce the effects of under-burning;
 - d. Maintaining trees with broken tops for source of Larger Woody Debris (LWD) recruitment if they are leaning toward stream channel.
4. Apply SMZs as mapped in Project Hydrology report.
5. General aquatic species and riparian habitat protection measures within all Riparian Conservation Areas (RCAs) are to:
 - a. Do not allow mechanical equipment within 100 feet of meadows or other special aquatic features. Includes treatment areas: T3, T4, T7, T26, T30, T32, T33, T34, M11, and M16.
 - b. Do not allow mechanical equipment within SMZ.

- c. To protect bank stability, do not cut streambank trees (trees with drip line extending to or over edge of streambank).
 - d. Do not cut any tree located within a channel.
 - e. For water drafting, use a screened intake device and pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. A Hydrologist and Aquatic Biologist would approve water-drafting sites. See Best Management Practices (BMP) 2-21 in Table 2 for specific requirements.
 - f. Monitor potential project effects to streams and aquatic habitat using the Region 5 (R5) Stream-Condition Inventory protocols (Frazier et al. 2005).
 - g. When lighting piles, start burn from one end only to allow escape route for any species inhabiting piles.
 - h. No lighting into SMZs, but fire can creep into zone.
6. Report any discovery of amphibians or reptiles (e.g. frogs, toads, salamanders, and turtles) during project sale preparation and implementation to the district biologist immediately.
 7. If newly listed or unknown occurrences of Federally listed threatened, endangered, proposed, candidate or Forest Service sensitive aquatic species are found within the affected project area during sale preparation and implementation, additional species protection measures may need to be imposed by the district fisheries and aquatic biologist.

Hydrology

Project specific Best Management Practices, listed in Appendix B of this document, will be implemented.

Silviculture

A limited operating period would be imposed in well stocked stands heavy to fir (over 50% fir) where operations could begin August 1st or later when the sap is not running (fir bark is much more easily dislodged when the sap is running than later in the year). The District Silviculturist will determine which stands require a LOP during the thinning layout phase.

Fuels

Utilization of prescribed fire and designation of areas where prescribed fire will be used need to take into consideration the following:

1. In treatment areas designated as mastication (M), prescribed fire should first be considered where it is too steep and /or rocky for the masticator to work effectively, oak dominates the stand and/or as a maintenance treatment in areas where brush re-growth has not been slowed and have not been planted with conifers.
2. In treatment areas designated as tractor (T), prescribed fire should first be considered where there are larger residual trees (of size less susceptible to fire damage) with light fuel loadings, areas not being thinned due to steepness, follow-up treatments have been completed or are not required, and/or areas where conifer reproduction is not being used for re-generation of openings.
3. Prescribed fire should be used during the late fall or early spring, to minimize effects to trees during active growing period and within Pacific fisher denning habitat areas.

Engineering

1. Maintain all NFS roads to standards established in the Forest Service Handbook 7709.58. Perform road maintenance, reconstruction and new road construction activities to support project access needs. Insure drainage structures are functional and stable to prevent potential resource damage and degradation of water quality (S&G #78, #79, #124, #206 and BMPs).
2. Perform a final field review of project roads to determine reconstruction needs prior to project activities. Where economically feasible, place aggregate on existing native surface roads located in areas with High and very High Soil Erosion Hazard ratings (S&G #129).
3. Close temporary roads required for unit access upon completion of use; remove all culverts, rip and ditch landings, construct waterbars, block the entrance with a log and dirt berm, and disguise the entrance with brush to discourage additional traffic.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Alternatives based on varying the upper diameter limit (currently 30-inch dbh) for mechanical thinning to ensure a 50 to 60% plus canopy cover is maintained and by which wildfire intensity and spread are reduced

The purpose and need for this project is not solely focused on the reduction of wildland fire intensity and spread into and out of WUI, but includes the need to maintain sustainable forested stands by reducing stand density. In considering this alternative, it was determined that it incorporated many of the same concerns for the proposed action as were made in the issue listed on page 6, in particular, the need to maintain high canopy cover. In bringing forward Alternatives 3 and 4 for detailed study, as well as design criteria incorporated to address the issue listed on page 6, the effects of varying stand density treatments as they relate to meeting the purpose and need for fire/fuels objectives and forest health objectives is addressed. It was determined that any alternative based on varying upper diameter limits for mechanical thinning would measure the same effects as these two alternatives and would be duplicative to other alternatives.

