Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Pacific Southwest Region, Sequoia National Forest and Giant Sequoia National Monument

Western Divide Ranger District and Kern River Ranger District

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Castle Fire Ecological Restoration

Environmental Assessment

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Summary of Change from Preliminary to Final EA

The Preliminary EA was issued for Public Comment on February 1, 2023. Five comments were received. A response to comments is included as Appendix D. In summary the changes made to finalize the EA are:

- Clarified proposed action and overlap between project treatment units and inventoried roadless areas, and designated research natural areas and botanical areas.
- Removed proposed Moses Wilderness from reforestation and mechanical treatment,
- Changed the prescribed burning in the proposed Moses Wilderness to managed wildfire,
- Added additional analysis to clarify effects based on comment period (see Appendix D),
- Added design criteria to protect giant sequoia seedlings during prescribed burning,

Table 1 displays a summary of the changes in acres proposed.

Table 1: Castle Fire Proposed Action Acreage Change from Preliminary to Final EA

Activity	Original PA	Clarified PA	Change
Rx burn	39,335	37,279	-2,056
Mechanical fuels (overlap with Rx burn)	2,925	2,902	-23
Reforestation (overlap with Rx burn)	11,367	11,362	-5
Managed Wildfire	0	2,056	2,056
Dead Tree Removal (overlap with Rx burn, Dead tree removal and mechanical fuels)	4,979	4,979	0
TOTAL Acres (based on GIS mapping)	39,335	39,335	-28

Background

The Castle Fire, ignited by lightning on August 19, 2020, burned approximately 170,650 acres, including approximately 129,218 acres managed by the Western Divide and Kern River Ranger Districts in the Sequoia National Forest. The Castle Fire burned approximately 79,397 acres of National Forest System lands outside of designated wilderness. The Castle Fire Ecological Restoration Project analysis area encompasses these 79,397 acres. Approximately 78,300 acres (about 90 percent) of the project area is within the Giant Sequoia National Monument (monument) in the Western Divide Ranger District. The project area within the monument complies with the 2012 Giant Sequoia National Monument Management Plan. The remaining 10 of the project area is within the Kern River Ranger District and complies with the 1988 Sequoia National Forest Land and Resource Management Plan and its amendments.

The project area is in Tulare County, California. It is immediately adjacent to California Highway 190, Mountain Home State Forest, Balch Park, the communities of Alpine Village, Camp Nelson, Cedar Slope, Coy Flat, Doyle Springs, Pierpoint, Ponderosa, Sequoia Crest, and a few small private inholdings.

The Castle Fire burned through all or portions of ten giant sequoia groves: Alder Creek, Mountain Home, Belknap Complex, Burro Creek, Dillonwood, Freeman, Middle Tule, Silver Creek, Upper Tule, and Wishon. In addition, the Castle Fire burned through many major watersheds and drainages: South Fork Kaweah River, North Fork Tule River, North Fork Middle Fork Tule River, South Fork Middle Fork Tule River, Little Kern River, and North Fork Kern River.

The recent drought and subsequent bark beetle outbreak, culminating in the 2020 Castle Fire, resulted in extensive loss of vegetation within the project area. Over 50 percent of the forest within the fire perimeter burned at moderate to high severity, causing extensive tree mortality and deforestation. Prior to the Castle Fire, forested areas in the project area included approximately 52,635 acres of conifer-dominated forest types: Sierra mixed conifer (30,575 acres), red fir (13,543 acres), montane hardwood-conifer (4,855 acres), and ponderosa and Jeffrey pine (3,662 acres). At lower elevations, approximately 15,237 acres were dominated by oaks. Based on available geospatial data, conifer species such as white fir (*Abies concolor*), red fir (*Abies magnifica*), and ponderosa pine (*Pinus ponderosa*) dominated areas burned at moderate to high fire severity. In moderate severity fire areas, pockets or individual trees were killed, interspersed with live trees. In high fire severity, most of the vegetation was killed.

The mosaic burn pattern of the Castle Fire includes areas of unburned, very low, low, moderate, and high fire severity. As a result, in some areas tree mortality is 100 percent, while other areas still support a green tree component. This range of fire severity leaves the existing landscape with a wide range of potential fire behavior depending on vegetation burn severity, fuel loading changes from dead and dying trees, and the regrowth of non-forest vegetation over time.

Prior to the Castle Fire, the project area included Northern goshawk (*Accipiter gentilis*) Protected Activity Centers (PACs), California spotted owl (*Strix occidentalis occidentalis*) PACs, mountain yellow-legged frog (*Rana muscosa*) habitat, riparian conservation areas, and Pacific fisher (*Pekania pennanti*) denning and foraging habitat. Wildlife habitat for these species remains across the landscape, but the amount and quality of habitat have been greatly reduced. Large areas of old-forest and other forested wildlife habitat conditions were converted to early seral conditions. The project area also includes other sensitive resource areas such as cultural sites. Vegetation cover lost during the fire left sites exposed and vulnerable to vandalism.

The removal of immediate hazards to public health and safety from burned and dead trees along roads, in recreation sites, and at administrative sites within the Castle Fire footprint is addressed by the Castle Fire Hazard Tree Removal project (https://www.fs.usda.gov/project/?project=59698) and the Region 5 Post-Disturbance Hazardous Tree Management Project (https://www.fs.usda.gov/project/?project=60950).

Most of this project area is within the Giant Sequoia National Monument, proclaimed by President Clinton in April 2000. The Giant Sequoia National Monument Management Plan (Monument Plan) (USDA 2012) identified its purpose as:

> The purpose of the Giant Sequoia National Monument Management Plan is to provide overall strategic guidance for managing the Giant Sequoia National Monument. The unique and special features of the Monument—the giant sequoia groves, the ecosystems that support them, and the other objects of interest—are what make the Monument what it is: a special area that merits careful management, protection, and preservation. This plan provides for the protection of the objects of interest while encouraging continued public and recreation access and use consistent with the purposes of the Monument (Clinton 2000, p. 24097). (Monument Plan. p. 7)

The use of fire is recognized in the Monument Plan as a treatment for ecological restoration in the Monument:

> There are two types of wildland fires: wildfires and prescribed fires. Prescribed fires are planned and used for ecological restoration following site-specific project analysis. Wildfires are caused by natural ignitions, such as lightning, or some type of human interaction. The term “managed wildfire” refers to the use of wildfires started by natural ignitions to protect, maintain, and

enhance resources, and, whenever possible, allow fire to function in its natural ecological role. (Monument Plan, p. 80)

The Castle Fire was not a wildland fire that could be managed to protect, maintain, or enhance resources due to the extensive loss of green vegetation resulting from the recent drought and beetle infestation in the area, creating vast acreages of dead trees. Firefighters did their best to protect as many of the old growth giant sequoias as they could manage, but many of the objects of interest were lost to the effects of the Castle Fire.

The Castle Fire Ecological Restoration Project is designed to begin the restoration of the habitat lost in the fire, and to create resiliency to forest stressors in the remaining habitat.

Purpose and Need

The following have been identified as the purpose and need for the Castle Fire Ecological Restoration Project:

1. Remove excess fuels created by fire-killed trees to establish fuel conditions that have a low risk for large, stand-replacing fires, reduce threats from wildland fires in the Wildland Urban Interface (WUI), and create safe working conditions to allow for reforestation activities.
2. Improve the health of the remaining green forests (including giant sequoia groves) to promote forest resilience to fire.
3. Re-establish healthy fire resilient forest conditions that provide wildlife habitat for a diverse assemblage of species including threatened, endangered, and sensitive species and old forest dependent species.
4. Reforest high severity burned forest to promote a return to a forested landscape for wildlife habitat and watershed health.
5. Maintain and improve functional watersheds and restore ecological integrity including carbon sequestration.

Timely action is needed to remove dead trees that pose a hazard for restoration work and fuel for future fires. As dead trees fall and cover the ground, they will inhibit regeneration and serve as a continuous fuel source for future high severity wildfires. Areas that burned at high severity no longer have a seed source available for natural regeneration. It is important to begin restoration in high severity burn areas before aggressive shrubs occupy the site and reforestation is difficult. Without restoration of a forested ecosystem, habitat for forest dependent species would continue to be fragmented, watersheds would continue to erode and impact water quality and flood risk.

The Castle Fire Ecological Restoration Project would move the project area toward the desired conditions and objectives in the Giant Sequoia National Monument Management Plan (Monument Plan), Sequoia National Forest Land and Resource Management Plan (Forest Plan) (USDA 1988), as amended, by promoting a resilient forest and restoring ecological integrity lost in the Castle Fire and the preceding extended drought and bark beetle outbreak. The project would restore ecological processes in medium and high severity burned areas within the Castle Fire footprint and promote a healthy forest ecosystem in the low severity and unburned areas.

Ten giant sequoia groves or grove complexes burned in the Castle fire. The high severity burned areas resulted in unprecedented mortality of large monarch giant sequoias that were thought to be able to survive fire. The largest patch of high severity fire occurred in the Freeman Creek grove which is also the grove that is the lowest in elevation and one of the hotter and drier giant sequoia groves. Reforestation in that grove was completed in spring of 2023 under the Freeman Creek Reforestation CE (DM 2022).

Monitoring in all the groves is occurring to understand the fire dynamics and factors that contributed to mortality. Results of the monitoring is guiding the proposed action for fuels reduction and reforestation.

Desired Conditions

The following Desired Conditions from the Monument Plan (USDA 2012) provide direction for proposed management activities within the monument:

1. Fire and Fuels – fire occurs in its characteristic pattern and resumes its ecological role, and fire susceptibility and severity, and fire hazards to adjacent human communities and surrounding forest types, are low. (Monument Plan page 24).
2. Vegetation, including Giant Sequoias - the desired condition of a forested stand is diversity in composition (species, size, age class, distribution) and spatial distribution that are expected to be more resilient to climate change over time. (Monument Plan page 22).

The following Forest Goals (desired conditions) from the Forest Plan provide direction for proposed management activities within the Sequoia National Forest, outside of the monument:

1. Wildlife, Fish and Plants – 5) increase the diversity of plant and animal communities (Forest Plan page 4-3)
2. Protection – 1) Provide pest management, fire control and law enforcement activities to reduce resource losses and to enhance and maintain resource productivity (Forest Plan page 4-4).

