Social and Ecological Resilience Across the Landscape (SERAL) Scoping Notice

Stanislaus National Forest
Calaveras, Mi-Wok, and Summit Ranger Districts
Tuolumne County, California

The Forest Service is seeking initial scoping comments on the proposed Social and Ecological Resilience Across the Landscape (SERAL) project. The SERAL proposed action has been developed in collaboration with Yosemite Stanislaus Solutions (YSS) with a commitment to getting vegetation treatments done that benefit the environment, the economy, and the community. YSS is a diverse group that includes environmentalists, conservationists, loggers, recreational users, Tuolumne County government representatives, and biomass industry representatives. The SERAL project is centrally located on the Stanislaus National Forest, within the YSS collaborative area, with portions located on the Calaveras, Mi-Wok, and Summit Ranger Districts (Map 1). The SERAL project area is located south and east of the North Fork Stanislaus River and north and west of the North Fork Tuolumne River (T2N-T5N, R14E-R18E; MDBM). The project area is also almost entirely to the north and west of Highway 108. Elevation ranges from 1,120 to 7,760 feet above sea level. Approximately 92,000 acres of the 116,692 acre project area (79%) are National Forest System lands. Yellow Pine/Dry Mixed Conifer and Oak Woodland are the predominant general vegetation types in the SERAL project area (Table 1).

Table 1: General vegetation types in the project area (Map 2). All acreages are approximate.

General Vegetation Type	Acres	Percent of Project Area
Yellow Pine / Dry Mixed Conifer	63,043	54%
Oak Woodland	29,802	25%
Shrub	11,889	10%
Fir / Moist Mixed Conifer	6,929	6%
Herbaceous	3,540	3%
Non-Vegetated	1,489	1%
TOTAL	**116,692**	**100%**

The overall purposes of SERAL are to:

- Conduct landscape scale forest planning and active management while incorporating new science (including forest plan amendments to apply new science-based management approaches) and utilizing new tools enabling forest management to adapt to changing conditions and implement at a pace that will influence effective change on the landscape.
- Prepare the landscape for the safe reintroduction of fire and reestablish fire processes through larger, watershed scale efforts that mimic the natural range of fire severity and frequency (i.e., the natural range of variation).
- Restore forest conditions to a range of natural conditions (i.e., the natural range of variation) to promote resilience and reduce threats to habitat from disturbances such as drought, insects and disease, and wildfire.
- Reduce risks to human communities, resources, and infrastructure.
- Manage the forest in an economically efficient and cost-effective manner, including making wood products available to local industries and businesses; and to
- Manage the forest in a manner that promotes public access, provides sustainable safe recreation and enhances present and future generations' sense of security and ability to respond when faced with an emergency situation or unexpected change.

The focus of this project is intentionally narrow, as will be the emphasis of the treatments under development. We understand other needs exist. However, the most pressing and time sensitive need is to modify the existing landscape vegetation conditions which pose high risk to human safety, the local economy, and persistence of our forest and the resources it provides.

Meeting the project purposes to restore the natural range of fire regimes and forest conditions are reliant on meeting the objectives to conduct landscape scale forest planning and active management and to manage the forest in an economically efficient and cost-effective manner. The remaining two purposes also support restoring the natural range of fire regimes and forest conditions, but each also have specific objectives which are independently beneficial, such as supporting wildfire management operations, reducing the fire threat to human life or damaging resources and critical infrastructure, providing sustainable safe recreation, and enhancing present and future generations' sense of security and ability to respond when faced with an emergency situation.

This scoping notice provides information related to the proposed action, the scoping process and how to submit comments. Other project information and detailed project maps are available online at: https://www.fs.usda.gov/project/?project=56500.

1. BACKGROUND

1.01 Planning Approach

Over the past 15 years the Stanislaus National Forest has planned and implemented projects developed under the direction of the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD, USDA Forest Service 2004). During this time, the rate of forested lands lost to wildfire, insects, disease, and drought have continued to increase. This increased occurrence and susceptibility to natural disturbances puts wildlife habitat and human safety at risk, as well as critical infrastructure, communities, and businesses, as witnessed firsthand during the 2018 Ferguson and Donnell Fires.

Traditional project planning efforts have identified site-specific treatment units with spatially-specific management requirements and prescriptions directly associated with those units. In this traditional way, the decision authorizes treatments to occur that were designed based on conditions that exist at the time of decision, with minimal flexibility. These past efforts have taken on average 2 to 5 years to complete, have authorized on average 1,000 to 5,000 acres of treatments, and often take greater than 5 years to fully implement, or in some instances, had limited implementation so far, while not keeping pace the current trend of natural disturbances. To continue forest management in these traditional ways will leave the forest vulnerable to largescale mortality from wildfire, insects, disease, and drought. We are in a planning and implementation race with these natural disturbances.

Since the 2004 SNFPA ROD, new scientific information and tools have become available and additional planning tools are currently being developed to support the SERAL effort[1]. The recently released *Conservation Strategy for the California Spotted Owl in the Sierra Nevada* (USDA Forest Service 2019) highlights a growing body of literature supporting the need for change in management practices and presents new approaches to forest management. The SERAL project presents a proposal that significantly increases the scale of our planning efforts, incorporates new science (including forest plan amendments to apply new science-based management approaches –see section 4.03 and Appendix B) and will utilize new tools that will enable forest management to adapt to changing conditions and be implemented at a pace that will influence effective change on the landscape.

[1] One tool is based on the Landscape Treatment Designer (Agar et al. 2012) another tool is based on fire risk prioritization (Dunn et al. 2020).

1.02 Departure from Range of Natural Conditions (Fire Regime and Forest Structure)

Historically, prior to the past century of forest management, widespread lightning and indigenous peoples' fires combined to provide frequent fire patterns throughout the Sierra Nevada and the foothills. The resulting ecosystem conditions over time were not static or constant. They varied due to droughts, snowfall, insects, and disease, but conditions consistently reflected the frequent dry-season fires that created a mosaic of vegetation patterns. Based on all that affected the forests, conditions ranged between different levels of canopy cover and clearings. The forest landscape consistently had sunlit, open areas with mostly new growth, and other shadier areas dominated by large, older trees, as well as conditions in between. Scientists refer to the general range of historic conditions of a region as the "natural range of variation."

The Sierra Nevada ecosystems have evolved with a pattern of fire history, known as a fire regime, and the average period between fires under the presumed historical fire regime is called a fire return interval (FRI). Current FRIs show a significant departure from their NRV in comparison to pre-Euro-American settlement FRIs, which compromises forest resiliency to large-scale, high severity fire patches or other disturbances. Based on the mean percent FRI departure categorized into condition classes (Safford and Van de Water 2014), approximately 79% of the SERAL landscape is "highly departed" from pre-settlement fire frequencies (Table 2, Map 3), primarily burning at frequencies that are significantly longer than pre-settlement fire regimes. Specifically, this means there has been greater than two-thirds percent decrease in fire frequency over the past century as compared to the pre-settlement period, indicating that multiple fire cycles have been missed. Another 14% of the landscape is "moderately departed," i.e., FRIs are one-and-a-half to three times the historic interval. The decrease in fire frequency has occurred in all vegetation types in the project area, though the departure is more extreme in the conifer forests than in the oak woodland or shrub vegetation types (Table 2).

Table 2: The mean percent fire return interval condition class categorization by vegetation type in the SERAL project area. Positive condition classes (CC1, CC2, CC3) indicate areas where fires are burning less often than under pre-settlement conditions, while negative condition classes (CC-1, CC-2, CC-3) indicate areas where fires are burning more often than under pre-settlement conditions.

Fire Return Interval Mean Condition Class (CC)	Shrub	Oak Woodland	Yellow Pine/ Dry Mixed Conifer	Fir/ Moist Mixed Conifer	Barren, Herbaceous, Water, Urban, Agriculture[2]	Total Acres (% of Project Area)
CC3: 67% or more departure (High Departure)	2,517	20,433	62,758	6,067	N/A	91,774 (79%)
CC2: 33 to 67% departure (Moderate Departure)	5,727	9,478	207	616	N/A	16,029 (14%)
CC1: 0 to 33% departure (Low Departure)	2,825	490	0	82	N/A	3,397 (3%)
CC -1: 0 to -33% departure (Low Departure)	0	62	0	0	N/A	62 (<0.001%)
CC-2: -33 to -67% departure (Moderate Departure)	306	6	0	0	N/A	312 (<0.01%)

[2] Areas not included.

Fire Return Interval Mean Condition Class (CC)	Shrub	Oak Woodland	Yellow Pine/ Dry Mixed Conifer	Fir/ Moist Mixed Conifer	Barren, Herbaceous, Water, Urban, Agriculture[2]	Total Acres (% of Project Area)
CC-3: less than -67% departure (High Departure)	0	0	0	0	N/A	0 (0%)
Total	**11,375**	**30,469**	**62,965**	**6,765**	**5,130**	**116,704 (100%)**

Similar to the FRI, the current landscape-scale forest structure was evaluated within the SERAL project area in order to determine departure from NRV. The approximate proportions of different seral stages existing within the Yellow Pine/Dry Mixed Conifer and Fir/Moist Mixed Conifer forest types were assessed, and compared to NRV reference conditions as described in GTR-256: *Natural range of variation for yellow pine and mixed-conifer forests in the Sierra Nevada, southern Cascades, and Modoc and Inyo National Forests, California* and GTR-263:*Natural range of variation of red fir and subalpine forests in the Sierra Nevada bioregion* (Safford and Stevens, 2017; Meyer and North, 2019) (Appendix A, see NRV range, Table A.1). Current forest conditions in the SERAL project area are considerably departed from their NRV in terms of their structure and function (Figure 1).

A comparative assessment of seral stages occurring in *excess* or *deficit* in comparison to the NRV reference conditions broadly identifies the areas within the project area in need of restoration as well as the type of restoration needed (Appendix A, Table A.2 and Table A.3). The magnitude of the departure from NRV within each seral stage (as made apparent in Figure 1) also informs the scale of restoration needed.

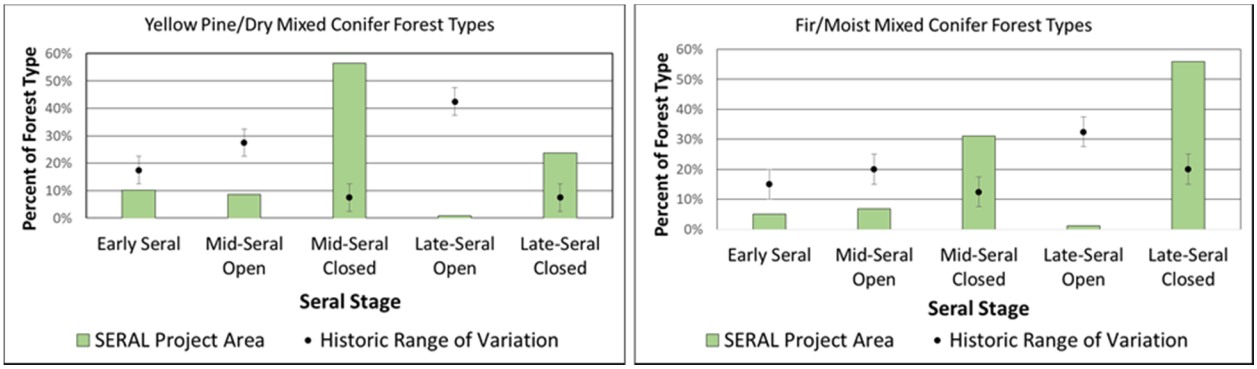

Figure 1: Current landscape structure of Yellow Pine/Dry Mixed Conifer and Fir/Moist Mixed Conifer forest types compared to historic conditions. In both the Yellow Pine/Dry Mixed Conifer and Fir/Moist Mixed Conifer forest types, current departure is pronounced in both mid- and late-developmental stages, with the current landscape containing much more closed canopy and much less open canopy in both developmental stages.

Combined, the departure of landscape forest structure and fire return intervals from NRV highlight the need for management actions across the project area. The concept of NRV-focused management is rooted in the assumptions that forests restored towards their NRV are more resilient to many disturbances, such as large-scale, high-severity fire, insects, disease, drought, and climate change and result in a condition where ecological processes and adaptive capacity can continue to evolve together (USDA Forest Service 2019). If the status quo is maintained (i.e., fire suppression and minimal restoration treatments) then most NFS lands will continue to burn severely and the area that would have burned at low to moderate severity

will continue at a deficit. Unless this trend is changed, it is likely that critical wildlife habitat (e.g., CSO nesting habitat) will continue to decline as a result of wildfire (Stephens et al. 2016).

1.03 Risks to Human Communities, Resources, and Infrastructure

Throughout the western United States, forest health challenges are prevalent. From extensive insect and disease outbreaks to successive record fire years, the changes to the landscape and ecosystem function are beyond their NRV. These disturbance factors are not only impacting the health of the forest, they are impacting our homes, communities, drinking water, recreation opportunities, and sensitive wildlife that rely on the Forest for survival. The challenge before us is to define a condition for the landscape that incorporates not only the historic landscape conditions, as in the NRV of the Sierra Nevada, but also lends itself to the changing climate while meeting our current and future needs.