Comparison of Alternatives

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

Table 2. Comparison of Alternatives

Measure or Effect	Alternative 1 – No Action			Alternative 2 – Proposed Action			Alternative 3			Alternative 4		
Total Project Area =5,416 acres; Total Acres Analyzed in Treatment Areas = 2,920 Estimated Acres by Alternative to be Treated by Treatment Area Type:												
Tractor	0 Acres			1,356 Acres (Commercial Thin= 914 acres; biomass/mast/precommercial thin= 432 acres; hand thin=10 acres)			1,356 Acres (Commercial Thin = 824 acres; biomass/mast/ precommercial thin = 522 acres; hand thin = 10 acres)			1,356 Acres (Commercial Thin= 66 acres in plantations; biomass/mast/precommercial thin= 1,280 acres; hand thin=10 acres)		
Mastication	0 Acres			532 acres			532 acres			532 acres		
Prescribed Fire	0 Acres			215 acres			215 acres			215 acres		
Miles of Road												
Maintenance	0			28.2			28.2			28.2		
Reconstruction	0			9.8			9.8			9.8		
Temporary	0			0.5			0.5			0.5		
New Road	0			0.2			0.2			0.2		
Fire/Fuels Objective Measures:												
Fuel Model (Resultant)	4	10	12	12	TU1	9	12	TU1	9	12	TU1	9
Predicted Rate of Spread (chains/hour)	92	10	16	11	8	6	11	8	6	11	8	6
Predicted Flame Length (feet)	23	10	16	8	3	3	8	3	3	8	3	3

Measure or Effect	Alternative 1 – No Action			Alternative 2 – Proposed Action			Alternative 3			Alternative 4		
Predicted Fireline Intensity (BTU/ft ²)	5131	282	781	531	63	47	531	63	47	531	63	47
Predicted Crown Fire Potential (Yes/No; Type)	Y/ Crowning	Y/ Crowning	Y/ Crowning	Y/ Torching	N/ Surface	N/ Surface	Y/ Torching	N/ Surface	N/ Surface	Y/ Torching	N/ Surface	N/ Surface
Resistance to Control (High, Moderate, Low)	High	High	High	High	Low	Low	High	Low	Low	High	Low	Low
Forest Health Objective Measures (Desired Condition by Species: Pine= 135; White Fir= 240; Mixed Conifer= 210)												
Estimated Range of Basal Area Remaining (ft ² /acre) for >5-inch dbh conifers	130 to 480 ft ² /acre (all species)			130 to 330 ft ² /acre (all species)			130 to 330 ft ² /acre (all species) (Treatment area T4 would be changed from estimated range BA remaining of 130 to 190 to 130 to 310 with this Alternative)			130-480 ft ² /acre (all species)		
Estimated Range of Stems per Acre Remaining for >5-inch dbh conifers (# trees/acre)	= 65 to 251 trees/acre (all species)			44 to 101 trees/acre			50-142 trees/acre (all species) (Treatment area T4 would be changed from estimated range Stems/Acre remaining of 57 to 84 to 66 to 142 trees/acre)			66 to 153 trees/acre (all species)		
Habitat Indicators (From Issue):												
Estimated Range of Average Canopy Cover Remaining (%)	39 to 100% Average= 69%			39 to 88%; Average= 57%			39 to 97%; Average= 58%			39 to 100%; Average= 69%		

Measure or Effect	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
Estimated Average Tree Diameter Removed (inches at dbh)	N/A	11 to 20-inch dbh	11 to 20-inch dbh (Treatment Area 4 would be changed from 11 to 20-inch dbh to 5 to 10-inch dbh with this alternative)	5 to 10-inch dbh
Large Snag and Down Wood Standard for Treated Areas	N/A	Listed in Design Criteria Common to All Alternatives (pages 10-18)	Listed in Design Criteria Common to All Alternatives (pages 10-18)	Listed in Design Criteria Common to All Alternatives (pages 10-18)
Movement Corridors Addressed (Yes or No)	Yes, with assumption corridors are present currently	Yes, addressed as Old Forest Linkage Areas on page 14.	Yes, addressed as Old Forest Linkage Areas on page 14.	Yes, addressed as Old Forest Linkage Areas on page 14.