Proposed Action

The Castle Fire Ecological Restoration project proposes treatment of an estimated 39,335 acres of National Forest System lands that burned during the 2020 Castle Fire within the approximately 86,800-acre analysis area. Most of the project area is located within the Giant Sequoia National Monument in the Western Divide Ranger District, with some additional project area in the Kern River Ranger District outside the Monument. Forest resource specialists identified these treatment areas as the highest priority for treatment to improve forest health and resiliency, reduce fuels, and to reforest components of wildlife habitat.

Proposed activities are designed to reduce areas of high fuels and create conditions for successful reforestation to restore the forested landscape. Proposed treatments would be in locations (see map in Appendix B) 1) where tree mortality from high severity fire, drought, and insects has been extensive, or 2) where unburned stands or stands that burned at low or moderate severity (less than 50 percent loss in basal area per acre) have high fuel loading and are at risk from the next drought, insect outbreak, or wildfire.

Table 2 below depicts proposed treatment types and associated acres. Many acres of proposed treatments overlap as depicted on the maps in Appendix B. Some treatments overlap due to the need to prepare the areas for reforestation or reduce fuels by mechanical treatment so prescribed burning can be implemented to further reduce fuels. Hand treatments overlap in areas where the ground is steep or mechanical equipment is restricted due to management requirements or project design features applicable to the area being treated.

Table 2: Proposed Treatment Types by Management Area[1]

Proposed Treatment	In Sequoia Groves (acres)	General Monument Outside Sequoia Groves (acres)	Kern River Ranger District (outside Monument) (acres)	Project Totals (acres)
Dead tree removal (overlaps with reforestation and Rx burn)	106	4,873	0	4,979
Mechanical fuels treatment (Overlaps with Rx burn)	106	2,796	0	2,902
Managed Wildfire	1,530	526	0	2,056
Rx burn and hand prep (some acres overlap with dead tree removal, reforestation, and mechanical fuels)	8,343	28,557	1,688	37,279
Planting (Acres overlap with dead tree removal, and Rx burning)	983	10,379	0	11,362

[1]-Acres are estimates based on GIS mapping and will be verified in the field during unit layout.

The total area disturbed or affected by all the proposed treatment activities is approximately 39,335 acres. The proposed activities would be implemented in treatment blocks of varying size with activities occurring over an estimated 10 to 15-year time span. The proposed action would include monitoring and research plots in the treatment areas to provide comparison of treatment efficacy and success between treated and untreated areas.

The following sections describe the specific activities that would occur on the treatment unit acres summarized in Table 2.

Dead Tree Removal

The dead tree removal proposed in this project is focused on reducing fuels and hazards formed by dead and dying trees and would be in addition to the roadside hazard tree abatement planned under the Region 5 Hazard Tree Project (DN 2022), Pier Fire Roadside Hazard Tree Mitigation Project (DM 2018), Lloyd Meadow Hazard Tree Mitigation Project (DM 2022), Castle Fire North Road Hazard Tree Mitigation Project (DM 2021) and Needles Lookout Road and Quaker Meadow Area Hazard Tree Mitigation Project (DM 2021) which overlap this project. Under those projects hazard tree removal occurred or is about to occur along the North Road, Redwood Drive, Lloyd Meadow Road, Quaker Road, Needles Lookout Road, and Fox Farm Road. The reforestation and prescribed burning for those areas is proposed under this analysis.

The dead tree removal proposed in this project includes some of the same areas analyzed in the Region 5 Hazard Tree and Castle Fire hazard tree projects. Additional dead tree removal units focus on areas around private land or access routes where dense standing and down fuel accumulations are priority for fuels reduction and biomass removal and would otherwise create a hazard for reforestation and/or high fuel loading for future fires as displayed on the map. Dead tree removal activities would follow the strategy and criteria in the Monument Plan (pages 45-48) to accomplish ecological restoration and reduce fuels to meet the purpose and need and accomplish the proposed action safely and effectively.

Areas for dead tree removal were selected in high severity burn areas that are within ¼ mile of roads and are on slopes less than 35 percent to minimize ground disturbance and improve operational safety using mechanical ground-based equipment such as feller bunchers. Activities include felling and removal of fire-affected dead or dying trees within approximately 4,979 acres of high severity burned conifer forest as displayed on the map. Priority to remove dead trees in high severity burned areas is:

1. where there is high recreation use potential or private residential inholdings thereby reducing strike hazards to the public,
2. where the trees contribute to high fuel loadings in and near remaining sequoia groves, and
3. where planting trees would restore key wildlife habitat components or protect burned watersheds.

Within the Dead Tree Removal units, the following trees may be cut:

- Hazard trees with a 70 percent probability of mortality and that have a target which threatens human health and safety, except for giant sequoia larger than 12 inches dbh.
- Dead trees up to 35 inches dbh and dead giant sequoia up to 12 inches dbh or oak up to 8 inches dbh.
- Dead Giant sequoia 12 inches dbh or larger that are a human health hazard after an individual tree assessment has been documented.

Hazard trees are trees that may fall on a "target" (road, campsite or structure) (1) have no green needles or (2) meet the criteria of a 0.7 Probability of Mortality in the Marking Guidelines for Fire-Injured Trees in California (Report # RO-11-01) which is one of the supporting documents and referenced in Appendix 4 of the *2022 Hazard Tree Identification and Mitigation Forest Health Protection Technical Report* (FHP Report # RO-22-01) (Angwin et al 2022). Dead trees are burned trees that have no green needles. Trees that pose a hazard (0.7 probability of mortality as described in Appendix 4 of Angwin et al 2022) to a trail, parking area, road, camping area or other high use target may be removed. Dead trees that are a public safety hazard and that are on slopes over 35 percent slope may be cut by hand and left on site if removal is infeasible.

Areas that are identified for dead tree removal would leave 4 of the largest dead trees (snags 12-inch dbh or larger) scattered across the area to provide perch and nesting habitat. The Monument goal of leave 10-20 tons per acre would be met by leaving an average of 4 of the largest down trees (12 diameter or larger and 6 feet long). The large dead down woody debris will also serve as microsites for reforestation.

Approximately 106 acres of mechanical dead tree removal is within the grove administrative boundary of Mountain Home grove and generally outside the sequoia tree line. Dead giant sequoia less than 12-inches dbh may be cut if they are a ladder fuel or a threat to public safety. Dead giant sequoia 12-inch dbh or larger may only be cut if they are at high risk of immediate failure and hitting a target. These trees may also be topped or limbed to reduce the hazard. No dead sequoias would be removed from the site, unless needed for research or used for educational or interpretive programs. Mechanical equipment would not be allowed to operate within 25 feet of a live giant sequoia.

When feasible, trees may be removed as biomass. Small material and shrubs less than 10-inch diameter may be masticated, chipped on site, machine piled and burned, or distributed by cutting the slash down to a depth of 24 inches above the ground and scattering the branches. Specific slash and small diameter treatment will be decided based on quantity of fuels. In areas of low fuels and bare ground, slash will be lopped and scattered to reduce erosion potential up to 20 tons/acre. In areas of high fuel loading of small material, trees and branches will be piled for burning. In areas of high shrub density and size, the

area may be masticated. This EA covers a dynamic landscape that is changing overtime. Shrubs will continue to the openings created by the fire and will fully occupy these sites. Shrubs may need to be reduced to allow for young seedlings to compete for limited water resources. In areas of high erosion potential, crews would place logs or slash to intercept and reduce overland sediment flow and erosion. For this same purpose, material that could contribute to high fuel loading would be chipped and distributed over the soil surface. If feasible air curtain burners may be used to reduce a portion of the fuel created by dead tree removal.

The purpose of dead tree removal is to reduce the immediate hazards around private land and recreation residences, reduce the amount of fuels across the landscape, reduce the probability for another high severity burn, and protect planted or naturally regenerating areas from the next wildfire. During dead tree removal areas with advanced regeneration of pine, fir, and giant sequoias would be protected from damage where feasible. Pockets of regeneration will be avoided during unit layout. Within a year of dead tree removal, regeneration surveys would be conducted to identify if additional planting is necessary.

Within the Wildland Urban Interface (WUI) defense zone, hazard trees (0.7 probability of failure) that have the potential to strike private communities adjacent to National Forest System land would be removed as well as dead ladder fuels in low severity burned areas. On areas where slopes are greater than 35 percent within the WUI defense zone, hazard trees would be felled by hand.

Mechanical Fuels Treatment

As shown on the map in Appendix B there are 2,902 acres of mechanical fuels treatment, including mastication of shrubs, understory thinning of small diameter green (less than 20-inch dbh) and dead trees, and piling and burning of dead and down trees and limbs. Mechanical treatments would be limited to within ¼ mile from roads, on slopes less than 35 percent. In Mountain Home giant sequoia grove mechanical equipment would stay more than 25 feet away from giant sequoias. Mechanical treatments may also include machine piling or biomass removal. When feasible trees may be removed as biomass.

Shrubs may be masticated, and small diameter material may be chipped on site, removed as biomass, machine piled and burned, or distributed by cutting the slash down to within 24 inches of the ground and scattering the branches. In areas of high erosion potential, material will be lopped and scattered, or logs would be placed to intercept and reduce overland sediment flow and erosion. For this same purpose, material that could contribute to high fuel loading would be chipped and distributed over the soil surface. At least 4 of the largest snags per acre (over 12 inches dbh) and 4 of the largest down dead trees per acre (over 12 inches diameter and 6 feet long) will be retained on site to meet the desired snag habitat and 10 to 20 tons/acre of down logs for wildlife habitat and soil cover. Green trees will only be cut if they are a ladder fuel under a large (30-inch dbh or larger) green tree or in a plantation where the canopy closure is greater than 40 percent. The preferred live trees to cut to reduce ladder fuels are incense cedar and fir.

Fuels Reduction

Fuels reduction by hand piling and burning piles or prescribed burning around surviving monarch giant sequoias and within the forested stands are focused on reducing the probability of a high severity wildfire.