In just the past seven years the Stanislaus National Forest has experienced extensive loss of mature forest to wildfire. In 2013, when the Rim Fire burned with high vegetation severity results on huge parts of the landscape, it was the largest fire recorded in the Sierra Nevada, and the third largest in California at 257,314 acres. Just six years later, the Rim Fire now ranks 5th in California, surpassed by the 2017 Thomas Fire and the 2018 Mendocino Complex. Wildfires have been growing increasingly larger, with bigger areas of high severity effects and repercussions for forest ecology (Stevens et al. 2017, Miller and Safford 2012), and most scientists and managers see this trend continuing into the future. A century of fire exclusion has resulted in an ingrowth of shade-tolerant trees and an accumulation of surface and ladder fuels, increasing both the amount and patch size of high-severity fire in the Sierra Nevada low- and mid-elevation conifer forest types. Regionally, we are shocked and frightened by the accumulating fire threats found all over California, such as demonstrated by the 2018 Camp Fire, where at least 83 people died and over 18,000 structures were destroyed. Locally, the 2018 Ferguson and Donnell fires created significant impacts to local communities and watershed functions, and contributed to air quality concerns for a large portion of our region.

Forests of the Sierra Nevada range have also been experiencing one of the largest tree mortality events in recent history. Since 2010, approximately 147 million trees have been killed across California's forests, approximately 10 million of which were within the boundaries of the Stanislaus National Forest. Between 2014 and 2017, tree mortality levels increased more than 100-fold in many areas of the southern Sierra. During this period, 55 percent of the California spotted owl (CSO) Protected Activity Centers (PACs) on the southern Sierra national forests (Sierra, Sequoia, and Stanislaus) experienced tree mortality of more than 20 trees per acre with greater loss in larger-diameter trees (USDA 2019).

While the southern Sierra Nevada has experienced some relief from drought over the past few years, tens of millions of dead trees remain on the landscape, and hundreds of thousands of acres remain at risk of insect outbreaks and associated widespread, ecosystem altering mortality due to current densities and species composition. These concentrations of dead trees not only pose significant threats to life, property and infrastructure, they also create heavy fuel loads as these trees fall. Some of the greatest concentrations of tree mortality have occurred in areas that are the most departed from the fire regimes under which they evolved, posing serious threats to the sustainability of these ecosystems.

1.04 Social Resilience

Social resilience is the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change. A clear link is present between social and ecological resilience, particularly for social groups or communities that are dependent on ecological and environmental resources for their livelihoods (Adger 2000). Risks to homes and infrastructure from climate change and disturbance, as well as the departures from the natural range in ecosystem conditions, can greatly affect the resilience of rural communities. Social resilience is multifaceted. Economic sustainability, sense of security, and the ability to respond when faced with an emergency situation or

unexpected change are all critical aspects of a resilient society. Businesses in small rural towns often rely on tourism revenue throughout the year, so maintaining safe and consistent access to National Forest System lands for recreation and industry uses (timber and concessionaire businesses operated on NFS lands) contribute to resilient communities. Long-term closures, or limits to public access on the Stanislaus National Forest in recent years have reduced tourist traffic for several months to Yosemite National Park (due to the Rim and Ferguson Fires), and Kennedy Meadows and the Emigrant and Carson-Iceberg Wildernesses (due to the Donnell Fire). These impacts weigh heavily on local business owners, make operating seasonal businesses in small towns more difficult, and have led directly to business closures. Additionally, the National Forest's ability to perform mechanical thinning and fuel reduction treatments is dependent on a viable, local forest products industry, which in turn is dependent on a reliable and predictable flow of wood products. This work on National Forest lands provides jobs, and the output from those workers contributes to social resilience.

While recent and continued threat of large-scale wildfires have an acute effect on communities, other environmental changes can affect communities at a low level for much longer periods of time. The recent drought (2012-2016) lead to millions of trees dying, which became persistent hazards to powerlines, homes, roads, and recreation sites. The scale of insect and disease mortality is more difficult to address after its occurrence than fire-caused mortality because trees decay and lose value more rapidly than fire-killed trees, and the area impacted is more diffuse and widespread.

Individuals, communities, businesses and industry are a critical component of most areas in the western United States, yet more remote areas that have fewer large industries, year-round businesses, and employers situated locally are more deeply affected by repetitive or unpredictable environmental disturbances.

2. PURPOSE AND NEED

Based on the information shared in section 1, the purposes of the SERAL project are to:

1. **Conduct landscape-scale forest planning and active management**: Conduct landscape scale forest planning and active management while incorporating new science (including forest plan amendments to apply new science-based management approaches) and utilizing new tools enabling forest management to adapt to changing conditions and implement at a pace that will influence effective change on the landscape.
2. **Restore fire regimes:** Prepare the landscape for the safe reintroduction of fire and reestablish fire processes through larger, watershed scale efforts that mimic the natural range of fire severity and frequency (i.e., the natural range of variation).
3. **Restore forest conditions to a range of natural conditions (i.e., the NRV) to promote resilience and reduce threats to habitat from disturbances such as drought, insects, and disease, and wildfire:** Shift the landscape vegetation structure and composition towards alignment with NRV in strategic locations through active management to:
    a. Promote resilient and sustainable CSO habitat throughout the landscape by applying new scientific information and management recommendations provided in the Conservation Strategy for the California Spotted Owl (USDA Forest Service 2019);
    b. Increase within- and between-stand heterogeneity;
    c. Reduce stand densities;
    d. Increase the large tree component on the landscape;

e. Increase the relative abundance of shade-tolerant (e.g., pines) to shade-intolerant (e.g., firs) tree species;

f. Reduce the spread of invasive nonnative weeds;

g. Reduce ground fuels; and

h. Rapidly respond and actively restore habitat after insect-, disease-, drought-, or fire-mortality occurs.

4. **Reduce risks to human communities, resources, and infrastructure:** Modify the landscape vegetation in strategic locations through active management to:

   a. Support the reintroduction of prescribed fire at a scale and repeated intervals that mimic the NRV in comparison to pre-settlement fire frequencies and severities;

   b. Support wildfire management operations, and

   c. Reduce the risk of fire threatening human lives, spreading into communities, or damaging highly valued resources and assets (HVRAs) and critical infrastructure.

5. **Provide for increased economic sustainability:** Manage the Forest in an economically efficient and cost-effective manner, including making wood products available to local industries and businesses.

6. **Increase the ability of groups or communities to cope with external stresses as a result of environmental change:** Manage the Forest in a manner that promotes public access, provides sustainable safe recreation, and enhances present and future generations' sense of security and ability to respond when faced with an emergency situation or unexpected change.

In order to meet these purposes, the interdisciplinary (ID) team identified the following needs:

1. **Vegetation Management:**

   a. Reduce fuels to reduce the risk of uncharacteristically large, high severity wildfire, loss of wildlife habitat, and to improve wildfire management operations.
   b. Thin forest vegetation to modify forest structure, composition, and fuel loads towards the NRV.
   c. Generate forest products (sawtimber, biomass) to support local businesses.
   d. Consider cost-effectiveness and leverage resources in order to increase the rate in which treatments are implemented.
   e. Abate hazard trees for safety of humans and our infrastructure.
   f. Salvage of insect-, disease-, drought-, and fire-killed trees in strategic areas where they can support achieving the desirable forest structure based on NRV.
   g. Prevent, control, and eliminate priority infestations of invasive, non-native plant species.

2. **Strategic Fire Management Features:** Construct and maintain a network of strategically placed vegetation features (fuelbreaks, prepared roadsides, and defensible space) on the landscape to:

   a. Reduce the likelihood of fire moving from the ground into the overhead tree canopy;
   b. Provide increased access, safety zones, and efficient movement of fire management resources within the treatment area; and
   c. Provide improved opportunity for fire retardant to penetrate the forest canopy.

3. **Forest Plan Amendments:** Amend the current Land and Resource Management Plan (LRMP) with the management recommendations provided in the *Conservation Strategy for the California Spotted Owl in the Sierra Nevada (USDA Forest Service 2019)*.

3. PROPOSED ACTION

To meet the purpose and need of the project, the proposed action would involve vegetation management focused on fuel reduction and forest thinning treatments designed to realign the landscape structure and composition within its NRV to minimize the potential for large, high severity fire patches, restore desirable fire regimes, reduce the fire risk to community and infrastructure, assist the reintroduction of prescribed fire, and to support fire management operations. The extent and acreages of the proposed treatments described and shown in tables and figures are approximate. As additional information is obtained, and the environmental review process proceeds, the locations of treatments may be modified.

3.01 Vegetation Management

A. Prescribed Fire

The proposed action would use strategically placed prescribed burning units to reduce the risk of uncharacteristically large, high severity wildfire, loss of wildlife habitat, and improve wildfire management operations.

Prescribed fire may be used as the primary tool, or as a follow up treatment to the variable density thinning treatments described in Section 2.01-E.1 below. Prescribed fire, in combination with hand thinning (Section 3.01B) and Strategic Fire Management Features (SFMFs, Section 3.02) will be utilized as the primary tool where possible, over an estimated 10,000-20,000 acres per year (Map 4), depending on staffing and weather conditions. These prescribed fire focus areas are those that are: (1) highly and moderately departed from their fire return intervals (FRI Condition Class 2 and 3) and/or (2) located within wildland urban intermix (WUI) zones. The timing and location of prescribed fire treatments will be strategically coordinated with the implementation of other proposed actions (e.g., hand thinning and mechanical thinning) or wildfire footprints to increase efficiency and effectiveness. Areas in and around high-use recreation sites, as well as operational feasibility and safety (e.g., steep slopes, and ability to control the fire and fire effects) will also be considered when scheduling and implementing prescribed fire.

As prescribed fires are implemented across the project area creating a strategic network of interconnected treated areas on the landscape, this will exponentially enhance fire management operational efficiencies and lead to a cumulative pattern that will allow the total acres and rate of prescribed fire efforts to increase. As larger areas are treated and other proposed actions are implemented including the Strategic Fire Management Features described in Section 3.02, the condition on the landscape will improve and allow more efficient fire management (e.g., safe, large, broad scale burning) to occur and move towards creating resilient watersheds. It will be an iterative process, implemented in phases, with some areas receiving multiple treatments, based on priorities identified with decision support tools, such as the Potential wildland fire Operational Delineations (PODs) process (Dunn et al. 2020, Thompson et al. 2016).

Prescribed burning includes broadcast or understory burning, and pile or jackpot burning of fuels. Prescribed burning treatments would only be conducted when conditions meet approved burn plan requirements and comply with relevant air quality regulations.

Fire control lines may be constructed wherever necessary to keep prescribed burns from spreading outside of treatment areas and where necessary for wildfire management. Fire control lines may consist of natural barriers of unburnable materials (e.g., rocky areas, rivers or meadows), and existing barriers like prepared roadsides, fuelbreaks, and defensible space (SFMFs, Section 3.02).

B. Hand Thinning of Understory and Ladder Fuels

Some areas are currently in a condition where prescribed fire is not feasible as an independent treatment, such as some plantations, invasive non-native or rare plant areas, steep slopes or limited accessibility, close to homes, or areas with cultural or natural resource concerns or management constraints. In these areas, vegetation may be hand thinned to reduce understory and ladder fuels to prepare for prescribed fire or wildfire management.

Hand thinning treatments are costly, and therefore are only utilized where necessary to support implementation of other treatments (i.e., prescribed fire) or where it is the only permissible method to achieve the desired condition. Where hand thinning is applied, snags, small trees (generally less than 10 inches DBH) and shrubs would be felled using chainsaws. Felled material may be lopped and scattered, piled and burned, or removed as firewood or biomass.

Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches DBH), may be conducted prior to burning as needed to protect important elements of owl habitat.

C. Mastication

In plantations, wildland urban interface areas (WUI), and along roadsides throughout the project area where fuel loads are high or broadcast burning is not feasible, the proposed action would consider mastication as a method to shred shrubs, large down woody debris, and small trees (live and dead, generally less than 10 inches DBH) on slopes up to 45% (Map 6). In plantations, the mastication objective is to promote desired forest structure. In WUI and along roadsides mastication may be used to mulch woody surface debris and increase the height to live tree crowns. Where shrubs are intermixed with oaks and conifers, mastication would target the shrubs in order to break up the fuel continuity while retaining populations of desired trees.

D. Mechanical Thinning Treatments

D.1 Variable Density Thinning

The proposed forest structure restoration treatments focus on the Yellow Pine/Dry Mixed Conifer and the Fir/Moist Mixed Conifer vegetation types (approximately 70,000 acres, or roughly 60% of the project area). In order to restore forest structure approximating NRV within these two vegetation types, the proposed action would conduct a *variable density thinning* approach on an estimated 38,000 acres (approximately 54 percent of all coniferous forests) in the project area[3]. The potential variable density thinning treatment areas are presented in two categories: average slopes less than or equal to 45 percent and those greater than 45 percent (Map 5). In general, conventional ground-based harvesting equipment (including, but not limited to, forwarders, feller bunchers, or harvesters) will be used on slopes less than 45 percent, while conventional skidding equipment will be used on slopes less than 35 percent. Removal of harvested material on slopes greater than 35 percent will require specialized equipment (such as shovel, cable, or helicopter yarding systems). Variable density thinning treatment areas displayed in Map 5 include Yellow Pine/Dry Mixed Conifer and Fir/Moist Mixed Conifer vegetation types in CWHR class 3M, 3D, 4M, 4D, 5M, and 5D, located on NFS lands, within 0.25 miles of existing roads, and where mechanical operations are not precluded or restricted by law, regulation or policy. More acres are available for treatment with slopes averaging less than 45 percent (approximately 38,100 acres) than with

[3] The estimated acres of proposed variable density thinning are less than those 'available' operationally for treatment: approximately (38,000 out of 42,400 acres), however, the 38,000 acres meets the restoration need determined by the current landscape departure assessment from NRV (Figure 1, Table A.2 and A.3). The reason for the difference is due to the 100-acre maximum limitation per individual CSO PAC which limits VDT to approximately 5,000 acres (Table 4) of the estimated 9,700 acres of CSO PAC which would be conducive to mechanical variable density thinning barring any constraints.

slopes averaging greater than 45 percent (approximately 4,300 acres). Variable density thinning may also be used in plantations (CWHR class 2) to move towards desired NRV heterogeneity.