Fuels reduction is proposed to reduce the amount of fuel available for future fires, provide and maintain effective control points for wildland fire suppression, and provide space for reforestation activities. The proposed action includes treatment of fuels on approximately 37,279 acres in the project area using a

combination of mechanical, hand work, and prescribed burning as displayed on the map. Fuels reduction would occur in the green plantations, unburned forest in the wildland urban interface and giant sequoia groves as necessary to create a fire resilient forest and reduce the probability of a future high severity wildfire.

The objective is to develop conditions to allow managed fire in the Monument with a low probability of high severity fire destroying homes or killing monarch giant sequoias and other old growth species. Fuels treatments are designed to meet objectives for different forest and habitat types including leaving snags and down logs for wildlife as described in the Forest Plan as amended by the 2004 Sierra Nevada Forest Plan Amendment (pages 50-52 and 60-62), and the Giant Sequoia National Monument Plan (pages 85-93), as applicable.

Both hand and mechanical fuels treatments include cutting dead trees up to 35-inch dbh to be removed or piled where feasible on slopes less than 35 percent and within ¼ mile of a road. Dead or small diameter live (up to 20-inch dbh) ladder fuels from the understory of green, large diameter trees (greater than 30-inch dbh), may be cut and fuel would be pulled away from the base of large diameter trees. This material may be piled for burning or cut and scattered away from the large trees in preparation for burning. Fuel reduction in green plantations with a basal area (BA) over 90 square feet or canopy closure over 50 percent may include understory thinning of live conifers up to 20-inch dbh down to a residual stand at approximately 75 square feet BA, or 40 percent canopy cover. Understory thinning to reduce fuels would allow cutting live oak less than 8-inches dbh, or occasionally live young sequoia up to 12-inch dbh if they are a ladder fuel for a large tree. The objective is to create a diverse fire resilient forest with clumps and openings.

Material may be removed, piled for burning or lopped and scattered, depending on the site, current fuel loading, distance to road and slope. Treatment of the small diameter material will depend on the depth and extent of contiguous fuel layer it creates. An average of 10-20 tons per acre of the largest material (average of 4 logs over 12-inch diameter and 6 feet long) will be left on site for wildlife. If feasible air curtain burners may be used to reduce a portion of the fuel created by dead tree removal. In stands with less than 40 percent green canopy cover, no green trees would be cut, only the dead trees would be removed to reduce fuels and protect the remaining live trees. Crews would maintain existing fuelbreaks using the fuels reduction methods listed above. Targeted grazing of shrubs, forbs, grasses, and other woody and herbaceous vegetation by sheep, goats, or cattle (where they don't conflict with existing grazing permits) maybe be used to maintain fuel breaks. In areas of high erosion potential, logs would be chipped to reduce overland sediment flow and erosion. In high severity burned hardwood forest, oak may be pruned to encourage faster development for acorn production.

As shown on the map in Appendix B prescribed burns would be conducted in areas that still have higher than desired fuel loads and that are still at risk of a high severity fire. The mapped prescribed burn units would be broken into smaller treatment areas by methods such as hand crews constructing fire line along ridges and other terrain features to achieve fuels reduction objectives for the specific site conditions. If a naturally ignited wildfire starts that can be managed based on Wildland Fire Decision Support System (WFDSS) analysis or a newer decision support tool, it may be used to accomplish fuels reduction objectives. In the mapped fuel reduction areas, where vegetation growth and snag fall results in increased fuel accumulation, broadcast burning, or managed wildfire would be used to reduce understory fuels while maintaining a forested or woodland overstory. Prescribed burns require burn plans to meet the objectives of the EA which include protecting regenerating trees, retaining large and old trees, and reducing fuels on the forest floor and in the understory. Prescribed burns or managed wildfire would also be used to reduce shrub density and size.

Hand prep and Prescribed burning

Hand treatments to prep the area for prescribed or natural fire would occur in areas where mechanical treatments are not feasible, that could damage regenerating giant sequoia, fuel loading is high or rapidly increasing, and are at risk of high severity fire. The hand work would be in the mapped prescribed burn areas that are relatively accessible and that are necessary to conduct prior to a prescribed burn. The areas are within ½ mile of roads, near private lands, on steeper slopes and in Freeman Creek, Belknap Complex, and Mountain Home giant sequoia groves where high fuel loading exists. These activities will help prepare the areas for pile or broadcast burning. Additional hand treatments include clearing fire line, limbing low branches and scraping away duff from around the base of a large tree (30-inches dbh or larger). Hand treatment around large (30 inches dbh or larger) giant sequoia trees and pile burning has already been conducted in Belknap Complex grove under the emergency authority decision signed by the Chief in July of 2022. Additional piles may be burned in the winter of 2023/2024.

Hand treatments include:

- Cutting small diameter (less than 20-inch dbh) green trees that are ladder fuels, or to create a fuel break,
- Cutting dead trees (less than 35-inch dbh) to create a fuel break, remove a ladder fuel, or reduce fuel loading,
- Grubbing scalping or masticating shrubs to create a fuel break,
- Piling the cut material for burning,
- Burning piles,
- Creating fuel breaks or fire line, and
- Igniting broadcast burns.

In the Inventoried Roadless Areas both prescribed burning and managed wildfire are proposed as shown in Table 3. In the Moses Mountain Proposed Wilderness, managed wildfire is the only planned treatment. This managed wildfire treatment area includes portions of Alder, Middle Tule, and Mountain Home sequoia groves.

Table 3: Proposed Treatment in Inventoried Roadless Areas

Name of IRA	Treatment Proposed	Acres to Treat
Dennison Peak	Prescribed Burn	576
Moses Mountain	Prescribed Burn	1,706
Moses Mountain proposed Wilderness	Managed Wildfire	2,056
Rincon	Prescribed Burn	260
Slate Mountain	Prescribed Burn	2,267

In the giant sequoia groves, prescribed burning is proposed where fuel accumulations are high and the forest, including the advanced sequoia regeneration, is at risk. Any prescribed burning in a giant sequoia grove would be designed and conducted to protect pockets of established giant sequoia regeneration.

Site Preparation

Site preparation for planting within the mapped planting units would occur following the dead tree removal and fuels removal as described above. Additional site preparation may include mastication of dead trees and brush, hand spraying of shrubs with herbicide, mechanical or hand piling of slash and brush followed by burning of the piles and exposing bare mineral soil to encourage regeneration and seedling success. Within the mapped reforestation areas, the priority for planting are areas of high-quality old forest habitat that burned at high severity and are key to reestablishing wildlife travel corridors and nesting or denning habitat in areas that are not regenerating naturally.

Treatment to reduce shrub competition would be considered for areas where reforestation is needed, and the shrub growth, especially bear clover, is greater than 50 percent of ground cover (Appendix B map). Bear clover, shrubs, and non-native invasive species can be substantial competitors with tree seedlings. In areas planned for reforestation and where shrub cover is greater than 50 precent, shrubs may be controlled or reduced prior to, and in, the year after seedlings are planted. The following tools would be implemented depending on site-specific conditions at the time of implementation:

1. Mastication or hand-cutting of shrubs to create openings for planting using chainsaws or other hand tools, as well as cutting up and scattering or piling and burning shrubs,
2. Ground spot application of herbicide (triclopyr or glyphosate or other suitable herbicide) around planted or natural seedlings to suppress shrubs, bear clover, and non-native invasive species to reduce competition and improve the survival of naturally seeded conifers and planted seedlings.

Planting

Proposed planting areas are displayed on the map in Appendix B. The proposed action would be to plant seedlings or manage the few naturally seeded trees in approximately 11,362 acres of high severity burn with low probability of natural regeneration within the project area to re-establish forested conditions and move towards Monument and Forest Plan desired conditions. Planting would be initiated following any proposed fuels work or dead tree removal in high severity burned areas. Old plantations or other areas that have little fuel remaining or that are not feasible to reduce fuels that burned high severity within the mapped planting areas may be planted without fuels removal.

Areas of low probability for natural regeneration were identified using a spatially explicit model to produce a five-year predictive map of potential conifer regeneration following the Castle Fire (see Vegetation Report). Moderate to severely burned areas within ½ mile of roads and on slopes less than 50 percent may be planted within the mapped areas for planting and where site conditions are appropriate. Planting would occur in large high severity burned areas that were previously forested where natural regeneration is not occurring to accomplish the following objectives:

1. Reforest high severity burned areas to restore watershed function, riparian habitat, forest resiliency, sequester carbon, and provide forested wildlife habitat.
2. Reforest areas that are at least 5 acres in size in major wildlife corridors and partially burned spotted owl protected activity centers (PACs).
3. Reforest burned plantations and leave some gaps no larger than 0.5 acre to regenerate to shrubs to promote a greater mixed conifer composition and heterogeneity.
4. Promote natural regeneration in high severity burned areas in giant sequoia groves to perpetuate this endemic species.

Reforesting gaps in major wildlife corridors, partially burned spotted owl PACs and some gaps in partially burned plantations that are in proximity to each other would be the initial priority while monitoring to determine if planting is needed in giant sequoia groves because natural regeneration either did not occur or failed.

The wildlife corridors proposed for planting are areas that were considered potential fisher denning habitat and burned at high severity according to the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) mapping. Planting in these areas would be both beneficial in improving connectivity for fishers and speeding recovery of habitat for California spotted owls, Northern goshawks, and other species dependent on older forest.

Plantations that burned with high or moderate severity and that need reforestation would be planted to increase spatial and species diversity. Pockets of high severity burn would be left to create gaps in the canopy and larger openings would be planted with a clumpy distribution.

In areas where conifer seedlings were historically present, native tree species from seed collected in the area and adapted to the site would be planted at a density that reflects land management objectives at the location of the planting. For instance, 400 trees per acre might be planted where the objective is to reforest a gap in a spotted owl PAC at high density or 100 trees per acre might be planted where the objective is a shaded fuel break with low tree density. The density and species planted would be site specific to reflect site potential, expected survival, climate change adaptation and desired stocking rates. Planting techniques that promote spatial heterogeneity would be used. Other native tree species would also be considered for planting in appropriate habitat (e.g., sycamore in riparian habitat).

Giant Sequoia Regeneration

Giant sequoia (*Sequoiadendron giganteum*) seeds released by the Castle Fire germinated in the spring of 2021 and 2022 before any site preparation was feasible. Giant sequoia is a fire adapted species, and the cones in some areas provided a flush of seedlings. Monitoring in several groves in 2021 and 2022 found limited areas of natural regeneration; and seedling survival in high severity burn areas where parent trees were killed had no seedlings sprouted or the seedlings died, and no viable seed source remains. High severity fire that results in 100 percent giant sequoia mortality is unprecedented in human history.

Monitoring will continue in the areas with natural sequoia regeneration and giant sequoia seedlings would be protected during management activities. To promote survival and growth, competing vegetation may be reduced using herbicides or hand-cutting where needed. Areas where giant sequoia groves have not regenerated naturally or where survival of seedlings is poor would be planted in the future with a mix of species including giant sequoia.

Invasive Plants

High severity wildfires create a seed bed for invasive plants. In the above treatment areas, invasive weeds would be inventoried and treated manually, or by hand treatment of herbicides to control the spread of invasive weeds. All safety precautions and BMPs would be applied. No herbicides would be applied in stream management zones or near wet areas.

Roads

To effectively implement proposed restoration treatments, existing National Forest System (NFS) roads would be maintained or repaired where necessary. Activities may include grading, improving, or installing new drainage features, installing armored dips, laying gravel, or replacing culverts. Existing roads and landings would be used wherever possible, with new landings constructed as needed. Existing non-system roads in the project area may be used when needed for access for project work. These non-system roads are considered temporary and, if used for hauling, would be rehabilitated within one year of project completion. No new permanent roads would be constructed, and any temporary roads opened for the project would be closed.

Project Design Features

A suite of project specific design features would apply to all treatment activities. The project design features include resource specific standards and guidelines from the Monument Plan and Forest Plan. The combination of design features provides a thorough set of protection measures to address resource concerns associated with project implementation. The specific measures are provided in Appendix C.

The effects analysis in this document takes into consideration full implementation of all design features planned for the proposed action.

Agencies and Persons Consulted

This action was originally listed as a proposal on the Sequoia National Forest Schedule of Proposed Actions and updated periodically during the analysis. On January 26, 2021, scoping was initiated with a letter sent to 245 addressees of the potentially interested public regarding the proposed action. The District Ranger received seventeen letters in response. Public field trips were held on June 17, 2021, and June 24, 2021, to the proposed project area to provide an opportunity to see the forest conditions, discuss the proposed action and answer questions. The Forest Service consulted Federal, State, tribal, and local agencies during the development of this EA. The complete scoping list can be found in the project record on file at the Sequoia National Forest Headquarters.

On December 23, 2022, the Forest Service initiated informal consultation with the U.S. Fish and Wildlife Service on the proposed Castle Fire Ecological Restoration Project. On March 23, 2023, the U.S. Fish and Wildlife Service concurred with the determination that the proposed project *may affect* but is not likely to adversely affect the fisher and its proposed critical habitat, the mountain yellow-legged frog, and the Little Kern golden trout.

A 30-day public comment period was initiated on February 1, 2023, which resulted in five responses. The respondents raised several of the same concerns as they did during scoping, which resulted in several clarifications to this EA and the project record. No significant issues were identified (see Appendix D).

Alternatives to the Proposed Action

Alternatives Considered and Eliminated from Detailed Study

Although no alternatives to the proposed action were carried forward for detailed analysis, Forest Service staff considered several approaches while developing the proposed treatment and layout of units. Specifically, the interdisciplinary team initially considered a larger area for dead tree removal but based on unit capacity and priorities these areas were reduced to critical areas as identified in the project maps. Scoping responses included several options to consider as follows:

1. Suggestion to avoid doing any specific treatments, especially any tree removal, and instead avoid driving on the areas or otherwise disturbing the area beyond monitoring conditions.

This alternative was analyzed as it is part of the No Action Alternative.

2. Consider an alternative to plant and conduct fuels treatment without dead tree removal.

An alternative to plant and conduct fuels treatment without dead tree removal was considered but dropped from detailed analysis because it would not meet the purpose and need and would not be feasible due to the abundant fuels created by the Castle Fire. In the high severity burned areas, there is 100 percent tree mortality resulting in no viable seed source. It is expected that within the next few years all those trees will fall over and pile on top of each other. This jack straw effect of dead trees creates an impassable barrier to be able to plant trees. It also sets up the site for another high severity burn. Planting an area that will most likely reburn at high severity in the next 10 years is not an appropriate use of taxpayer funds and doesn't comply with management direction regarding reforestation practices. To break up the abundant and extensive fuels without tree removal would involve machine piling and burning thousands of piles on almost 5,000 acres. The soil burn severity under a pile can be very high and it takes the

soil a long time to recover. The large size of the dead material would require mechanical equipment to drive all over the site to pile the material and result in at least as much of an impact as dead tree removal. This alternative would not result in a fire resilient forest.

3. Suggestion that the Castle Fire itself has accomplished several of the strategies for ecological restoration in the Monument Plan, pp. 46-47 (Table 10) through use of managed wildfire and therefore does not need any further management.

This suggestion is also part of the no action alternative. While the Castle Fire did accomplish fuels reduction across the landscape, it also created new fuels in the form of thousands of dead trees in some areas and did not burn in other areas. There are areas within the Castle Fire footprint where restoration is not proposed because the fire burned at an intensity that accomplished ecological objectives and that is why this restoration project focused on only certain areas as discussed in this EA. The document "Background Information on Giant Sequoia National Monument" that accompanied the President's Monument Proclamation identified prescribed fire projects and cultural treatments as consistent with the goals of the Monument and said these kinds of maintenance will continue for the protection of the Monument resources. The Science Advisory Board which informed the Monument Plan regarding Undesirable Fire Effects as a "catastrophic fire" defined as a fire of an extent and severity beyond that which is consistent with the values for which the Monument was created (SAB 2003 Advisory IX) (USDA 2008). The Monument Plan (p. 47) strategy 13 includes a footnote that clarifies the use of managed wildfire should consider site-specific analysis and the existing conditions. Due to the existing conditions, the Castle Fire could not be managed for resource benefits. Further detail is in the vegetation and fuels analysis. (EA pp.16-18, 20-26.)

4. Suggestion to maintain or expand the trail and road system; and repair or rebuild structures including Needles and Jordan fire lookouts, and facilities at Trout and Grey meadows.

Expanding or building/rebuilding facilities is outside the scope of this EA. Road maintenance may be necessary to safely access treatment areas and minimize impacts from road use. The purpose and need are focused on treating the vegetation and fuels to improve forest health and resiliency, reduce fuels, and to reforest components of wildlife habitat. Changes to the road system cannot occur without a new travel management decision.

5. Suggestion to consider a prescribed fire alternative without manual or mechanical treatments.

The proposed action acreage is based on use of prescribed fire alone and in combination with other treatments. Prescribed fire alone is not feasible and does not meet the purpose and need of this project because there are several areas of extensive and highly volatile fuels. Several key areas need to be treated manually or mechanically to allow use of prescribed fire as a secondary treatment. The Castle Fire, like most wildfires, burned in a mosaic of intensities, resulting in a mix of fuel loads across the project area. The Castle fire burned considerable amounts of fuel, but it also created new volatile fuel in the form of dead trees. Where Castle Fire burned at low intensity there are still fuels that have accumulated over the last 100 years of fire suppression and the recent drought which would burn at high intensity. Fire managers would not be able to burn these areas in one entry without a high risk of killing the remaining green trees, losing control of the fire, and threatening the mountain communities in the area. Treatment to break up the fuels and reduce the ladder fuels around the remaining green trees must be done before fire managers can begin to return natural fire to the landscape. Using prescribed fire alone

would take multiple low intensity burns and up to several decades to complete the work. In contrast, the proposed manual and mechanical treatments to break up the fuels allows reintroduction of fire and achieving management objectives to reduce fire risk within five to ten years. Therefore, this alternative was considered but dropped from detailed analysis.

6. Suggestion for an alternative that does not allow herbicide use.

This alternative was considered but dropped from detailed analysis. An alternative that would not allow herbicide use for site preparation and planting would not meet the purpose and need of the project due to the aggressive response of bear clover and other shrubs as described in more detail under the vegetation analysis (p. 25). No rodenticides are proposed in this project. Bear clover and some of the other native shrubs such as whitethorn and deer brush are very responsive to fire and quickly resprout and compete to reoccupy a site. They are very good at sprouting early and taking full advantage of all the soil moisture in the spring. Once they have become established, it is very hard for a tree seedling to compete with them for the limited summer moisture. Controlling shrubs while the new seedlings get established is extremely important to regenerate the forest and reduce seedling mortality. Manual control of bear clover has been proven to be ineffective, so herbicides are the only feasible option to meet reforestation requirements under the National Forest Management Act to reforest areas within five years. Planted seedlings have a high mortality rate if bear clover and other shrubs are not suppressed during establishment.

Mechanical treatments and reforestation within Inventoried Roadless Areas were initially considered but subsequently removed from the proposed action due to public comment and lack of Forest capacity.

Affected Environment

The Castle Fire caused large areas of old-forest and other forested wildlife habitat conditions to be converted to early seral stage conditions. The mosaic burn pattern of the Castle Fire includes areas of unburned, very low, low, moderate, and high fire severity. As a result, in some areas tree mortality is 100 percent, while other areas still support a green tree component.

This range of fire severity leaves the existing landscape with a wide range of potential future fire behavior depending on vegetation burn severity, fuel loading changes from dead and dying trees, and the regrowth of non-forest vegetation over time. Table 4 below shows the acreage of California Wildlife Habitat Relationships (CWHR) vegetation types burned by fire severity type. The Castle Fire burned approximately 34 percent (29,615 acres) of the vegetation in the project area at high fire severity, with 100 percent tree and shrub mortality. In addition, approximately 23 percent (20,330 acres) of the vegetation experienced moderate fire severity, with 25 to 75 percent tree and shrub mortality. Most of the conifer forested areas that experienced high fire severity and some of the forest that experienced moderate is now in a deforested condition. Fire adapted shrubs have quickly resprouted and are aggressive competitors with tree seedlings.