Variable Density Thinning is a form of uneven-aged management designed to produce a mosaic of individual trees, clumps of trees, and openings (ICO structure) of various sizes, similar to what was once found in historical forests prior to logging and fire suppression. Thinning objectives may be to reduce stand density, facilitate the growth of mid-seral forests toward late seral conditions, improve forest health, reduce ladder fuels, prepare stands for the safe reintroduction of fire on the landscape, improve species composition, increase stand structural heterogeneity, promote the health and vigor of legacy trees and rust resistant sugar pine, and create regeneration openings to recruit new age classes of shade-intolerant species (pines). A registered borate compound may be applied to freshly cut stumps to limit the spread of annosus root disease and to reduce the risk of new infection centers from developing.

Hardwoods (e.g., oaks, aspens, maples) would be retained unless removal is necessary to facilitate treatment efficacy and/or safety. Post-treatment density targets (generally a residual basal area and/or canopy cover; see Table 3 below) would consider land designation, management objectives, forest type, site characteristics such as site productivity, topographic position, proximity to communities (WUI), and wildlife habitat needs (USDA Forest Service 2017; GTR-220; USDA Forest Service 2019). For example, a thinning prescription for a stand in a CSO territory would retain higher overall canopy cover than would a prescription for a stand in the WUI Defense zone. Likewise, more open canopy conditions (single trees, small clumps) would generally be favored on upper slope positions and south-facing aspects, while denser canopy conditions (larger groups of trees) would be retained on lower slope positions and on north-facing aspects. The most distinctive variation of the variable density thinning prescription is related to DBH as applied within CSO PACs, CSO Territories, and outside of CSO territories (i.e., General Forest) (Table 4: **Diameter at breast height limitations, exemptions and other constraints pertaining to variable density thinning treatments.**).

Table 3: Desired structure within forested stands based on NRV.

Forest Type	Tree Basal Area (square feet per acre)	Tree Canopy Cover (percent overhead canopy)
Yellow Pine / Dry Mixed Conifer	20-200 (mostly less than 150)	10-50 (may exceed 50 in small patches)
Fir / Moist Mixed Conifer	50-300 (mostly less than 200)	20-75 (may exceed 75 in small patches)

Table 4: Diameter at breast height limitations, exemptions and other constraints pertaining to variable density thinning treatments.

Land Allocation	Estimated Treatment Acres	DBH Limit (inches)	Exemptions or Additional Constraints
California spotted owl PAC	5,000	To ensure nesting and roosting habitat is maintained, trees greater than 20 inches will not be removed	Although the California Spotted Owl Conservation Strategy allows for mechanical thinning treatments to occur throughout a PAC, this project will limit mechanical variable density thinning treatments to 1/3 of each individual PAC[4] (approximately 100 acres) that overlaps with a variable density thinning treatment area to retain the highest quality habitat in areas with higher canopy cover in large/tall trees. Acre selection will be prioritized on lands that are at high risk of large, high-severity wildfire and strategically located generally on ridgelines, on drier southwest mid-slopes, areas less-utilized by owls based on location data, and also where ecologically meaningful, within WUI areas.
California spotted owl Territory	13,900	24 inches (pines and Douglas-firs) 30 inches (shade-tolerant cedars and white fir)	Maintain and promote 40 to 60 percent of a territory in mature tree size classes with moderate and high canopy cover.
General Forest (Outside of CSO Territory)	18,000	30 inches (up to 34 or 40 inches when specific criteria are met see exemptions column)	Limited to only when necessary or beneficial to achieve restoration objectives: a) Shade tolerant white firs and incense cedars up to 34 inches DBH may be removed wherever a 30 inch shade-intolerant conifer is left within one tree height of the tree removed; and b) Trees up to 40 inches DBH may be removed for the purposes of benefitting trees in the rust resistant sugar pine program and to restore aspen stands.

D.2 Encroaching Conifer Removal: Meadows and Aspen Stands

This treatment entails removing encroaching conifers and shrubs from meadows or aspen stands, where large numbers of conifers have not historically occurred. The objective is to reestablish the historic meadow edge and enhance meadow function, or to promote and/or stimulate aspen growth. All conifers established since the interruption of the historic fire regime (in compliance with DBH limits defined in Table 4 above) that are within or adjacent to (within approximately one tree length of) the meadow edge or aspen clones may be removed. Falling may be done manually or mechanically, and felled material may be removed or piled for later burning.

[4] Due to the 100 acre maximum limitation per individual CSO PAC SERAL will only conduct VDT an estimated acres 5,000 acres of the estimated 9,700 acres of CSO PAC which are located in representative forest type and condition class that would fulfill the NRV-restoration need and also would be conducive to mechanical variable density thinning.

D.3 Hardwood and Shrub Enhancement

The primary objectives of this treatment are to reduce fuels, break up fuel continuity to improve future fire behavior, and increase spatial heterogeneity in stands dominated by decadent brush or oaks. As shown in Table 2, multiple fire cycles have been missed in most of both the oak woodland and shrub vegetation types. Reintroduction of fire is needed in these systems to restore vegetation composition, structure, and function. Prior to burning, however, manual or mechanical fuels treatments may be needed to minimize undesirable fire effects. These treatments may include hand or mechanical thinning (of small trees and/or decadent shrubs), piling, or mastication. Treatments would retain and radially thin around healthy, mature oaks and other overstory trees in order to create openings and promote oak regeneration. Piled material may be removed via firewood cutting, pile burning, or transported off-site and used for biomass fuel for electric cogeneration plants. Due to the high costs associated with these treatments, they would occur primarily in the WUI or along roadsides, and on slopes <45% (see Map 6). Once fuel levels are restored to levels more consistent with NRV, prescribed fire would be a more feasible option.

D.4 Salvage of Insect-, Disease-, or Drought-Killed Trees

Tree mortality which occurs as a result of insect and disease infestations or drought may occur on a spectrum from low (less than 30% overstory mortality) to severe (greater than 90% overstory mortality). The SERAL project proposes the cutting and removal of insect- and disease- or drought-killed trees where they can support achieving the desirable forest structure based on NRV. Salvage of insect-, disease-, or drought-killed trees would only occur within 0.25 miles of maintenance level 2, 3, 4, and 5 NFS roads. Limiting the removal of trees within these areas is intended to constrain the need for temporary roads, and would only occur when the need for temporary road access remains less than 500 feet.

D.5 Salvage of Fire-Killed Trees

Fires occur at different sizes and burn severities which result in varying degrees of mortality and uncertain landscape conditions. The SERAL proposed salvage actions are intentionally limited to hazard tree removal along level 2, 3, 4, and 5 roads in response to any fire event or in other areas only after a cumulative watershed effects analysis (CWE) is conducted after each potential fire event, prior to implementation, supports that the watershed is below a threshold of concern (TOC) and will remain below a TOC if the proposed salvage is implemented.

The objective of the proposed fire salvage is to allow rapid response to address safety concerns, support achieving the desirable forest structure and reduce fuels based on NRV and to capture some economic value of commercial products and other material that can be used by local businesses while adhering to the following additional criteria:

1. **Hazards to Maintenance Level 2, 3, 4, and 5 NFS Roads**: Fire-killed (or dying) hazard trees may only be removed when the need for temporary road construction to retrieve and remove the tree(s) remains less than 500 feet. Hazard trees requiring a temporary road greater than 500 feet for removal, or those whose removal may harm cultural or other sensitive resources that cannot be mitigated, will be cut and left on site.

2. **Other Salvage in Response to Potential Fire Event 1**: When a CWE analysis supports a watershed is below a TOC and will remain below a TOC, the cutting and removal of fire killed (or dying) trees may only occur on up to 1,000 acres spanning two HUC 6 watersheds, with a maximum of 500 acres per HUC 6 watersheds (Figure 2) where the need for temporary road access remains less than 500 feet.

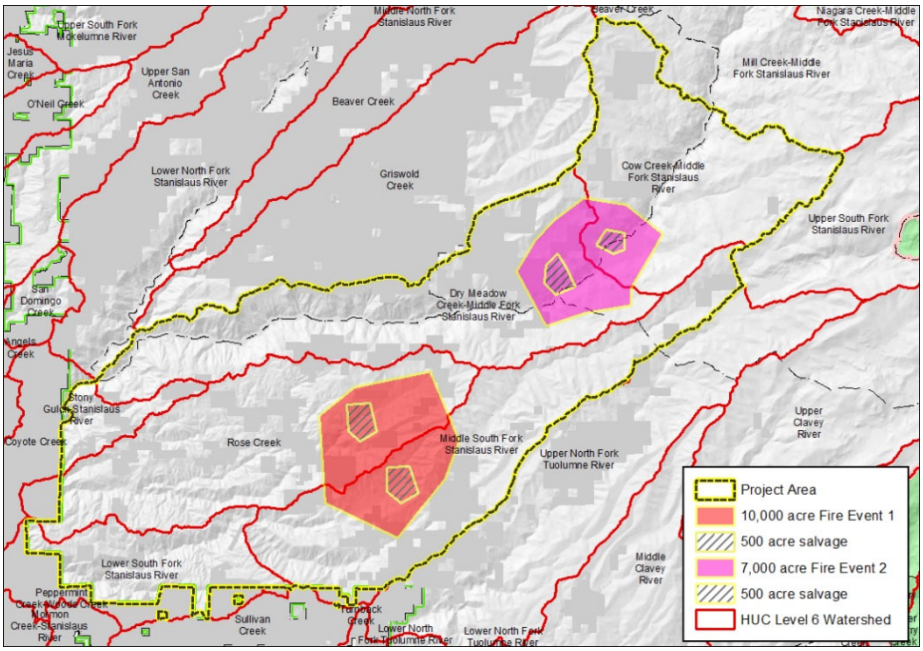

Figure 2: Visual depiction of acreage constraints for the general salvage of fire killed trees.

3. **Other Salvage in Response to Potential Fire Event 2 or more**: When multiple fires occur within the SERAL project area (e.g., Fire Events 2, 3, etc., the following guidelines would be followed:

- When Fire Event 2 (or more) occur in different HUC 6 watersheds than Fire Event 1, fire killed or dying trees may be cut and removed on up to 1,000 acres spanning two watersheds, with a maximum of 500 acres per watershed per single fire event (Figure 2).
- When Fire Event 2 (or more) occur within a HUC 6 watershed where a previous fire salvage treatment has already occurred (e.g., Fire Event 1 in the example figure above, Rose Creek and Middle South Fork Stanislaus River), additional salvage treatments would only be approved if the watershed has recovered to a lower-disturbance state, as defined by cumulative watershed effects (CWE) analysis. A CWE analysis would be conducted at a smaller scale, HUC 7, to determine if any portion of the larger HUC 6 watershed is still over a threshold of concern (TOC). If no HUC 7 is over TOC, an additional 500 acres could be approved within the HUC 6 boundary.

D.6 Temporary Road Construction and Use

The proposed thinning treatments would require temporary road construction. Temporary roads will be constructed to provide short-term access to landings generally limited to those located greater than ¼ mile from an existing system road. The need for the construction of temporary roads is to limit skidding distances to less than ¼ mile. Temporary roads will be decommissioned after their designated use period is over. Temporary road construction, use, and decommissioning will be completed in accordance with assigned management requirements, agency policy and best management practices.

E. Non-Native Invasive Weed Control and Eradication

The proposed action is to annually treat a portion of the non-native invasive plant occurrences within the project area, including any spread of infestations prior to treatment, with the goal of eradication or control. The number of infestations and acreages treated each year will depend upon available funding. Treatments would involve integrated prescriptions that generally combine the use of herbicides with mechanical, manual, and cultural control methods over several years. Currently, there are 154 acres of

mapped known occurrences of 26 invasive plant species (Map 7) within the project area. Yellow star-thistle, Maltese star-thistle (tocalote), and bull thistle account for approximately 100 acres of the known, mapped occurrences. Occurrences are found across the project area and more than 97 percent are less than one acre in size.

An early detection / rapid response (EDRR) approach will be used within the project area and newly discovered populations would be treated when they are small, so that the likelihood of adverse effects from treatments are minimized, and before the invasive plants cause measurable ecological damage. This approach assumes that new occurrences will be similar to current infestations and within the same variety of conditions. Thus, the impacts would be predictable. Although the precise location or timing of the treatment may be unpredictable; management requirements will be designed to keep potential effects limited to those disclosed for the current inventory.

Treatments would be applied in the following order of preference: (1) manual and mechanical treatment such as hand pulling and cutting; (2) use of organic mulch or temporary artificial mulch (e.g., plastic cover required to be removed after use); and (3) application of herbicide via backpack sprayers.

Only herbicides that have been approved for use in the state of California and have a label certifying that the chemical has been approved for use by the Federal Environmental Protection Agency (EPA) and the California Department of Pesticide Regulation (DPR) would be used. The label contains information about the product, including its relative toxicity, potential hazard to humans and the environment, directions for use, storage and disposal, and first aid treatment in case of exposure. Label directions provide for public and worker safety by requiring posting of treated areas, pre-designation of mixing, storage and filling sites, and transportation and handling practices in accordance with toxicity of each formulation. Label directions, as well as all laws and regulations governing the use of herbicides, as required by the U.S. Environmental Protection Agency, the California Department of Pesticide Regulation, and Forest Service policy pertaining to herbicide use, would be followed. All required licenses and permits would be obtained prior to any pesticide application.

Herbicide treatments would include the use of a surfactant to enable herbicide penetration of the plant cuticle (a thick, waxy layer present on leaves and stems of most plants). Surfactants are materials that facilitate the activity of herbicides through emulsifying, wetting, spreading or otherwise modifying the properties of liquid chemicals. Treatments would also include use of a dye to assist the applicator in efficiently treating target plants and ensuring full coverage of the invasive weed population.