Table 4: California Wildlife Habitat Relationships (CWHR) vegetation types by vegetation fire severity class for the Castle Fire. All values are in acres (approximate)

CWHR Vegetation Types	High Fire Severity	Moderate Fire Severity	Low Fire Severity	Very Low Fire Severity	Total
Barren/Brush	539	651	472	261	**1,923**
Shrublands	8,196	2,862	2,414	633	**14,105**
Meadow	199	196	147	35	**577**
Montane hardwood and blue oaks	4,183	5,621	3,517	223	**13,544**
Montane Hardwood-Conifer	1,237	885	1,112	43	**3,277**
Ponderosa pine and Jeffrey pine	1,594	1,143	1,053	320	**4,110**
Giant sequoia	5,349	2,645	1,471	166	**9,631**
Red Fir	7,005	2683	2,054	1,090	**12,832**
Sierra mixed conifer	8,808	5,538	3,965	1,087	**19,398**
Total	**37,110**	**22,224**	**16,205**	**3,858**	**79,397**

The removal of immediate hazards to public health and safety from burned and dead trees along roads, in recreation sites, and at administrative sites within the Castle Fire footprint was addressed by individual Fire Hazard Tree Removal projects. Incidental hazard tree felling occurred by firefighters at various locations aimed at reducing hazardous risk to fire personnel during the event. In addition, California Department of Transportation (Caltrans) and Southern California Edison (SCE) performed hazard tree mitigation of fire killed trees to protect human life. Reforestation occurred along Lloyd Meadow Road and in a small area near Sequoia Crest under individual projects.

Most of the project area is currently typed as mixed conifer, montane hardwood (oak)-conifer or red fir. There are known pockets of *Heterobasidion occidentales* root rot disease, and especially during the recent drought, there have been elevated levels of bark beetle activity in the vicinity. Where the fire burned at moderate or high intensity, fire and the effects of fire can lead to issues which would diminish forest health in both the short and long term. Fire can weaken and stress surviving trees through the creation of wounds and the reduction in ability for conduct photosynthesis by reducing green leaves/needles. Stressed and weakened trees may become more susceptible to bark beetle attacks, especially if drought continues. Forest and woodland areas unaffected by the Castle Fire are expected to continue along the same forest health trajectory of increasing stand density and susceptibility to drought, insect attack, and stand replacing fire and an increased rate of tree mortality across the unburned portion of the landscape.

Manzanita, deer brush and whitethorn are the main shrubby species, and bearclover with rock outcrops and small grassy openings are the ground cover. Within the unburned areas, the overstory is dominated by large diameter fir and pine, though up to 50 percent of these died or are dying from drought or bark beetles since 2015. The understory contains patches of bare ground due to shallow bedrock with little to no seedlings or saplings. In some areas in the low - moderate severity burned areas, the understory consists mainly of red and white fir seedlings and saplings. The giant sequoia groves are in the wetter sites and are also considered to be a mixed conifer stand with fir and pine. Giant sequoia groves also have scattered giant sequoias of all ages and dogwood in the understory.

Environmental Impacts

Issues or concerns that resulted from internal and external scoping are:

- The need for fuels reduction and restoration to reduce potential high severity wildfires,
- Negative effects to wildlife species including Pacific fisher and California spotted owl due to disturbance, noise, and habitat modification,
- Negative effects to soils and increase in sediment transport potential from mechanical treatment activities,
- Negative impacts from dead tree removal to regenerating trees.
- Need to analyze greenhouse gas emissions per Forest Service policy.

These concerns were used to inform the effects analysis completed for the project by the Forest Service interdisciplinary team. A summary of the analyses is provided below, with analysis details provided in the specialist reports prepared for the project.

Effects of No Action

The no-action alternative is a continuation of the current level of management including road maintenance, hazard tree removal, dispersed recreation, watershed restoration, and fire management against the backdrop of burned national forest and private lands within the assessment area. Taking no action would leave conditions on the ground in their current state and allow for high fuels accumulation as dead trees naturally decay and topple to the ground and reburn at high severity. Areas of high severity burn with no conifer seed sources would likely not regenerate to a forested vegetation type, instead converting to shrubland. Potential for habitat connectivity between light and moderate burned areas would not occur, thus reducing long term benefits to wildlife habitat. In Wildlife Urban Interface areas with dead trees, fuel accumulation would likely increase above acceptable levels, increasing the risk of damage to private land from catastrophic wildfires. Areas with low to moderate burn severity would continue to increase in fuel loading and be vulnerable to future wildfire.

Vegetation and Fuels

As stated in the Fire, Fuels, Air Quality and Climate Change Report (Fuels Report) “The Castle Fire area has high densities of dead trees …” This existing situation would result in an abundance of snags and down trees across the burned area. Thus, the management challenge is not one of providing for snag retention but one of managing the fuel loading as the dead trees fall over the next 20 years. (Fuels Report page 17.)

Under No Action, there would be no alteration in the vegetation condition in these high mortality areas within the project area in the next few years. Portions of these areas burned hot enough to kill seeds in the duff layer, and are reliant on birds, animals, and windblown seed to become reestablished as a forest. On some of these sites the shrub species and bear clover are already dominating the site, which means they would remain shrub fields for decades or centuries, depending on the site and the returning fire cycle.

As the numerous snags eventually fall, down woody debris would increase over time. The snag fall rate is expected to remain at high levels for the next five to ten years based on the condition resulting from the 2020 Castle Fire and drought/insect infestation from 2014 through the present. The smaller snags (less than 12 inches diameter at breast height (dbh)) are expected to fall soonest as studies show the smaller trees break or fall more quickly than the larger trees.

Under no action the varied rates of snag fall and decay, and vegetation growth is predicted to result in a high density of dead down material of all sizes intermixed with live shrubs for several decades until the next wildfire or other disturbance occurs. These stands would have potential to reburn at high severity due to the high fuel loading.

In the lower elevations, it is expected that the oak would resprout and reestablish as an oak woodland if high severity fire can be limited. In the higher elevation, high severity areas, the direct and indirect effects are continued shrub growth intermixed with the down woody debris from fallen trees creating high fuel loads in some stands over time. Manzanita, snowberry, deer brush, whitethorn, currant, bear-clover and other shrubs are and would continue to grow rapidly the next several years where the tree canopy is gone. The dense brush and down woody debris would compete with and ultimately retard growth of most conifers that seed into the area.

It can reasonably be expected that dead and down fuel loads within the footprint of the Castle Fire would persist until they are physically removed, consumed by fire, or naturally decompose. Specific details, such as tons per acre and snags per acres, of the post-fire fuel loadings are dependent upon factors such as tree stocking before fire and fire intensity. Areas of concern in the near term are where large concentrations of snags are close enough to threaten valuable resources or infrastructure in the next wildfire. Where the drought, bark beetles, fire, or a combination of these resulted in snags, the snags would fall and become down logs over the next decade, which would increase the surface fuel loading as snag stocking decreases. In the longer term, the fire risk would continue to increase where the density of snag and subsequent down woody debris is high, and shrubs become established. In these areas the likelihood of reestablishing forest habitat would be low for the next century. A wildfire in these areas would likely result in another stand replacing fire and perpetuation of shrubs.

The higher fuel loading mostly occurs in the 119 high severity burn patches that are 33 acres or larger. It is composed mostly of snags and/or woody debris of varying density with aggressive shrub regrowth as already recorded in the Alder Creek, Belknap Complex and Freeman Groves. Natural regeneration would be vulnerable to future fires where the high fuel loading is present because decay of small logs in the dry southern Sierra Nevada takes decades, and the fire return interval in mixed conifer forest is 10-15 years. These factors combined with the tendency that high severity burn patches usually reburn with high severity would put the current set of seedlings and young trees at risk of stand conversion where there is no remaining seed source. Under the no action, the large high severity burned patches would mostly become shrublands with tree regeneration on the edges.

In the high severity burned areas, the regenerating young sequoias may be vulnerable to mortality, depending on the fire return interval and the current fuel loading. If a fire were to occur within the next 20 years without fuel reduction, it is expected that the sequoia seedlings would not survive due to high fuel loading and high intensity fire. Additionally, remaining mature giant sequoias may be vulnerable to being killed due to the continuing increase in ladder fuels (dead trees and live fir and incense cedar under the canopy of the mature giant sequoia) and fuel accumulation on the forest floor. Allowing high fuel loading to remain, especially in close proximity to mature sequoias is not consistent with the Science Advisory Board (SAB) which informed the Monument Plan regarding Undesirable Fire Effects. SAB Advisory IX defined “catastrophic fire” as a fire of an extent and severity beyond that which is consistent with the values for which the Monument was created (SAB 2003 Advisory IX) (USDA 2008).

Under no action, the stands minimally affected by the fire and that are at moderate to high stocking would have inter-tree competition increase over time resulting in crowded trees, more vulnerability to drought stress and probability of more die-off from bark beetles, disease, and wildfire. Within the

forested areas, shade tolerant species such as incense-cedar and white fir are expected to be more abundant than in the proposed action due to lack of active fuel treatments.

The fuels were reduced in the overall Castle fire footprint and many areas in the low and low-moderate burned areas have conditions similar to those described in the Monument Plan. However, the fire also killed many trees in the understory and overstory. These new fuels would continue to accumulate. In the portions of the groves that burned low to moderate severity, the next wildfire would be expected to also burn low to moderate severity if conditions are similar.

Natural Regeneration

It can reasonably be expected that, over time, areas impacted by high severity fire during the Castle Fire would naturally regenerate where giant sequoia or other conifer species survived to provide a seed source. In the short term, some locations would have a flush of seedlings, especially where giant sequoia, incense-cedar and firs survived. Unfortunately, based on field surveys in 2021 and 2022 in the high and high-moderate severity areas, it has turned out to be small areas scattered throughout the area that regenerate. In the larger patches of high severity fire, seed trees are too far for natural regeneration to occur. Immediately after the 2015 Rough Fire, the continued drought conditions the year after the fire allowed some pine seedlings to germinate and grow before shrubs became established, which may have occurred in portions of Castle Fire footprint as well. Some tree species have competitive advantages, such as hardwoods known for sprouting from existing root systems, as well as conifers with serotinous cones, such as giant sequoia, which open following a fire event.

Natural regeneration is known to occur within 600 feet of live cone bearing giant sequoia and within 90 to 150 feet of other live cone bearing conifer species, which may have a competitive advantage over invasive shrubs. Natural regeneration could begin progressing further into the high severity burn patches when the seedlings grow into small trees and begin bearing seed, if a seed bed exists and the area is not dominated by shrubs. Once shrubs get established in a site, it is hard for conifer seedlings to establish and grow, due to the competitive advantage the shrubs have for soil moisture. Beyond the edges of high severity burn patches where natural regeneration could become established, no action would most likely result in conversion to “persistent shrubland for several decades or centuries” as predicted for a portion of the Freeman Creek Giant Sequoia Grove on page 23 of the Castle Fire Restoration Project Fire, Fuels, Air Quality and Climate Change Report.

Soils

There would be no impacts from upland erosion or sediment delivery to soils in the no action alternative. The post-fire hillslopes would revegetate naturally over time. Upland erosion would return to pre-fire conditions as ground cover and plant root strength re-establish across the uplands and riparian areas. There would be no meaningfully measurable sediment delivery to streams from project thinning units if left untreated. However, as evidenced by the March 2023 storms, in the short term the limited vegetation is insufficient to hold the soil especially on the steeper slopes. The mass wasting and gullying from the recent storms has resulted in several eroded hillsides and plumes of sediment into riparian areas.

Road sediment delivery would remain at current levels in the no action alternative. Up to ten miles of closed road would not be used (temporarily re-opened) for haul. Background sediment delivery from forest roads would continue. Emergency stabilization of roads within the project area would have already occurred under BAER implementation, but in some cases post-fire accelerated runoff and surface erosion and/or suppression actions may exacerbate roads issues and elevate post-fire road erosion as was demonstrated resulting from the March 2023 storms.

Wildlife and Botany

There would be no direct effects to species or their habitat under the no action alternative. Threatened, Endangered, and Forest Service Sensitive Wildlife Species known to live in the vicinity are California spotted owls, pallid bats, fringed myotis or Sierra martens. There are no known spotted owl nest sites, marten den sites or bat hibernacula in the project area. There are no known threatened or endangered plant species, and several known Forest Service Sensitive Plant Species with potential habitat in the project area including Tulare rockcress (*Boechera tularensis*), pygmy pussypaws (*Calyptridium pygmaeum*), Tulare County bleeding heart (*Dicentra nevadensis*), and short-leaved hulsea (*Hulsea brevifolia*). Surveys found some of the known populations of these species continuing to grow in the project area.

Forest regeneration would be limited to areas where remaining seed stock is available and areas without these have the potential to become brush fields.

There would be no impacts to aquatic species or their habitat under the no action and sediment delivery into aquatic habitat would be based on natural events or other on-going management activities and use in the project area.

There would be no substantive reduction in burned or green forest habitats on NFS lands because of management activities. Hazard trees along roads would be subject to being felled and left in place as downed logs. Such logs and accessible snags within the fire perimeter would be subject to being removed as fuelwood by woodcutters. These activities would cause minor reduction in the overall total of burned forest habitat, with most fuelwood activities confined to roadsides or other accessible areas. Such activities would affect relatively few of the burned acres on NFS lands. Over most of the burned acres, snags would remain until they naturally fall due to decay. Vegetation would go through natural recovery and regeneration.

Existing levels of large woody debris and snags would be maintained and may provide enhanced short-term foraging opportunities especially for species like black backed woodpeckers. However, over the large area of the fire, forest regeneration that eventually develops into mature forest would be expected to take much longer compared to the proposed action since trees would not be planted and large patches of high intensity burned areas would lack a conifer seed source.

Not addressing current fuel loading may lead to the indirect effect of increased fire severity if a wildfire enters the project area. This could result in more severe or catastrophic loss of suitable old forest habitat within the project area. Based on current trends in habitat and climate, without treatment, old forest habitat is at great risk from wildfire. Without active reforestation, there would also be the indirect effect of the landscape having more shrublands and less forest, which would increase the presence of shrub dependent species and decrease the amount of old growth dependent species including the endangered fisher.

For Forest Service Sensitive plant species, the forest landscape in and around the project area has been significantly altered, and current conditions can only be characterized as significantly disturbed, disrupted, and in a state of flux with regards to soil nutrients, watershed functioning, understory vegetation, canopy cover conditions, and the dynamics of tree survival. There would be no direct or indirect effects to Forest Service sensitive plant species individuals, populations, or habitats. There would also be no change in resources required for optimal growing conditions, meaning no opportunity to reduce the potential for largescale high intensity wildfire that can lead to drastic population losses and have the potential to lead to a change in federal listing status. Under the no action alternative, the abundance of burned trees within the fire area would make fire management difficult with less

opportunity to move the landscape towards conditions where fire managers would have more options to manage wildland fire for resource benefit including preservation of threatened, endangered and Forest Service Sensitive species.

Effects of Proposed Action

The following effects discussions focus on changes to the human environment from the proposed action that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action, including those effects that occur at the same time and place as the proposed action and may include effects that are later in time or farther removed in distance from the proposed action.

Vegetation and Fuels

Based on the proposed action, most of the mechanical treatments would occur within 1/4 mile of existing roads and on slopes 35 percent or less. This means thousands of burned acres farther from the roadways or on slopes greater than 35 percent would not be treated. In addition, based on field verification of site conditions, a portion of the treatable ground would not need treatment because the conditions are at or trending toward desired conditions of the Monument Plan or Forest Plan, as applicable.

Most of the treatment area is within the Monument where the desired conditions for vegetation focus on maintaining or restoring heterogeneity (species mix, age classes, and stand density) and resiliency to climate change and disturbance. Therefore, the effects analysis of the various treatments is couched in terms of the Monument desired conditions.

Based on field verification of the Rapid Assessment of Vegetation Condition (RAVG) data regarding vegetation burn severity in Castle Fire, the proposed action would treat approximately 14 percent of the high burn severity areas with an objective to return them to a forested condition. The rest of the high severity areas will have the same effects as the no action alternative.

According to analysis of the RAVG data, the 7 percent of the green forested/unburned areas that would be treated would have an understory that has fewer shade tolerant trees and less fuels than the untreated areas. The proposed action treats about one-fourth of the entire mapped burned footprint and less than half of the analysis area, with most of the treatment in the form of prescribed burning. In the untreated areas the species mix, heterogeneity and age classes would be similar to the no action alternative across the project area in the short term. Where the mortality was highest, species in non-treated areas in the proposed action would trend toward more shrub dominated communities. In the treated areas in the proposed action, more conifer species would be present and there would be more age class diversity than under no action because of the fuels reduction, site preparation and planting. The proposed action would reduce the amount of forested area converted to shrub dominated habitat for the next several decades. Under the proposed action, there is a greater potential to return to frequent low severity fire in the treated acres and even across the landscape because the fuel loading would be lower and more fragmented. In the long term, and based on the proposed activities, future fuel management needs in the Castle area, may be met by periodic light under burning, starting in about 10 to 15 years.

Dead tree Removal areas

The Monument Plan specifies: “Any treatments that involve the removal of trees from within the Monument area, including both standing trees and downed logs, would only be permitted following a determination that removal of the trees is “clearly needed for ecological restoration and maintenance or public safety.” Since the proposed action involves the felling of standing trees followed by the removal of them and the woody debris, the Deciding Official must first find one of the tree felling criteria applies

then one of the tree removal criteria. The number and density of the dead trees creates a safety hazard and conditions for future high severity fire. Removal of some dead trees to create gaps in fuels is necessary to reduce the probability of recurring high severity fire. However, the restoration project will not likely be implemented until 2023 or later, so few standing dead trees will have commercial value making removal through a commercial timber sale unlikely and biomass removal necessary. Appendix A of the EA contains the assessment of "Clearly Needed" requirement for felling and removal of trees in the Monument portion of the project.

Also, the Monument Plan directs incorporation of fuel treatment and protection planning into reforestation plans (page 86). In the high severity burn patches (30 acres and larger) and in some other burned areas, the ecological restoration challenge is snags that are beginning to fall in a short time but not decay for a long time; and in the meantime, shrubs are capturing most of the growing space. The result is high fuel loading which would cause high to extreme fire hazard that clearly would adversely affect the regeneration of conifer species when a reburn occurs. The biomass removal and other treatments in the proposed action would return overall fuel loads toward the desired range (10-20 tons), creating conditions for lower severity fire in the future and allow live trees to survive the next wildfire. Fuels reduction treatments would also break up the overall fuel loading across the landscape, slightly reducing the probability of high severity fire in the untreated areas over the next decade.

Treated areas would have less continuous fuels and would be less likely to reburn (USDA 2023a). The dead tree removal units and mechanical fuels treatment areas in the high severity burned area would be planted with native conifers. It is expected that these areas would return to a forested condition within 10 to 20 years under the proposed action. Dead tree and woody debris removal would be completed prior to planting so the areas are free of hazard trees and physical impediments such as large down woody debris, making the reforestation activities feasible and safe for workers. Removing fuels in the planting units would help ensure that the areas do not reburn in another high severity wildfire and the seedlings would be able to grow. The on-going Roadside Hazard Reduction Projects would make the main roads and approximately 100 feet on each side safe to plant. Snags and larger down woody debris would be left for wildlife habitat where it doesn't cause a hazard (i.e., block sight distance or roll into roadway).