3.02 Strategic Fire Management Features (SFMFs)

Strategic Fire Management Features (SFMFs) is a SERAL term used to refer to three proposed features: fuelbreaks, prepared roadsides, and defensible space. Collectively, SFMFs provide fire management access points to protect highly valued resources (HVRAs) near communities and major infrastructure. SFMFs function more effectively in combination with the with the vegetation management treatments described in Section 3.01 to change fire behavior on a larger spatial scale.

A. Fuelbreaks, Prepared Strategic Roadsides, and Defensible Space

The Proposed Action would install and / or maintain fuel reduction corridors (SFMFs, such as fuelbreaks and prepared strategic roadsides) that are approximately 500 feet wide (e.g., 250 feet from either side of identified strategic ridgelines or roads), as well as, fuel reduction areas within 250 feet from identified infrastructure, assets, or some non-federal land boundaries (defensible space around HVRAs) totaling approximately 10,800 acres (Map 8). The fuelbreaks displayed in Map 8 include those already implemented in need of maintenance treatments and newly proposed fuelbreaks in need of first entry implementation. Similarly, the existing conditions within the areas displayed as prepared strategic roadsides and defensible space occur in varying degrees of treatment, including first entry implementation to follow-up maintenance. For example, certain instances, like defensible space areas associated with

powerlines, a significant portion of the proposed treatment area may already be treated in alignment with the desired condition or to some degree by a utility company. In this circumstance, the SERAL proposed action covers any additional treatments needed to meet the SERAL desired condition of the SFMF.

Similar to implementing prescribed fire treatments, the extent of, and order of implementation of SFMFs will be prioritized based on support planning tools under development[5] and limited to the availability of appropriated and grant obtained funds. Due to these constraints, implementation can be expected to occur in priority phases, as opportunities present themselves. Whenever possible, implementation will be leveraged by pursuing work and funding through partnerships with other interest groups.

SFMFs will be developed to create two zones, inner core and outer core (Figure 3 below). *Inner core* treatments will generally occur within 150 ft. of either side of a linear SFMF centerline or from infrastructure, community protection areas, or some non-federal land boundaries and are designed to facilitate operations for prescribed burning and to manage wildfires. *Outer core* treatments will generally occur throughout the remaining width of the feature (up to 100 additional feet from the inner core zone) and are designed to blend and transition (aka feather) the SFMFs with NRV areas.

In all SFMFs, intent is to retain canopy shading (based on site's tree spacing) to the extent feasible to discourage understory growth while still meeting strategic fire objectives. Tree removal will occur by ground based mechanical thinning, hand thinning, or piling and burning. For retention, pine and hardwoods will be favored for fire resistance, and may be pruned to achieve adequate height to live crown to reduce ladder fuel potential. All suppressed and intermediate crown class trees less than 30 inches DBH may be removed. All live conifers 30 inches DBH or larger will be retained, except to meet needs for equipment operability or safety. All montane hardwood trees 12-inch DBH or greater, and all oak woodland hardwood trees 8-inch DBH or greater are to be retained unless removal is required for safety or equipment operability. Continuous understory vegetation less than 8-inch DBH or 12 feet tall may be broken up into naturally appearing clumps or islands of varied size and shape. Separation may be created between clumps or islands to disrupt horizontal fuel continuity. Dead and dying trees that pose a safety hazard to roads or infrastructure may be removed. Trees generally less than 10-inch DBH and all slash, excess snags, logs, shrubs, or other fuel load debris may be piled, burned, chipped, shredded, masticated, or removed off-site. In open areas where large trees are sparse, small (approximately 3 to 10 inches DBH) trees should be spaced approximately 25 feet apart to ensure adequate stocking; preferentially retaining healthy sugar pine and hardwood trees.

[5] One tool is based on the Landscape Treatment Designer (Agar et al. 2012) another tool is based on fire risk prioritization (Dunn et al. 2020).

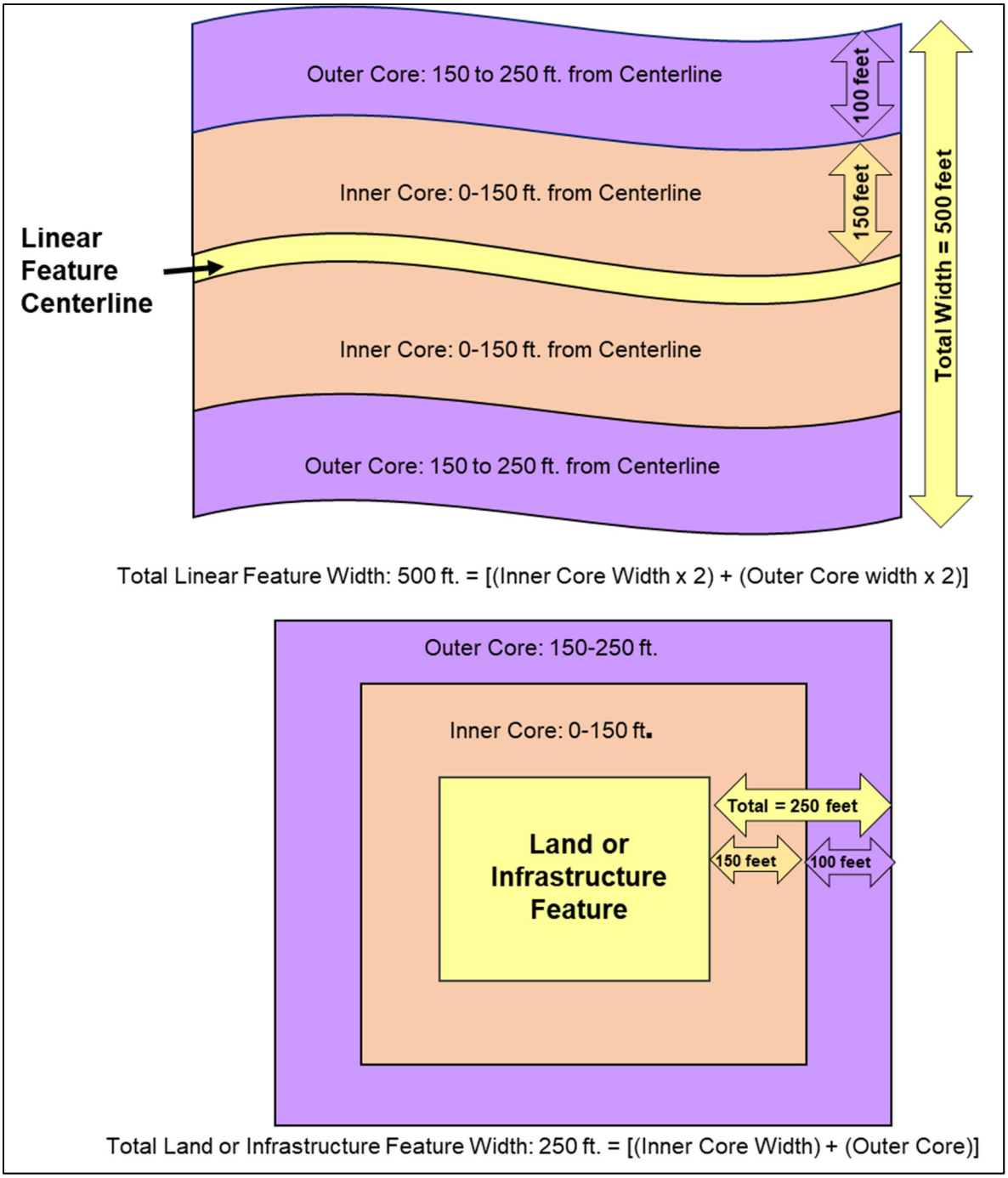

Figure 3: Graphic illustrating the widths of Inner core and outer core zones or areas.

A.1 Inner Core

Generally thin trees to attain an average spacing of ½ to 1 ½ crown width between residual crowns and to create gaps around hardwoods and large trees. All standing dead trees may be removed. Understory vegetation over 1 foot in height may be removed in order to develop vertical separation, or to reduce the horizontal continuity of fuels. Where possible, vegetation will be retained along roadsides to discourage unauthorized vehicle use off designated routes.

A.2 Outer Core

Generally thin trees to attain an average spacing of ½ to 1 crown width between residual crowns and to create gaps around hardwoods and large trees. When snags do not pose a safety risk, the target snag retention level is 4 of the largest snags per acre. The target dead and down log retention level is 4 of the largest logs (minimum of 20 in diameter or greater at midpoint, and 10 feet or more in length) per acre.

3.03 Forest Plan Amendments

The specific components of the Stanislaus National Forest's forest plan which pertain to the CSO and the proposed forest plan amendments are itemized in Appendix B, Table B.1. The proposed amendments are specific to the approximately 117,000 acre project area and are applicable everywhere and to every proposed treatment except where specifically excluded (i.e. Strategic Fire Management Features).

A. Identification of the Need to Change the Plan (36 CFR 219.13(b)(1))

In April of 2019, the *Conservation Strategy for the California Spotted Owl in the Sierra Nevada* (hereafter referred to as the "Conservation Strategy") was published by the USDA Forest Service providing updated guidance and recommendations focusing on maintaining high-quality habitat, while allowing for the development of resilient habitat across the landscape (USDA Forest Service 2019).

The 1991 Stanislaus National Forest Land and Resource Management Plan, as amended and as consolidated in the Stanislaus National Forest Plan Direction (USDA Forest Service 2017) includes certain standards and guidelines (S&Gs) specific to the CSO that are inconsistent with the Conservation Strategy. Restoring forest conditions to promote resiliency and reduce threats to habitat from natural disturbances such as drought, insects and disease as guided by NRV is one of six main purposes of SERAL and is a central and guiding principle of the Conservation Strategy. The Conservation Strategy concludes that restoring landscape structure and function to be within the NRV can help develop resilient habitat conditions that provide CSO conservation in the long term. The Conservation Strategy includes conservation measures that provide some immediate stability for individual owls while allowing landscape treatments to occur. The goal is to move the landscape toward the NRV, creating a more resilient forest.

In order to fully adopt and implement the management direction described in the Conservation Strategy and increase landscape resiliency as guided by NRV the Stanislaus National Forest's forest LRMP must be amended. The proposed forest plan amendments would allow the SERAL project's proposed landscape restoration treatments to best meet the purpose and need of the project and implement the guiding principles of the 2019 California Spotted Owl Conservation Strategy. The proposed amendments include standards and guidelines which will provide some immediate stability for individual owls while allowing forest management the ability to conduct treatments designed to help develop resilient habitat conditions that provide CSO conservation in the long term.

B. Substantive Requirements Directly Related to the Amendments (36 CFR 219.13(b)(5))

In accordance with 36 CFR 219.13(b)(5), based on the proposed amendments' purpose and anticipated effects, the Responsible Official has determined the following substantive provisions are directly related to the proposed amendments: **36 CFR 219.8(a)(1)**: Sustainability, (a) Ecological sustainability. (1) Ecosystem Integrity; **36 CFR 219.8(b)**: Sustainability, (b) Social and economic sustainability; **36 CFR 219.9(a)(1)**: Diversity of Plant and Animal Communities, (a) Ecosystem plan components, (1) Ecosystem integrity**; 36 CFR 219.9(a)(2)**: Diversity of Plant and Animal Communities, (a) Ecosystem plan components, (2) Ecosystem diversity; **36 CFR 219.10(a)(1)**: Multiple Use, (a) Integrated resource management for multiple use, (1) Aesthetic values, cultural and heritage resources, ecosystem services, fish and wildlife species, forage, geologic features, grazing and rangelands, habitat and habitat

connectivity, recreation settings and opportunities, riparian areas, scenery, soil, surface and subsurface water quality, timber, trails, vegetation, viewsheds, and other relevant resources and uses; **36 CFR 219.10(a)(5)**: Multiple Use, (a) Integrated resource management for multiple use, (5) Habitat conditions, subject to the requirements of § 219.9, for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence, and other activities (in collaboration with federally recognized Tribes, Alaska Native Corporations, other Federal agencies, and State and local governments); **36 CFR 219.10(a)(7)**: Multiple Use, (a) Integrated resource management for multiple use, (7) Reasonably foreseeable risks to ecological, social, and economic sustainability; and **36 CFR 219.10(a)(8)**: Multiple Use, (a) Integrated resource management for multiple use, (8) System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of the terrestrial and aquatic ecosystems on the plan area to adapt to change (§ 219.8).

3.04 Management Requirements

The following management requirements are not all inclusive. Additional management requirements related to specific resources will be identified as needed. The SERAL project will also ensure compliance with all applicable best management practices (BMPs) as outlined in USDA Forest Service (2011b) and USDA Forest Service (2012b) and forest plan direction (USDA Forest Service 2017) such as California spotted owl limited operating periods. A BMP and Forest Plan compliance checklist will be completed prior to implementation and identify all applicable BMPs and forest plan components, and how / where each applicable BMP and forest plan component are addressed in the contract provisions.

A. Prescribed Fire

- Place burn piles a minimum of 50 feet from perennial and intermittent streams and special aquatic features and 25 feet from ephemeral drainages. Locate piles outside of areas that may receive runoff from roads. Place piles a minimum of 15 feet from remaining green trees, recreation or utility infrastructure, or other areas of high value (e.g., heritage sites, plant avoidance areas).
- Avoid direct ignition within a riparian conservation area (RCA).
- Consult with a Forest Archeologist prior to implementing any fire control line through a cultural resource site. Do not prescribed burn in a cultural resource site that cannot be protected from damage.
- Protect historic wood features by constructing hand fire control lines, using foam wetting agents or fire shelter fabric.

B. Vegetation Management (All)

- Retain 4 to 6 of the largest snags per acre where appropriate (e.g., does not pose a hazard or risk to life or resources), except in inner core of SFMFs.
- Limit woody debris to less than 20 tons per acre on average in the 1hr, 10hr, and 100hr size classes. 1000hr and greater fuels shall be limited to 4 to 6 logs per acre with a desired size greater than or equal to 20 inches diameter and 10 feet in length, except in inner core of SFMFs.
- Treatments occurring within a CSO PAC must ensure habitat quality is not reduced (e.g., change in CWHR types) in greater than one third (100 acres) of any individual PAC.
- If a reduction in habitat quality is necessary to reduce the risk of large scale, high-severity wildfire or to address severe mortality from insects, disease, and drought, a reduction in habitat quality may occur on up to 100 acres provided (1) the highest quality nesting and roosting habitat (e.g., CWHR 6, 5D, or 5M, if available or 4D if that is the highest available within the PAC) and

a minimum of 50 percent canopy cover is maintained, averaged at the PAC scale, the quadratic mean diameter of trees is increased at the PAC scale, and habitat quality will increase post treatment.

C. Salvage of Insect-, Disease-, and Drought-Killed Trees

- Treatments are designed to retain and protect surviving green trees.
- Retain some patches of insect-, disease-, and drought-killed trees to create edge habitats for foraging owls. Patch sizes should generally range between 0.25 to 10 acres and comprise less than 15 percent across the landscape (Fettig 2012), preferably in small clumps of 2 to 4 trees (Lyderson et al. 2013) [USDA Forest Service 2019, p. 33, Approach 2, 7].

D. Salvage of Fire Killed Trees

- Dying trees will be evaluated using Forest Service publication *Marking Guidelines for Fire-Injured Trees in California* (USDA Forest Service 2011) or an equivalent document.
- Trees that are expected to die within 5 years will be removed using the 70% probability of mortality rule, except trees larger than 40 inch would use the 90% probability of mortality rule, as defined by *Marking Guidelines for Fire-Injured Trees in California* (USDA Forest Service 2011).
- Up to 8 large hardwood snags greater than or equal to 12 inches DBH and a minimum of four of the largest size class conifer snags per acre will be retained per acre for wildlife habitat (unless in a SFMF).

E. Non-Native Invasive Weed Control and Eradication

- Where other treatments will not be feasible or effective, herbicides will be applied in accordance with label instructions which include instructions on application under certain wind, temperature, precipitation and other weather conditions to reduce drift, volatilization, leaching, or runoff.

F. Strategic Fire Management Features (SFMFs)

- Remap PACs to avoid overlap with SFMFs. Where overlap cannot be avoided, treatment is limited to current management direction for PACs. For spotted owl, direction will follow California Spotted Owl Conservation Strategy direction (e.g., nest stand avoidance and meeting NRV criteria for tree retention, canopy cover, and snag and downed logs).
- Identify or create safety features for fire management staff as needed across the landscape, such as helispots and safety zones.

4. SCOPING PROCESS

Public participation is important at numerous points during project development and the environmental review process. The Forest Service seeks information, comments, and assistance from federal, state, and local agencies and individuals or organizations that may be interested in or affected by the proposed action.

The Forest Service conducts scoping according to the Council on Environmental Quality (CEQ) regulations (40 CFR 1501.7). In addition to other public involvement, scoping initiates an early and open process for determining the scope of issues to be addressed in the EIS and for identifying the significant issues related to a proposed action. This scoping process allows the Forest Service to not only identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the EIS process accordingly (40 CFR 1500.4(g)). An issue is an effect on a

physical, biological, social, or economic resource. An issue is not an activity; instead, the predicted effects of the activity create the issue. Issues are then separated into the two following groups;

Significant Issues are used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects.

Non-Significant Issues are: 1) outside the scope of the proposed action, 2) already determined through law, regulation, Forest Plan, or other higher level decision, 3) irrelevant to the decision to be made, 4) conjectural and not supported by scientific fact, 5) a comment opinion, or position statement, or 6) a question for clarification or information.

5. TIMELINE

The Forest Service intends to prepare an Environmental Impact Statement (EIS) for this proposal. Your scoping comments are requested during the designated 30-day scoping comment period (see cover letter). The Forest Service may use your scoping comments to help identify issues or alternatives while preparing an EIS, expected to be available for a 45-day opportunity to comment in February 2021. A final decision is expected in early 2022.

6. HOW TO COMMENT

This project is subject to comment pursuant to 36 CFR 218, Subparts A and B: The Responsible Official is requesting your specific written comments during an initial 30-day designated opportunity for public participation (see cover letter).

- Specific written comments are those submitted to the responsible official or designee during a designated opportunity for public participation (36 CFR 218.5(a)) provided for a proposed project (see Timeline). Written comments can include submission of transcriptions or other notes from oral statements or presentation.
- For the purposes of this rule, specific written comments should be within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the responsible official to consider.
- Individuals or representatives of an entity submitting comments must sign the comments or verify identity upon request.
- Only those who have submitted timely, specific written comments regarding the proposed project during a designated comment opportunity for public comment may file an objection.

Please submit comments electronically by typing your comments directly or by attaching a file through *https://cara.ecosystem-management.org/Public/commentInput?Project=56500*. Alternatively, comments may be mailed to the Stanislaus National Forest, Attn: **SERAL Project,** 19777 Greenely Road, Sonora, CA 95370. Names and addresses of those who comment will be considered part of the public record on this proposed action and will be available for public inspection. Please submit comments prior to **August 10, 2020**.

7. INFORMATION CONTACT

For additional information regarding this proposal contact Katie Wilkinson by emailing Kathryn.wilkinson@usda.gov or call (209)288-6321.

APPENDIX A: ADDITIONAL TABLES

Table A.1: Historic NRV Range and Seral or CWHR Stage Proportions.

Seral Stage	NRV Range (%)		Size		Density	
	Yellow Pine / Dry Mixed Conifer	Fir / Moist Mixed Conifer	CWHR Code	Tree Size Class (DBH in.)	CWHR Code[1] (Closure)	Canopy Cover
Early	15-20	10-20	<= 2	Seedlings / Saplings (<6 in.)	All	-
Mid-Open	25-30	20	3 & 4	Poles / Small Trees (6 - 24 in)	S & P	10% - 39%
Mid-Closed	5-10	10-15	3 & 4	Poles / Small Trees (6 - 24 in.)	M & D	40% - 100%
Late-Open	40-45	25-40	5 (&6)	Medium / Large Trees (>24 in.)	S & P	10% - 39%
Late-Closed	5	20	5 (&6)	Medium / Large Trees (>24 in.)	M & D	40% - 100%

[1]S & P = Sparse / Open Cover; M & D = Moderate and Dense Cover.

Table A.2: Yellow Pine / Dry Mixed Conifer forest type restoration estimates[6].

Seral Stage Excess (CWHR Class)	Seral Stage Deficit (CWHR Class)	Restoration Need	Approximate Restoration Acres
Mid-Closed (3M, 3D, 4M, 4D) 	Mid-Open (3S, 3P, 4S, 4P) 	**Disturbance:** Mechanical thinning and/or non-stand replacing fire	9,000
Late-Closed (5M/5D) 	Late Open (5S, 5P) 	**Disturbance:** Mechanical thinning and/or non-stand replacing fire	9,000
Mid-Closed (3M, 3D, 4M, 4D) 	Early (2 or less) 	**Disturbance:** Small gap creation via mechanical thinning and/or fire.	1,000
Late-Closed (5M, 5D) 	Early (2 or less) 	**Disturbance:** Small gap creation via mechanical thinning and/or fire.	1,000
Mid-Closed (3M, 3D, 4M, 4D) 	Late Open (5S, 5P) 	**Disturbance, then Succession** Mechanical thinning and/or non-stand replacing fire to transition from mid-seral closed to mid-seral open canopy, followed by growth with periodic, non-stand replacing fire.	18,000
Total Structural Restoration Need			**38,000**

[6] (Images from Haugo et al. 2015; originally by Robert Van Pelt).

Table A.3: Fir / Moist Mixed Conifer forest type restoration estimates[7].

Seral Stage Excess (CWHR Class)	Seral Stage Deficit (CWHR Class)	Restoration Need	Approximate Restoration Acres
Mid-Closed (3M, 3D, 4M, 4D) 	Mid-Open (3S, 3P, 4S, 4P) 	**Disturbance:** Mechanical thinning and/or non-stand replacing fire	800
Late-Closed (5M/5D) 	Late Open (5S, 5P) 	**Disturbance:** Mechanical thinning and/or non-stand replacing fire	2,000
Mid-Closed (3M, 3D, 4M, 4D) 	Early (2 or less) 	**Disturbance:** Small gap creation via mechanical thinning and/or fire.	250
Late-Closed (5M, 5D) 	Early (2 or less) 	**Disturbance:** Small gap creation via mechanical thinning and/or fire.	250
Total Structural Restoration Need			**3,300**

[7] (Images from Haugo et al. 2015; originally by Robert Van Pelt).

APPENDIX B: FOREST PLAN AMENDMENTS

Table B.1: Proposed forest plan amendments.

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
1	**California Spotted Owl Protected Activity Centers Designation:** California spotted owl protected activity centers (PACs) are delineated surrounding each territorial owl activity center detected on National Forest System lands since 1986. Owl activity centers are designated for all territorial owls based on: (1) the most recent documented nest site, (2) the most recent known roost site when a nest location remains unknown, and (3) a central point based on repeated daytime detections when neither nest or roost locations are known.	179	Land Allocation	**Designate activity centers and protected activity centers (PACs).** A. Survey suitable CSO nesting and roosting habitat of unknown occupancy status in advance of any management activities that would reduce CSO nesting and roosting habitat quality. B. Designate owl activity centers for territorial owl pairs based on (1) the most recent documented nest site, (2) the most recently known roost site when a nest location remains unknown, or (3) a central point based on repeated daytime detections when neither nest nor roost locations are known. **[CSO Strategy, p. 26; PACs 1. A & B]**	Guideline
2	**California Spotted Owl Protected Activity Centers Designation:** PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 300 acres of habitat in as compact a unit as possible. The best available habitat is selected for California spotted owl PACs to include: (1) two or more tree canopy layers; (2) trees in the dominant and codominant crown classes averaging 24 inches dbh or greater; (3) at least 70 percent tree canopy cover (including hardwoods); and (4) in descending order of priority, CWHR classes 6, 5D, 5M, 4D, and 4M and other stands with at least 50 percent canopy cover (including hardwoods). Aerial photography interpretation and field verification are used as needed to delineate PACs.	179	Land Allocation	**Designate activity centers and protected activity centers (PACs).** Designate PACs surrounding each activity center to include 300 acres of the highest quality nesting and roosting habitat, in as compact an area as possible, comprised of (1) CWHR classes 6, 5D, 5M, 4D, and 4M (listed in descending order of priority); (2) at least two tree canopy layers; (3) dominant and codominant trees averaging more than 24 inches dbh; (4) more than 60 to 70 percent canopy cover; (5) large snags (at least 45 inches dbh); and (6) snag and down woody material levels that are higher than average. D. Where possible, delineate PAC boundaries based on the best available information (for example, biophysical, climatic water deficit, Landscape Management Unit [LMU]) to include the most sustainable locations of high-quality nesting and roosting habitat, where such habitat can be resilient to natural disturbances and climate change. **[CSO Strategy, p. 26; PACs 1. C & D]**	Guideline
3	**California Spotted Owl Protected Activity Centers Designation:** As additional nest location and habitat data become available, boundaries of PACs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available 300 acres of habitat.	179	Land Allocation	**Modify individual PACs, the PAC network, or both based on biophysical conditions, disturbance events, or lack of occupancy.** **PAC Modification.** 1) Adjust PAC boundaries, as needed, based on the best available information (for example, biophysical, climatic water deficit, LMU) to include the most sustainable locations of high-quality nesting and roosting habitat, where such habitat can be resilient to natural disturbances and climate change. 2) As CSO nesting or roosting habits change, adjust PAC boundaries as needed to include new nest sites or concentrated areas of roosting which do not fall within PAC boundaries. 3) PAC boundaries should be modified when large-scale disturbance events make nesting and roosting habitat within a PAC unsuitable or when owl data indicates owl nesting has shifted to areas outside of a PAC. Assess habitat conditions within a 1.5-mile radius of an activity center to modify PACs according to PAC designation criteria A-D or PAC retirement criteria B.1) through B.2) and C.1) through C.2). **[CSO Strategy, p. 27; PAC Modification A.1 through A.3]**	Guideline