Several recent papers were reviewed as part of the Fuels and Vegetation Reports. Some recent scientific papers including DellaSala (DellaSala et al 2022), Baker and Hanson (Baker and Hanson 2022) and others say that the recent large fires are normal and recommend few to no management activities. Other scientists oppose this view as summarized in a commentary by Jones et al in Frontiers in Ecology and the Environment (Jones et al 2022). Jones et al recognize that there is misinformation about wildfires and their effects, as well as management opportunities. Misinformation is incorrect or misleading evidence or discourse which counters best available science or expert consensus on a topic. Jones et al explain that science is an imperfect, self-correcting process, relying on continuous hypothesis, method, and data development. As knowledge accrues, facts align and holistic understanding improves, allowing for robust frameworks of evidence when more studies confirm, and fewer refute, findings over time. These robust frameworks provide vital nuance and more accurately inform management (Jones et al 2022).

Jones et al explain that some wildfire misinformation originates from distilling complex wildfire science into generalizations that rarely apply everywhere. Appropriate management interventions differ widely across ecosystems, but wildfire misinformation often blurs these lines too. Wildfire communication best practices include appropriate recognition of natural variability and complexity within and among ecosystems. Oversimplification of complex wildfire causes and consequences, particularly when

perpetuated by public figures or scientist-advocates, muddies public perceptions of appropriate management (Jones et al 2022).

To mitigate potential for spread of misinformation Jones et al suggest that reliable sources have relevant "domain expertise" (specialist knowledge) as well as the trust of many subject-matter experts and their audience. Predetermining trusted sources who can anticipate misinformation and relate clear messages to the media (pre-bunking) or activate in response to misinformation (debunking) (Jones et al 2022) (Castle Fuels Report Appendix D). In summary Jones et al (2022) note that changing our relationship with fire and the risks we face in the 21st century requires understanding human behavior as much as it does managing ecosystems. We must learn to deal with misinformation about wildfire and develop strategies for limiting its impact on our ability to implement effective wildfire policies.

In *California's Wildfire and Forest Health Crisis: A State of Emergency in Our National Forests,* the Forest Service found that according to researchers, active management is critical to addressing the current wildfire crisis and restoring forest health. Actions such as forest thinning, prescribed fire, and managed wildfire can reduce the risk of uncharacteristically large and severe wildfires while improving forest health and resilience (USDA 2023a).

Tree density management is an important factor in forest health and minimizing contiguous surface and ladder fuels. However, according to recent papers by DellaSala (2022), Baker and Hanson (2022), and Hanson (2022) there is concern regarding tree mortality accounting and effectiveness of commercial thinning as a wildfire management tool because the trees removed during thinning are not counted as tree mortality along with any trees killed during a wildfire. However, identification, removal, and use of the trees in a timber sale or other project is part of the strategy to improve forest health and reduce the ladder and crown fuels contributing to the fuel loads in the event of a wildfire. The number of trees cut, and therefore killed, in any one stand is dependent on the silvicultural prescription. A wildfire kills trees based on the fuel and other environmental conditions (wind, terrain, rH, etc.) during the event.

In summary, most research conducted in the West concerning the effectiveness of fuels treatments, natural regeneration in burned areas and the impacts of logging on natural regeneration generally conclude that fuels treatments are effective at reducing the probability of a high severity fire, high severity burned areas usually reburned with high severity and natural regeneration mostly occurs within a few hundred feet of a green tree (USDA 2023b). Any ground disturbing activity in and around regenerating trees impacts the survival of tree regeneration. The Vegetation Report is hereby incorporated by reference. Based on the best available science, project managers conclude that:

1. The GSNM Management Plan criteria for tree felling and tree removal (F2 and R1) would be met so those elements of the proposed action are "Clearly Needed."
2. Natural regeneration and planted seedlings would be vulnerable to future fires unless dead trees and woody debris are reduced to between 10 and 20 tons per acre.
3. High severity burned patches usually reburned with high severity.
4. Fuels treatment and removal is critical to restoring low fuel loads, restoring forested habitat, and managing the Monument in the future with managed and prescribed fire.

Fuels Reduction units

Some areas within the Castle Fire perimeter burned at low severity or were unburned. Other areas burned at moderate severity, killing 25-50 percent of the green trees, and increasing the number of snags that would become future fuel. As described under the dead tree removal section, without treatment there are likely to be extensive areas of fuel accumulation, especially in the high burn severity

areas. The objective is to reduce fuels in the green forest to allow future natural fires to burn at a low severity and decrease the competition so that trees can withstand future drought.

The Monument Plan (p. 47) strategy 13 includes a footnote that clarifies the use of managed wildfire should consider site-specific analysis and the existing conditions. Due to the existing conditions, the entire project area could not be managed using wildfire alone for resource benefits. The document "Background Information on Giant Sequoia National Monument" that accompanied the President's Monument Proclamation identified prescribed fire projects and cultural treatments as consistent with the goals of the Monument and said these kinds of maintenance will continue for the protection of the Monument resources.

Within the conifer and mixed conifer forest, 32 percent and 49 percent respectively had low to moderate mortality and are still forested. Some of these stands are open grown, and others are still near or at stem exclusion causing inter-tree competition. Overall forest health and resiliency can be anticipated to improve or be maintained through understory thinning and burning in the next decade under the proposed action. This would be the result of decreased resource (water, light, nutrients) competition among surviving trees and other vegetation, and ability to burn at low intensity during the next wildfire. In the proposed action, the treated areas would favor more regeneration of sugar pine, ponderosa pine and Jeffery pine, though the incense-cedar and firs would also regenerate. Thinning and limbing are silvicultural practices that are also key suggested methods to help trees be resilient to drought, climate change, and other stressors. The Castle Project is expected to reduce the number of shade-tolerant species, but not eliminate these trees from the treatment areas, because they are important components of the mixed conifer forest. Thinning small trees, while leaving large and moderate sized trees in the overstory, would lead to improved stand health, and a variety of canopy layers.

The proposed action for fuels reduction is to reduce fuels in the remaining green forest to improve the resiliency of the forest to wildfire and to create defensible spaces in the wildland urban interface. Generally, fuels treatments have been shown to help reduce the probability of a high severity wildfire and create defensible space for firefighters. As discussed in the Fuels Report, thinning and green tree removal with follow up burning reduces fire rate of spread and intensity. Research indicates that for managing fuels, most of the reduction in fire severity is achieved by reducing surface fuels and thinning smaller ladder-fuel trees (see summaries in Agee et al. 2002, Agee and Skinner 2005). In the treated areas for this project, most of the fuels that would be removed are dead or down, or are ladder fuels in the understory. It is not expected that there will be much change to canopy closure or wind speed because of the proposed action.

High severity fire may also create high fuel loading (e.g., high snag and shrub cover) conditions that contribute to subsequent high severity "reburns." High severity reburns can damage recovering watersheds, harm habitat, threaten communities, and lead to vegetation type conversion. Post-fire fuel reduction treatments can effectively reduce reburn risk and foster ecological recovery, especially when coupled with active or natural reforestation (Coppoletta 2016). In summary, Coppoletta et al found that in areas where frequent high-severity fire is undesirable, management activities such as thinning, prescribed fire, or managed wildland fire can be used to moderate fire behavior not only prior to initial fires, but also before subsequent reburns. Jones et al (2022) summarize several of the key points of scientific contention regarding wildfires and effectiveness of fuels treatments in their table named

"Prebunking prominent examples of wildfire misinformation related to in western North American forests" (Fuels Report Appendix D).

In a recent briefing paper by Rocky Mountain Research (RMR) Station (USDA 2023b), Theresa Jain collaborated with scientists from RMR station and colleagues from research institutions across the country to synthesize existing scientific literature on landscape-scale fuel treatment effectiveness in North American ecosystems through a systematic literature review. They identified 127 studies that addressed the fuels treatment effectiveness using simulation modeling, empirical analysis, and case studies. They found those studies show that fuel treatments reduce negative outcomes of wildfire and often promote beneficial wildfire outcomes. Jain and her colleagues acknowledged that weather conditions can influence the effectiveness of treatments, and effectiveness lessens over time. They found that the various study results highlight the importance of treating multiple fuel layers (canopy, ladder, and surface) to reduce fire spread and severity; and the need for maintenance treatments (USDA 2023b).

Where only prescribed burning is proposed, the species mix is predicted to remain essentially unchanged but the quantity of shade tolerant, fire vulnerable species would be reduced and sun loving, fire tolerant species would increase. In the forested sites with higher growing quality, the burning would reduce dead tree fuel loading, reduce shrub density, and stimulate seed sprouting in the existing seedbed. Where advanced oak and conifer regeneration survived or has become established, low intensity fire would thin the young trees and spur growth in the remaining live older trees and saplings.

The prescribed burning is expected to create some small openings where additional black oak and conifer seedlings would sprout. Prescribed burning would also help keep the conifer forest more open canopy and reduce inter-tree competition for up to a decade longer than no action and prevent rapid in-growth of shade tolerant tree species. This would allow the trees to grow more rapidly to begin reestablishing mid- to late-seral characteristics important components of old forest wildlife habitat.

The proposed action to thin out smaller trees through mechanical means and prescribed fire, would result in a forest more resilient to natural fire and with a broader range of large diameter trees in several decades sooner than under no action. The proposed action would create conditions to allow trees space to grow without competition for a decade or more and where they would be less vulnerable to a high severity fire, drought, and beetle attacks. This trend may result in a measurable shift toward larger diameter trees (30-inch+ dbh) in the next several decades. The remaining trees would be more resilient to drought by having more access to the limited water resources. Under the proposed action, the shift toward mid- and late-seral stage stands is more rapid than no action because the thinning from below would allow the retained larger trees to freely grow for about a decade after the competing vegetation is removed. These minor changes toward desired conditions would be reflected in the stand structure as well. The proposed thinning treatments would result in more stands with at least two canopy layers (strata) in the next 10 to 20 years, and more stands reaching 60 percent canopy cover than no action.

The various treatments of the proposed action would improve the overall health and function of the forests and woodlands of the project area. These treatments, as proposed, would reduce fuel loading to be more in line with desired conditions identified in the Monument Plan and Forest Plan, facilitate the re-establishment of forest and woodland stands through artificial regeneration, reduce the severity of

the next wildfire and reduce resource competition within stands through thinning of suppressed and intermediate trees.