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
4	**California Spotted Owl Protected Activity Centers Designation:** PACs are maintained regardless of California spotted owl occupancy status. However, after a stand replacing event, evaluate habitat conditions within a 1.5-mile radius around the activity center to identify opportunities for re-mapping the PAC. If there is insufficient suitable habitat for designating a PAC within the 1.5-mile radius, the PAC may be removed from the network.	180	Land Allocation	**PAC retirement based on disturbance.** 1) When a territory associated with a PAC experiences more than 75 percent basal area mortality over more than 50 percent of the territory, conduct surveys one year post disturbance within the PAC. If neither nesting nor territorial activity by a pair of owls is documented, the PAC and associated territory may be retired. Retain and protect those areas in the territory with the highest potential to support future CSO breeding and nesting/roosting habitat. 2) When a PAC has experienced a large-scale disturbance (for example, wildfire, tree mortality from drought and insects) that substantially reduces suitable habitat, assess habitat conditions within a 1.5-mile radius of the activity center to determine if 300 acres of suitable nesting and roosting habitat remains that would satisfy the PAC designation criteria. If insufficient suitable habitat exists to remap the PAC, the PAC and associated territory may be retired. If the PAC can be remapped, refer to [Row 4 proposed amendment PAC modification guideline]. **[CSO Strategy, p. 27; PAC retirement based on disturbance B.1 and B.2]** **PAC Retirement based on lack of occupancy**. 1) When a PAC has been surveyed repeatedly over time (at least two years of surveys within the last 12 years) with no observed breeding activity nor territorial behavior by an owl pair, monitor or survey the PAC for an additional three consecutive years. If no owl is detected, the PAC and associated territory may be retired. If an owl is detected but no breeding activity nor territorial behavior by an owl pair has been documented, the PAC and associated territory may be retired. 2) When a PAC has unknown breeding activity and no history of protocol level surveys, monitor or survey for five consecutive years. If no owl is detected, the PAC and associated territory may be retired. If an owl is detected but no breeding activity nor territorial behavior by an owl pair has been documented, the PAC and associated territory may be retired. **[CSO Strategy, p. 27; PAC retirement based on disturbance C.1 and C.2]**	Guideline
6	**California Spotted Owl Protected Activity Centers Desired Conditions, Intent and Objectives:** Stands in each PAC have: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.	180	Desired Condition	California spotted owl protected activity centers provide high-quality habitat that is resilient to high-severity wildfire and other stressors. **[CSO Strategy, p. 25; introductory to Approach 1.]**	Desired Condition
7	**California Spotted Owl Protected Activity Centers Desired Conditions, Intent and Objectives:** Maintain PACs so that they continue to provide habitat conditions that support successful reproduction of California spotted owls and northern goshawks.	180	Management Intent	Maintain and improve currently occupied PACs (CSO and NGO) that are likely to contribute disproportionately to population growth and reproduction. **[CSO Strategy, p. 25, Approach 1 narrative, paragraph 2]**	Desired Condition
8	N/A			**Add:** Sierra Nevada forests occur within the natural range of variation (NRV) and contain an abundance of owl nesting, roosting, and foraging habitat distributed across the landscape. **[CSO Strategy, p. 25, Approach 1 narrative, paragraph 1]**	Goal
9	**California Spotted Owl Protected Activity Centers Desired Conditions, Intent and Objectives:** Avoid vegetation and fuels management activities within PACs to the greatest extent feasible. Reduce hazardous fuels in PACs in defense zones when they create an unacceptable fire threat to communities. Where PACs cannot be avoided in the strategic placement of treatments, ensure effective treatment of surface, ladder, and crown fuels within treated areas. If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acreage wherever possible. Add adjacent acres of comparable quality wherever possible.	180	Management Objective	**Manage PACs for resiliency and sustainability while minimizing near-term effects of resiliency treatments.** Fire, hand treatments, mechanical treatments, or a combination of these things may be necessary in PACs to increase resiliency and sustainability. Prioritize treatments in PACs that are at highest risk of large-scale, high-severity wildfire or severe tree mortality from insects and drought. Design treatments to maintain and promote the highest quality nesting and roosting habitat available. **[CSO Strategy, p. 28, Approach 1 4.A]**	Guideline

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
10	**S&G 71.** Within the assessment area or watershed, locate fuels treatments to minimize impacts to PACs. PACs may be re-mapped during project planning to avoid intersections with treatment areas, provided that the re-mapped PACs contain habitat of equal quality and include known nest sites and important roost sites. Document PAC adjustments in biological evaluations.	180-181	Standard & Guideline	**Remove this portion of S&G 71.**	N/A
11	**S&G 71 (cont.)**. When treatment areas must intersect PACs and choices can be made about which PACs to enter, use the following criteria to preferentially avoid PACs that have the highest likely contribution to owl productivity. • lowest contribution to productivity: PACs presently unoccupied and historically occupied by territorial singles only. • PACs presently unoccupied and historically occupied by pairs, • PACs presently occupied by territorial singles, • PACs presently occupied by pairs, • highest contribution to productivity: PACs currently or historically reproductive. Historical occupancy is considered occupancy since 1990. Current occupancy is based on surveys consistent with survey protocol (March 1992) in the last 2-3 years prior to project planning. These dates were chosen to encompass the majority of survey efforts and to include breeding pulses in the early 1990s when many sites were found to be productive.	180-181	Standard & Guideline	In addition to prioritization by risk level, prioritize treatments in PACs based on the history of active nesting and pair territorial behavior where information is available. Treatments that may have negative near term effects should be minimized or avoided in PACs with the highest likely contribution to reproductive success. 1) Prioritization for PAC treatment (listed from highest to lowest priority for treatment): • PACs presently unoccupied and historically occupied by territorial singles only • PACs presently unoccupied and historically occupied by pairs • PACs presently occupied by territorial singles • PACs presently occupied by pairs • PACs presently occupied by pairs and currently or historically reproductive **[CSO Strategy, p. 28, Approach 1 4.B]**	Guideline
12	**S&G 71 (cont.).** When designing treatment unit intersections with PACs, limit treatment acres to those necessary to achieve strategic placement objectives and avoid treatments adjacent to nest stands whenever possible.	181	Standard & Guideline	**Remove this portion of S&G 71.**	N/A
13	**S&G 71 (cont.).** If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.	181	Standard & Guideline	**Remove this portion of S&G 71.**	N/A
14	N/A	N/A	N/A	**Add:** When treating within PACs, design treatments to minimize impacts to reproductive owls and key owl habitat elements. Generally retain the highest quality habitat (CWHR 6, 5D, 5M), especially in areas with higher canopy cover (more than 55 percent) in large/tall trees. **[CSO Strategy, p. 28, Approach 1 4.C]**	Standard
15	N/A	N/A	N/A	**Add:** Design fuels treatments in PACs, by reducing surface and ladder fuels and minimizing impacts to overstory canopy, to manage for low- and moderate-intensity fires (flame lengths less than 4 feet and less than 6 feet, respectively), which will provide conditions for continued nesting and roosting. **[CSO Strategy, p. 28, Approach 1 4.D]**	Standard
16	N/A	N/A	N/A	**Add:** When practicable, use fire as the primary tool for achieving restoration goals within PACs. **[CSO Strategy, p. 28, Approach 1 4.E]**	Guideline
17	N/A	N/A	N/A	**Add:** Reduction in habitat quality is acceptable in up to one third (100 acres) of a PAC where necessary to increase long-term resilience, provided (1) the QMD is increased for the PAC as a whole; (2) a minimum of 50 percent canopy cover is maintained, averaged at the PAC scale; (3) habitat quality will increase post treatment; and (4) habitat quality is maintained in the highest quality nesting and roosting habitat (for example, CWHR 6, 5D, 5M). **[CSO Strategy, p. 28, Approach 1 4.G]**	Standard

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
18	**S&G 72.** Mechanical treatments may be conducted to meet fuels objectives in protected activity centers (PACs) located in WUI defense zones. In PACs located in WUI threat zones, mechanical treatments are allowed where prescribed fire is not feasible and where avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Mechanical treatments should be designed to maintain habitat structure and function of the PAC	181	Standard & Guideline	**Remove.**	
19	**S&G 73.** While mechanical treatments may be conducted in protected activity centers (PACs) located in WUI defense zones and, in some cases, threat zones, *they are prohibited within a 500-foot radius buffer around a spotted owl activity center within the designated PAC.* Prescribed burning is allowed within the 500-foot radius buffer. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted prior to burning as needed to protect important elements of owl habitat. Treatments in the remainder of the PAC use the forest-wide standards and guidelines for mechanical thinning.	181	Standard & Guideline	Avoid mechanical treatments within 10 acres surrounding a nest tree or nest structure. **[CSO Strategy, p. 28, Approach 1 4.F]** NOTE: The rest of S & G 73 is replaced by other proposed amendments.	Standard
20	**S&G 74.** In PACs located outside the WUI, limit stand-altering activities to reducing surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches dbh and greater, design prescribed fire treatments to have an average flame length of 4 feet or less. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted prior to burning as needed to protect important elements of owl habitat.	181	Standard & Guideline	**Remove.** *[Proposed amendments related to CSO Strategy, p. 28, Approach 1, 4.A through 4.F replace S&G 74]*	
21	**S&G 75.** For California spotted owl PACs: Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the activity center during the breeding season (March 1 through August 31), unless surveys confirm that California spotted owls are not nesting. Prior to implementing activities within or adjacent to a California spotted owl PAC and the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center.	181	Standard & Guideline	Apply a 0.25-mile (125-acre) buffer around an active nest during the breeding season (March 1 through August 15) that limits or prohibits mechanical harvest activities that may disturb breeding owls. This LOP does not apply to existing road and trail use and maintenance. **[CSO Strategy, p. 26, Approach 1, PAC 2.A and 2.B]**	Standard
22	**S&G 77.** The LOP may be waived for vegetation treatments of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be modified.	182	Standard & Guideline	California spotted owl PAC LOPs may be modified or waived under any of the following conditions: (1) when surveys indicate absence of nesting owls, (2) when activities are of small scale and short duration, or (3) when the benefit of management activities to habitat resilience outweighs the potential short-term risk to owls. **[CSO Strategy, p. 26, Approach 1, PAC 2.]**	Standard
23	**S&G 78.** Breeding season limited operating period restrictions may be waived, where necessary, to allow for use of early season prescribed fire in up to 5 percent of California spotted owl PACs per year on a forest.	182	Standard & Guideline	Avoid prescribed burning closer than 500 feet from active nests during the breeding season. This restriction may be waived in up to 10 percent of PACs per year in a national forest, where necessary to facilitate the benefits of using early season prescribed fire. **[CSO Strategy, p. 26, Approach 1, PAC 2.B]**	Guideline
24	**S&G 80.** For California spotted owl PACs: Conduct vegetation treatments in no more than 5 percent per year and 10 percent per decade of the acres in California spotted owl PACs in the 11 Sierra Nevada national forests. Monitor the number of PACs treated at a bioregional scale.	182	Standard & Guideline	**Remove.**	

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
25	**California Spotted Owl Home Range Core Areas (HRCAs) Designation.** A home range core area is established surrounding each territorial spotted owl activity center detected after 1986. The core area amounts to 20 percent of the area described by the sum of the average breeding pair home range plus one standard error. Home range core area sizes are as follows: 2,400 acres on the Hat Creek and Eagle Lake Ranger Districts of the Lassen National Forest, 1,000 acres on the Modoc, Inyo, Humboldt-Toiyabe, Plumas, Tahoe, Eldorado, Lake Tahoe Basin Management Unit and Stanislaus National Forests and on the Almanor Ranger District of Lassen National Forest, and 600 acres of the Sequoia and Sierra National Forests. Aerial photography is used to delineate the core area. Acreage for the entire core area is identified on national forest lands. Core areas encompass the best available California spotted owl habitat in the closest proximity to the owl activity center. The best available contiguous habitat is selected to incorporate, in descending order of priority, CWHR classes 6, 5D, 5M, 4D and 4M and other stands with at least 50 percent tree canopy cover (including hardwoods). The acreage in the 300-acre PAC counts toward the total home range core area. Core areas are delineated within 1.5 miles of the activity center.	184	Land Allocation	**California Spotted Owl Territory Designation.** A California spotted owl territory represents a 1,000 acre geographic area consistently used for nesting, roosting, and foraging, containing essential habitat for survival and reproduction. A territory includes the associated 300-acre PAC. Generally, map territories as a circular core around an activity center. However, territory boundaries may be adjusted to be noncircular, as needed, to include the most sustainable areas of high-quality habitat and exclude areas less likely to support suitable habitat. **[CSO Strategy, p. 28; Approach 1, Territory/Watershed 1. A & B]**	Guideline
26	**California Spotted Owl Home Range Core Areas (HRCAs) Designation.** When activities are planned adjacent to non-national forest lands, circular core areas are delineated around California spotted owl activity centers on non-national forest lands. Using the best available habitat as described above, any part of the circular core area that lies on national forest lands is designated and managed as a California spotted owl home range core area.	185	Land Allocation	**Remove.**	
27	**California Spotted Owl Home Range Core Areas (HRCAs) Desired Conditions, Intent and Objectives.** HRCAs consist of large habitat blocks that have: (1) at least two tree canopy layers; (2) at least 24 inches dbh in dominant and co-dominant trees; (3) a number of very large (greater than 45 inches dbh) old trees; (4) at least 50 to 70 percent canopy cover; and (5) higher than average levels of snags and down woody material.	185	Desired Condition	Desired conservation outcomes for an occupied territory are to maintain and promote 40 to 60 percent of a territory in mature tree size classes with moderate and high canopy cover for nesting, roosting and foraging. This corresponds to roughly the following CWHR size/density classes in descending order of priority: 6, 5D, 5M, 4D, and 4M. Those territories in more mesic conditions and at higher elevations within the watershed should contain relatively more of this habitat than those in drier conditions and at lower elevations. The remainder of the territory should represent a diversity of many different structure and canopy cover classes. **[CSO Strategy, p. 29; Approach 1, Territory/Watershed 2. A]**	Desired Condition
28	N/A	N/A	N/A	**Add:** When occupied territories do not meet the desired conditions described above, retain the existing large tree moderate/high canopy cover habitat (for example, CWHR 6, 5D, 5M) wherever it exists throughout the territory. **Does not apply within strategic fire management features (fuelbreaks and defensible space).** **[CSO Strategy, p. 29; Approach 1, Territory/Watershed 2. A.1]**	Standard
29	N/A	N/A	N/A	**Add:** For areas where multiple territories comprise more than 75 percent of a watershed (typically a HUC 8 unit and larger than 10,000 acres) the desired condition is to maintain at least 30 to 50 percent of the watershed in the mature tree habitat at moderate and high canopy cover. **Does not apply within strategic fire management features (fuelbreaks and defensible space).** **[CSO Strategy, p. 29; Approach 1, Territory/Watershed 2. B]**	Desired Condition
30	N/A	N/A	N/A	**Add:** In California spotted owl territories, design vegetation treatments to retain **patches** of large/tall trees (more than 48 meters / approximately 160 feet) with high canopy cover (more than 70 percent), both inside and outside of PACs, for developing future nesting sites. **[CSO Strategy, p. 29; Approach 1, Territory/Watershed 2. C1]**	Standard

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31	N/A	N/A	N/A	**Add:** In California spotted owl territories, design vegetation treatments to promote habitat connectivity at the watershed scale by retaining connected areas of moderate and high canopy cover in large/tall trees. **[CSO Strategy, p. 29; Approach 1, Territory/Watershed 2. C2]**	Guideline
32	N/A	N/A	N/A	**Add:** Increase resiliency for territories at the watershed scale by reducing tree density of smaller trees that are prohibiting growth of larger trees. Vegetation thinning treatments within California spotted owl territories should be designed to minimize the loss of and to recruit large and very large trees and snags (at least 24 inches and at least 36 inches dbh, respectively). **[CSO Strategy, p. 29; Approach 1, Territory/Watershed 2. C3]**	Guideline
33	N/A	N/A	N/A	**Add:** At the landscape scale, manage towards a mix of seral stages and canopy conditions consistent with NRV. This will generally entail increasing the amount of open canopy habitat in all seral stages and the amount of late seral stand conditions (open or closed canopy) to get a patchy distribution of diverse stand types. Seral stage desired conditions can be inferred by comparing current conditions with the level of departure from historic conditions (for example, Safford and Stevens 2017, pages 177 through 181; table 11, pages 178 and 179). **[CSO Strategy, p. 30; Approach 2, 1.A.1]**	Desired Condition
34	N/A	N/A	N/A	**Add:** At the stand/patch scales, manage for within-stand and multi-stand diversity. Manage for a pattern of individual trees, clumps of trees, and openings (ICOs) containing various sizes of clumped trees and openings. These patterns range in size, configuration, and frequency based on NRV (Safford and Stevens 2017, table 8, page 140). **[CSO Strategy, p. 31; Approach 2, 1.A.2]**	Desired Condition
35	N/A	N/A	N/A	**Add:** Manage the understory of mid- and late-seral areas for a patchy distribution of shrubs, orbs, tree regeneration patches, and bare ground to increase diversity, reduce fuels continuity, and provide habitat for owl prey species. **[CSO Strategy, p. 30; Approach 2, 1.A.3]**	Desired Condition
36	N/A	N/A	N/A	**Add:** Retain a diversity of size and age classes consistent with NRV. Retain sufficient smaller trees to provide habitat diversity and recruitment of future large trees. **Does not apply within strategic fire management features (fuelbreaks and defensible space).** **[CSO Strategy, p. 31; Approach 2, 2.A.1]**	Guideline
37	N/A	N/A	N/A	**Add:** Remove trees in overrepresented size classes and retain the largest trees in the stand to provide both space and resources for remaining trees to grow larger and more resilient.	Guideline
38	N/A	N/A	N/A	**Add:** Where stand tree densities are outside NRV, reduce densities in small- to medium-size classes across seral stages and canopy-cover classes, while retaining representation of at least three age/size classes where they exist. The lowest tree densities would be in open-canopy, late-seral stands on low-productivity, dry sites. The highest densities would be in closed-canopy, early- and mid-seral stands on high-productivity, wetter sites. **Does not apply within strategic fire management features (fuelbreaks and defensible space).** **[CSO Strategy, p. 31; Approach 2, 2.B.1]**	Guideline
39	N/A	N/A	N/A	**Add:** Retain large and structurally-complex trees and snags. **[CSO Strategy, p. 31; Approach 2, 2.C)]** Maintain and promote large, old, and structurally complex trees and snags to provide quality owl nesting and roosting habitat. For desired conditions of old and structurally complex trees and snags in yellow pine and mixed-conifer forests, refer to Safford and Stevens 2017, pages 141 through 145 and table 11, pages 178 and 179. **[CSO Strategy, p. 31; Approach 2, 3.A]**	Standard

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40	**S&G 10.** Determine down woody material retention levels on an individual project basis, based on desired conditions. Emphasize retention of wood in the largest size classes and in decay classes 1, 2, and 3. Consider the effects of follow-up prescribed fire in achieving desired down woody material retention levels.	39	Standards and Guidelines	Manage stands for relatively low levels of surface fuels, relatively low but variable levels of coarse woody debris, and variable densities of logs across the landscape. 1) Manage surface fuels, fine fuels, and coarse woody debris (CWD), to correspond with the distribution and volume of duff, litter, and woody debris consistent with NRV. Refer to Safford and Stevens 2017 (pages 141 through158 and pages 177 through 189) for guidance on appropriate NRV conditions. 2) At the stand scale, manage for patches of CWD and thick litter layers interspersed with areas of shrubs and open areas with only ground vegetation, such as forbs and grasses. Avoid continuity of heavy surface fuels. 3) Preferentially retain logs in the largest size classes to reach NRV goals. **Does not apply within strategic fire management features (fuelbreaks and defensible space). [CSO Strategy, p. 32; Approach 2, 5.A]**	Standard
41	N/A	N/A	N/A	**Add:** When possible, use prescribed fire or managed fire to achieve NRV conditions for duff, litter, and woody debris. When using fire alone is not practical to achieve NRV conditions, use manual or mechanical means in combination with fire. **[CSO Strategy, p. 32; Approach 2, 5.B]** See also proposed amendment: "When practicable, use fire as the primary tool for achieving restoration goals within PACs. **[CSO Strategy, p. 28, Approach 1 4.E]**	Guideline
42	N/A	N/A	N/A	**Add:** Increase large-scale application of managed and prescribe fire to maintain dynamic ecosystem structure and function. **[CSO Strategy, p. 33; Approach 2, 6]**	Goal
43	N/A	N/A	N/A	**Add:** Manage prescribed fires and natural ignitions at multiple scales for a range of fire severity effects. . **[CSO Strategy, p. 33; Approach 2, 6.C]**	Goal
44	N/A	N/A	N/A	**Add:** To the extent feasible, manage fire at the landscape scale to create a mosaic of patches burned at low and moderate severities interspersed with large, unburned patches and small, high-severity burned patches. Generally, proportions of fire effects desired to mimic NRV are approximately unburned (10 to 30 percent), low severity (30 to 60 percent), moderate severity (15 to 35 percent), and high severity (1 to 10percent). **[CSO Strategy, p. 33; Approach 2, 6.C.1]**	Guideline
45	N/A	N/A	N/A	**Add:** Where prescribed fire is used in California spotted owl territories, design fire treatments so high-severity patch sizes are generally less than 10 acres (potentially up to 100 acres) to minimize adverse impacts to habitat. **[CSO Strategy, p. 33; Approach 2, 6.C.2]**	Standard
46	**California Spotted Owl Home Range Core Areas (HRCAs) Desired Conditions, Intent and Objectives.** Treat fuels using a landscape approach for strategically placing area treatments to modify fire behavior. Retain existing suitable habitat, recognizing that habitat within treated areas may be modified to meet fuels objectives. Accelerate development of currently unsuitable habitat (in non-habitat inclusions, such as plantations) into suitable condition. Arrange treatment patterns and design treatment prescriptions to avoid the highest quality habitat (CWHR types 5M, 5D, and 6) wherever possible.	185	Management Intent	**Remove.**	
47	**California Spotted Owl Home Range Core Areas (HRCAs) Desired Conditions, Intent and Objectives:** Establish and maintain a pattern of fuels treatments that is effective in modifying wildfire behavior. Design treatments in HRCAs to be economically efficient and to promote forest health where consistent with habitat objectives	185	Management Objective	**Remove.**	

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48	**S&G 6.** For all mechanical thinning treatments, design projects to retain all live conifers 30 inches dbh or larger. Exceptions are allowed to meet needs for equipment operability.	34	Standard & Guideline	Due to the current deficit of very large trees as indicated by the departure from NRV (Safford and Stevens 2017, page 97; table 11, page179), trees more than 30 inches dbh should not be removed from occupied CSO territories. Outside occupied CSO territories, trees of 30 to 40 inches dbh should only be removed in very limited instances for restoration and resilience purposes, as guided by NRV. As the abundance and distribution of large and very large trees begins to align with NRV, this recommendation may no longer be necessary. Circumstances for removal of 30- to 40-inch dbh trees outside occupied CSO territories could include the following: 1) Removal of select shade-tolerant trees to promote existing shade-intolerant pine species in the same area of comparable size, such as ponderosa pine or sugar pine, or shade-intolerant broadleaved species, such as black oak or aspen. 2) Removal of select shade-intolerant trees to promote the establishment, growth, and development of stands with multiple size and age classes, and create small gaps in historically pine dominated stands. 3) Removal of trees surrounding rust-resistant white pine to improve the growth and vigor of these trees and maintain this valuable genetic resource on the landscape. 4) Removal of select conifers to restore aspen, oaks, or meadows. 5) Thinning of trees in homogeneous plantations where large diameter trees are at risk due to competition. **[CSO Strategy, p. 32; Approach 2, 3.D]**	Guideline
49	N/A	N/A	N/A	**Add:** Restore the proportion and distribution of tree species on the landscape consistent with NRV and potential vegetation type. **[CSO Strategy, p. 32; Approach 2, 4]**	Desired Condition
50	N/A	N/A	N/A	**Add:** Design vegetation treatments to increase the abundance and distribution of fire-resilient and resistant species (for example, ponderosa pine, sugar pine, Jeffrey pine, and black oak) and decrease the abundance of shade-tolerant species (for example, white fir, incense cedar, Douglas fir). 1) Promote species diversity as guided by NRV. 2) Remove smaller trees and fire-sensitive species that would not have survived under a natural fire regime. **[CSO Strategy, p. 32; Approach 2, 4.A]**	Guideline
51	**S&G 7.** For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside WUI defense zones: • Design projects to retain at least 40 percent of the existing basal area. The retained basal area should generally be comprised of the largest trees. • Where available, design projects to retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches dbh within the treatment unit. • Design projects to avoid reducing pre-existing canopy cover by more than 30 percent within the treatment unit. Percent is measured in absolute terms (for example, canopy cover at 80 percent should not be reduced below 50 percent.) • Within treatment units, at a minimum, the intent is to provide for an effective fuels treatment. Where existing vegetative conditions are at or near 40 percent canopy cover, projects are to be designed remove the material necessary to meet fire and fuels objectives.	34	Standard & Guideline	**Remove.**	
52	**S&G 7 (cont.).** • Within California spotted owl Home Range Core Areas: Where existing vegetative conditions permit, design projects to retain at least 50 percent canopy cover averaged within the treatment unit. Exceptions are allowed in limited situations where additional trees must be removed to adequately reduce ladder fuels, provide sufficient spacing for equipment operations, or minimize re-entry. Where 50 percent canopy cover retention cannot be met for reasons described above, retain at least 40 percent canopy cover averaged within the treatment unit.	34	Standard & Guideline	**Remove.**	

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
53	**S&G 7 (cont.).** • Outside of California spotted owl Home Range Core Areas: Where existing vegetative conditions permit, design projects to retain at least 50 percent canopy cover within the treatment unit. Exceptions are allowed where project objectives require additional canopy modification (such as the need to adequately reduce ladder fuels, provide for safe and efficient equipment operations, minimize re-entry, design cost efficient treatments, and/or significantly reduce stand density.) Where canopy cover must be reduced below 50 percent, retain at least 40 percent canopy cover averaged within the treatment unit.	34	Standard & Guideline	**Remove.**	
54	**S&G 7 (cont.).** Within California spotted owl PACs, where treatment is necessary, remove only material needed to meet project fuels objectives. Focus on removal of surface and ladder fuels.	34	Standard & Guideline	**Remove.**	
55	**S&G 8**. For mechanical thinning treatments outside defense zones in the eastside pine type: in mature forest habitat design projects to retain 30 percent of the existing basal area. The retained basal area should be generally comprised of the largest trees. Projects in the eastside pine type have no canopy cover retention standards and guidelines.	34	Standard & Guideline	**Remove.**	
56	**S&G 9.** Standards and guidelines # 6, 7, and 8 above apply only to mechanical thinning harvests specifically designed to meet objectives for treating fuels and/or controlling stand densities.	34	Standard & Guideline	**Remove.**	
57	**S&G 16.** Outside of WUI defense zones, **salvage harvests** are prohibited in PACs and known den sites unless a biological evaluation determines that the areas proposed for harvest are rendered unsuitable for the purpose they were intended by a catastrophic stand-replacing event.	35	Standard & Guideline	**Manage highly disturbed areas for NRV-based restoration and conservation benefits**. A. When disturbances like fire and insect-outbreaks move landscapes away from NRV conditions, evaluate post-disturbance conditions across multiple scales (substand to landscape scale) to determine what management activities (such as reforestation or fuels reduction) may be necessary to achieve NRV conditions and associated conservation outcomes. B. When managing highly disturbed landscapes, strive to retain and protect the best available patches of owl nesting, roosting, and foraging habitat. C. When managing burned areas, consider retaining severely burned stands in areas more likely to have experienced severe fire effects under NRV, such as upper portions of south-facing slopes. D. When managing beetle-killed areas, retain some high-severity patches of beetle-killed trees to create edge habitats for foraging owls. Patch sizes should generally range between 0.25 to 10 acres and comprise less than 15 percent across the landscape (Fettig 2012), preferably in small clumps of 2 to 4 trees (Lyderson et al. 2013). **[CSO Strategy, p. 33, Approach 2, 7].**	Guideline
58	A network of land allocations, including California spotted owl and northern goshawk protected activity centers (PACs), **California spotted owl home range core areas**, forest carnivore den sites, and the southern Sierra fisher conservation area, with management direction specifically aimed at sustaining viable populations of at-risk species associated with old forest ecosystems well distributed across Sierra Nevada national forests;	11	Strategy	**Modify California spotted owl home range core areas to read territories as follows:** A network of land allocations, including California spotted owl and northern goshawk protected activity centers (PACs), **California spotted owl territories,** forest carnivore den sites, and the southern Sierra fisher conservation area, with management direction specifically aimed at sustaining viable populations of at-risk species associated with old forest ecosystems well distributed across Sierra Nevada national forests;	Strategy
59	Treatment patterns are to be developed using a collaborative, multi-stakeholder approach. Resource considerations factored into the strategic placement of fuels treatments include objectives for locating treatments to overlap areas of condition class 2 and 3, high density stands, and pockets of insect and disease. **Treatment areas are located to avoid PACs to the greatest extent possible.**	14	Strategy	**Remove bold sentence.**	

ID #	Existing Plan Direction	Forest Plan Direction (pg.)	Existing Plan Component Type	Proposed Forest Plan Amendments	Amendment Plan Component Type
60	**S&G 1.** Strategic placement of fuels treatments should also consider objectives for locating treatment areas to overlap with areas of condition class 2 and 3, high density stands, and pockets of insect and disease. **Avoid PACs to the greatest extent possible when locating area treatments.** Incorporate areas that already contribute to wildfire behavior modification, including timber sales, burned areas, bodies of water, and barren ground, into the landscape treatment area pattern. Identify gaps in the landscape pattern where fire could spread at some undesired rate or direction and use treatments (including maintenance treatments and new fuels treatments) to fill identified gaps.	33	Standard & Guideline	**Remove bold sentence.**	

APPENDIX C: LITERATURE CITED

Adger, WN. 2000. Social and ecological resilience: are they related? Progress in Human Geography, 24 (2000), pp. 347-364

Ager, Alan A.; N.M. Vaillant; D.E. Owens; S. Brittain; and J. Hamann. 2012. Overview and example application of the Landscape Treatment Designer. Gen. Tech. Rep. PNW-GTR-859. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p. url [28 June 2020]: https://www.fs.usda.gov/treesearch/pubs/40115

Calkin, D.E.; A.A. Ager; J Gilbertson-Day; J.H. Scott; M.A. Finney; C. Shrader-Patton, T.M. Quigley, J.R. Stittholt, and J.D. Kaiden. 2010. Wildfire Risk and Hazard: Procedures for the First Approximation. Gen. Tech. Rep. RMRS-GTR-235. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 62 p.

Dunn, C.J., C.D. O'Connor, J. Abrams, M.P. Thompson, D.E. Calkin, J.D. Johnston, R. Stratton, and J. Gilbertson-Day. 2020. Wildfire risk science facilitates adaptation of fire-prone social-ecological systems to the new fire reality. Environmental Research Letters 15 (2), 15 p. url [13 June 2020]: https://iopscience.iop.org/article/10.1088/1748-9326/ab6498

Fettig, C.J. 2012. Forest health and bark beetles. In M. North, editor. Managing Sierra Nevada forests. General Technical Report PSW-GTR-237. Albany, CA: USDA Forest Service, Pacific Southwest Research Station. 184 p.

Haugo, R., C. Zanger, T. DeMeo, C. Ringo, A. Shlisky, K. Blankenship, M. Simpson, K. Mellen-McLean, J. Kertis, and M. Stern. 2015. A new approach to evaluate forest structure restoration needs across Oregon and Washington, USA. For. Ecol. Manage., 335 (2015), pp. 37-50.

Lydersen, J, M. North, E. Knapp, and B. Collins. 2013. Quantifying spatial patterns of tree groups and gaps in mixed-conifer forests: reference conditions and long-term changes following fire suppression and logging. Forest Ecology and Management 304: 370-382.

Long, J.W., L. Quinn-Davidson, and C.N. Skinner, eds. 2014. Science synthesis to support socioecological resilience in the Sierra Nevada and southern Cascade Range. Gen. Tech. Rep. PSW-GTR-247. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 723 p.

Meyer, M.D. and M.P. North. 2019. Natural range of variation of red fir and subalpine forests in the Sierra Nevada bioregion. Gen Tech. Rep. PSW-GTR-263. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 135 p.

Miller, J.D., and H. Safford. 2012. Trends in wildfire severity: 1984 to 2010 in the Sierra Nevada, Modoc Plateau, and southern Cascades, California, USA. Fire Ecology 8(3): 41-57. url [28 June 2020] https://fireecology.springeropen.com/articles/10.4996/fireecology.0803041

North, M.P.; P. Stine; K. O'Hara; W. Zielinski; S. Stephens. 2009. An ecosystem management strategy for Sierran mixed-conifer forests. Gen. Tech. Rep. PSW-GTR-220 (Second printing, with addendum). Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 49 p. url [13 June 2020]: https://www.fs.fed.us/psw/publications/documents/psw_gtr220/

Safford, H.D.; J.A. Wiens; and A.G.D. Hayward. 2012. The growing importance of the past in managing ecosystems of the future. In: Wiens, J.A.; Hayward, G.D.; Safford, H.D.; Giffen, C.M., eds. Historical environmental variation in conservation and natural resource management. Chichester, United Kingdom: John Wiley & Sons: 319–327. Chapter 24

Safford, H.D. and K.M. Van de Water. 2014. Using fire return interval departure (FRID) analysis to map spatial and temporal changes in fire frequency on national forest lands in California. Res. Pap. PSW-RP-266. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 59 p.

Safford, H.D. and J.T. Stevens. 2017. Natural range of variation for yellow pine and mixed-conifer forests in the Sierra Nevada, southern Cascades, and Modoc and Inyo National Forests, California, USA. Gen. Tech. Rep. PSW-GTR-256. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 229 p.

Stephens, S.L., J.D. Miller, B.M. Collins, M.P. North, J.J. Keane, and S.L. Roberts. 2016. Wildfire impacts on California spotted owl nesting habitat in the Sierra Nevada. Ecosphere. Vol. 7, Issue 11.

Stevens, J.T., B.M. Collins, J.D. Miller, and M.P. North, S. L. 2017. Changing spatial patterns of stand-replacing fire in California conifer forests. Forest Ecology and Management 406 (2017) 28–36. url [28 June 2020] https://doi.org/10.1016/j.foreco.2017.08.051

Thompson, M.P.; J. Scott; D. Helmbrecht; and D.E. Calkin. 2013. Integrated Wildfire Risk Assessment: Framework Development and Application on the Lewis and Clark National Forest Montana, USA. Integrated Environmental Assessment and Management. Vol. 9, No. 2. pp. 329-342.

Thompson, M.P.; P. Bowden; A. Brough; J.H. Scott.; J. Gilbertson-Day; A. Taylor; J. Anderson; J.R. Haas. 2016. Application of wildfire risk assessment results to wildfire response planning in the southern Sierra Nevada, California, USA. Forests. 7(3): 64. url [23 June 2020]: https://www.fs.usda.gov/rmrs/publications/application-wildfire-risk-assessment-results-wildfire-response-planning-southern-sierra

USDA Forest Service. 2011. Marking Guidelines for Fire-Injured Trees in California (Report # RO-11-01). May 2011. Pacific Southwest Region, Forest Health Protection.

USDA Forest Service 2011(b). Soil and Water Conservation Handbook, Chapter 10- Water Quality Management Handbook, Section 12- Best Management Practices. R5 FSH 2509.22. USDA Forest Service, Pacific Southwest Region, Vallejo, CA. 237 pp.

USDA Forest Service 2012. Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region (Report # RO-12-01). April 2012. Pacific Southwest Region, Forest Health Protection.

USDA Forest Service 2012(b). National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a. April 2012. USAD Forest Service, Washington Office.

USDA Forest Service 2017. Forest Plan Direction. March 2017. USDA Forest Service, Stanislaus National Forest, Sonora, CA. 192 pp.

USDA Forest Service. 2019. Conservation Strategy for the California spotted owl (*Strix occidentalis occidentalis*) in the Sierra Nevada. Publication R5-TP-043.

APPENDIX D: GLOSSARY

Biomass: Generally refers to non-merchantable material (i.e., not sawtimber); may include live trees (generally less than 10 in. DBH) or dead trees or brush.

Broadcast Burning: Prescribed burning activity where fire is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both (NWCG Glossary).

DBH: diameter at breast height, refers to the tree diameter measured at 4.5 feet (1.37 meters) above the ground.

Defensible space: An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation, with further outer zones areas being cleared to minimal vegetation or fuels, depending on slope and site conditions.

Dry Mixed Conifer: As used in Safford and Stevens (2017), "dry mixed-conifer" generally refers to mixed conifer forests with a dominance by yellow pine and an annual precipitation mostly <40 inches

Fuelbreak: A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled (NWCG Glossary).

Fuels: Any combustible material, such as found in wildlands, that is made up from dead or alive vegetation.

HVRA: Highly valued resources and assets (HVRAs) are simply the things we care about. HVRAs can be both qualitative (e.g. visual quality) or quantitative (e.g. tons of carbon). There are a multitude of HVRAs for national forests, and the choice of a single or multiple HVRAs depends on the project objectives and needs. Some resources have only modest value and may not be analyzed so that efforts can be focused on the more highly valued resources and assets. At the national scale Calkin et al. (2010) categorized HVRAs into: critical habitat, recreation infrastructure, energy infrastructure, air quality, and municipal watersheds. In an assessment of the Lewis and Clark National Forest Thompson et at. (2013) categorized HVRAs into: green trees, wildlife habitat, infrastructure, watersheds and wildland urban interface. The precise HVRAs used in a fuels or vegetation project depends on the issues at hand as identified in the purpose and need.

Jackpot Burning: a type of prescribed burn that focuses on consuming a sporadic pattern of built up fuels (natural, human, or machine piled), as part of an understory burn.

Ladder fuels: Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning (NWCG Glossary).

Natural Range of Variation (NRV): The "variation of ecological characteristics and processes over scales of time and space appropriate for a given management application. The NRV concept focuses on a subset of past ecological knowledge developed for use by resource managers incorporating a past perspective into management and conservation decisions. The pre-European-influenced reference period is considered to include the full range of variation produced by dominant natural disturbance regimes such as fire and flooding and should also include short-term variation and cycles in climate" (USDA Forest Service 2019).

Moist Mixed Conifer: As used in Safford and Stevens (2017), "most mixed-conifer" generally refers to mixed conifer forests with a greater fir presence and annual precipitation mostly >40 inches; moist mixed-conifer stands are also more common at higher elevations.

Pile burning: Piling slash resulting from logging or fuel management activities and subsequently burning the individual piles.

Prepared roadsides: This term is used in the prescribed fire and SFMF section. A prepared roadside is one type of SFMF, where vegetation and fuels are removed or burned along strategic roads so it can perform like a fuelbreak. Prepared roadsides are centered along designated national forest system roads up to 250 ft on either side of that road to prepare for prescribed fire and wildfire management operations.

POD: Potential wildland fire Operational Delineation (PODs) are polygons whose boundary features are relevant to fire control operations (e.g., roads, ridgetops, and water bodies). PODs are created by local fire experts with the help of analytical tools that highlight landscape features with control potential and provide information on their likely effectiveness. See Dunn et al. 2020.

Quadratic Mean Diameter: In forestry, quadratic mean diameter or QMD is a measure of central tendency which is considered more appropriate than arithmetic mean for characterizing the group of trees which have been measured. For n trees, QMD is calculated using the quadratic mean formula: $\sqrt{(\sum D_i^2/n)}$ where D_i is the diameter at breast height of the i^{th} tree. Compared to the arithmetic mean, QMD assigns greater weight to larger trees – QMD is always greater than or equal to arithmetic mean for a given set of trees.

Sawtimber: refers to live or dead trees that meet commercial sawlog specifications

Seral Stage: A developmental phase, or successional class, of a forest stand, with characteristic structure and plant species composition. Seral stages are generally classified as Early, Mid-, or Late-Seral (Figure D-1).

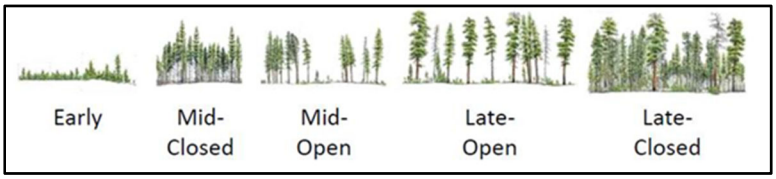

Figure D-1: Example classification of different seral stages in a Sierra Nevada mixed conifer forest (Images from Haugo et al. 2015; originally by Robert Van Pelt).

SFMFs: Strategic Fire Management Features is a SERAL (or Stanislaus National Forest) term used to refer to three proposed features: fuelbreaks, prepared roadsides, and defensible space. Collectively all three are achieved through implementation of vegetation and fuels management actions and function more effectively as fire management access points in combination with the vegetation management treatments to change fire behavior on a larger spatial scale.

Threshold of Concern (TOC): The level of watershed disturbance which, if exceeded, could create adverse watershed or water quality effects, in spite of application of best management practices and project design criteria.

Understory burn or Underburn: A fire that consumes surface fuels but not the overstory canopy; prescribed burning under a forest canopy (NWCG Glossary of Wildland Fire [PMS 205] 2020).

Yellow Pine: refers to ponderosa pine (*Pinus ponderosa*) and Jeffrey pine (*Pinus jeffreyi*).