Burning Treatments (understory and pile burning)

Under the proposed action, less than half of the analysis area may be burned in the next 10 to 15 years. The impacts of burning depend on levels of fire severity. Slash piles would result in the highest severity from higher soil temperatures in a concentrated area. Litter and duff consumption are likely to occur at high rates in pile burns. Negative soil effects are substantially reduced when soil moisture levels are above 25 percent which is when fuels reduction activities would occur (project design feature SO-12). If litter layers and organic matter are kept intact throughout the rest of the stand (which would occur through the implementation of project design feature SO-7, nutrient losses would be minimal from burning slash and would be localized. According to the Soils Report modeling results upland erosion is not expected to occur resulting from the proposed action (Prentice 2022). Generally, if plants colonize sites following fire, nutrient levels can reach pre-fire levels quickly, which is expected in the project area through natural regeneration and planting. Charcoal deposited following fire also adds carbon to the soil.

According to the Soils Report the potential for a soil condition indicators to change is moderate in most of the soil map units. To leave effective soil cover, high severity burned areas would not be treated until litter, duff and vegetation have recovered, which has occurred rapidly since 2020. Burning in this area would occur during times of high (greater than 25 percent) soil moisture to ensure that the soil conditions would remain intact and in Good or Fair condition. In soil map unit 665 where the soil condition is currently rated Fair/Poor immediately after the Castle Fire, there is a high chance that the proposed action would affect the soil condition, but leaving extra cover (at least 70 percent cover), limiting ground-based equipment to slopes less than 25 percent, designating skid trails near steep drainages and avoiding turning equipment on soils with high soil burn severity would help to mitigate the further impact to the soil. Restoration planting and noxious weed treatments following the fuels reduction activities would increase resilience on these sites.

Reforestation

Where no or minimal natural regeneration occurred since the 2020 Castle Fire, site preparation, planting, and maintenance are essential to avoid potential long-term type conversion to large shrub-dominated and deforested areas across the landscape as described previously in this document. Planting units were selected in large high severity burned areas where natural regeneration is unlikely to occur and within ½ mile of a road and on slopes less than 50 percent. In these areas dead tree removal or fuels reduction treatments would be conducted as needed to reduce fuel loading prior to planting.

In areas with high shrub density, cutting shrubs by hand or hand application of Glyphosate, Triclopyr or similar herbicide would be used to control shrubs within 5 feet around planted seedlings. A follow up hand release may be necessary the year after planting to limit shrub competition and allow seedlings to grow. Glyphosate is a non-selective herbicide that is registered for control of annual and perennial weeds and woody plants in forests by the EPA. For further information see the Human Health Risk Assessment and Ecological Risk Assessment for the herbicide glyphosate, surfactant R-11 and fungicide borate for use on the Castle Restoration Project, in the Vegetation Report that is a part of the project record. Application of the herbicide would only occur where hand treatments are ineffective and forest restoration is important for wildlife habitat and is unlikely to occur without treatment. Herbicide

treatment for reforestation units would be dependent on shrub response and density. It is estimated that approximately 1,000 -2,000 acres would be planted per year, depending on funding and capacity.

Natural tree regeneration must occur within a few years (i. e., by 2025) where shrub species have a significant competitive advantage, especially for pine and giant sequoia seedlings which are light loving species. Otherwise, the shrubs generally out compete the conifers. This is especially true for pine species.

The areas where planting and other cultural activities are essential to restore the forest in the short and mid-term for ecological restoration are in the high burn severity patches 33 acres or larger where natural regeneration has a low probability of success. Reforestation under the proposed action would only occur in areas within ½ mile of a road and on slopes less than 50 percent and where no tree species are regenerating. The rest of the high severity burned areas would be left to convert to shrublands or regenerate naturally. Planting in the giant sequoia groves would be dependent on the natural regeneration response. Areas with naturally regenerating giant sequoia and other species would be monitored and hand treatment of shrubs may be used to reduce competition.

As described in the proposed action planting trees at a density that reflects land management objectives would restore forested habitat in treatment units compared to the no action. Across the Sierra Nevada, forest canopy has dramatically decreased from drought, beetles, and wildfire. Forest dependent species, such as the endangered Pacific fisher, are losing habitat. Restoring forested areas after wildfire is important to help maintain the forested landscape for these wildlife species.

Additionally, a forested landscape increases carbon sequestration, provides shade and maintains a cooler surface and mediates the melt and timing of snow. Trees are long lived and sequester carbon over time. During their lifetime, they sequester the carbon and store it in their trunks. When they die, they begin to rot and release the carbon into the atmosphere. All the trees that have died in the wildfire will begin to rot and release carbon. To maintain the carbon balance, it is important to have new trees growing to store carbon. The shading of trees provides a cooler environment and reduces the plant stress of shade loving plants and understory. Shaded areas are extremely important for wildlife and plants in the hot summer months. In the wintertime, the forested landscape shades the snow and slows the melting. The dynamics between trees and snowpack is complicated as it also depends on radiant heat, aspect, and the reflective properties of the snow. In general, trees grow, hold the soil, slow over land flow, and change the rate of snowpack melt.

Giant Sequoia Groves

Under the proposed action, all the groves within the fire footprint would have hand work conducted around each live giant sequoia to decrease the probability that the tree would die in future prescribed burns or wildfires. Additionally, fuels reduction work in and around the giant sequoia groves would be conducted by either hand or mechanically. Mechanical equipment cannot operate within 25 feet of the bole of a live giant sequoia or where natural sequoia regeneration is occurring. These treatments are expected to reduce the fire intensity of the next fire and allow managers to use prescribed fire to reduce fuels in the future. Regenerating giant sequoia would be protected as much as feasible during treatment and prescribed fire, but some may be lost. Under the proposed action, shrubs would be cut back around advanced regenerating seedlings and fuels would be piled and burned.

Soils

Initially, ground-based harvesting treatments could increase the risk of soil compaction, rutting, puddling, and erosion, leading to decreased water infiltration rates and potential overland flow and

associated erosion, reduced soil organism function and reduced nutrient cycling. Generally, heavy machinery use would create localized areas of soil disturbance, so effects described above would mainly occur in the localized areas. Skid trails and landings generally make up about 10 to 15 percent of any activity area, so compaction would likely be limited to those areas within the project area. Outside of landings and skid trails, for large areas (greater than 100 square feet), high levels of soil disturbance are not expected because of project design features (such as harvesting while soils are dry or frozen, avoiding slopes greater than 35 percent with ground-based equipment including mastication equipment, and retaining cover) and best management practices implementation.

Effects of mastication would include fuel rearrangement, increased soil cover, temperature, and moisture and microbe activity. It is possible that a short-term (less than 5 years) carbon/nitrogen imbalance could occur if too much material is incorporated into the soil, but project design features SO-13 and SO-14 would ensure masticated material is not ground into the soil and is not too thick. The mulched material created by the masticator reduces the risk of soil compaction. Mastication treatments could have similar impacts as ground-based timber harvesting treatments including compaction, rutting, displacement, and loss of organic matter. These impacts would be localized to where the tracks occur, and soil loss (erosion) would be mitigated by retaining protective slash on the soil surface.

Overall, the potential for changes to soil condition in most of the soil map units is moderate, but by implementing project design features and best management practices, changes to soil condition are unlikely. Soil condition changes within soil map units 665 and 700 are rated High because these two soil map units are currently in FAIR/POOR condition. All design features would be applied to soil map units, but additional design features would protect the soils in these units and provide for added resilience to disturbance. Specifically, project design features SO-6 and SO-7 would provide more soil cover and specify ground-based equipment on slopes less than 25 percent across these two areas. Soil scarification, planting of native species and treatment of noxious weeds would also provide increased resilience and lead to soil recovery in the long-term by providing soil cover, improving infiltration and inputs to soil organic matter and help with belowground nutrient cycling. Reforestation activities have also been shown to decrease erosion potential following harvesting (Slesak et al. 2015). FSWEPP modeling (Castle Fire Ecological Restoration Soils Report) results show that upland erosion potential is very low overall, so these design features would provide adequate protection for erosive soils. The recovery of organic matter following fire is key to restoring ecosystems productivity (Beschta et al. 2004).

Wildlife and Botany

Fisher - The proposed action in the Castle Fire Ecological Restoration Project *may affect but is not likely to adversely affect* fishers and its proposed critical habitat[1]. The direct, indirect, and cumulative effects of the project would reduce some snags and large down woody material. However, project design features would maintain those habitat elements at the levels recommended by the *Southern Sierra Nevada Fisher Conservation Strategy* and *The Southern Sierra Nevada Fisher Conservation Strategy Interim Recommendations (2020)* for fisher habitat.

Mechanical plus fire treatments and late season prescribed fire could have short-term impacts on fisher resting habitat and canopy closure. Mechanical methods can have greater short-term reduction on fisher resting habitat suitability than prescribed fire alone, mitigating this effect by avoiding individual trees of high value to fishers is part of the conservation measures incorporated in the proposed action.

[1] The analysis for critical habitat was done using the revised proposed critical habitat from November of 2022, the best available science.

Prescribed fire would only be incorporated after the area was treated by hand or mechanical means to ensure that key fisher habitat requirements would withstand the fire. Removal of fuels from directly around large trees and piling of materials away from these large trees would benefit the fisher and restore natural fire return intervals.

The direct, and indirect effects of the Castle Fire Ecological Restoration Project would result in no change in the number of acres classified as high-quality reproductive habitat in the analysis area. On up to 6,608 acres (treatment of approximately 3,000 acres per year over 10 years) fuels reduction could change the canopy closure class from 4D to 4M, and therefore no longer be classified as "Potential Denning Habitat." This represents less than 8 percent of the "Potential Denning Habitat" in the analysis area and is scattered across the project area rather than in one contiguous block. Other than incidental hazard tree felling and torching during prescribed fire, none of the treatments would measurably affect overstory canopy cover or the abundance of medium and large trees in "high quality fisher reproductive habitat."

For remaining listed threatened and endangered species the proposed action would have minimal to no effect on the species or habitat.

Potential effects to Forest Service Sensitive Wildlife Species were considered in the Wildlife Biological Evaluation. It was determined that the proposed action **may affect individuals** but is not likely to result in a trend toward Federal listing or loss of viability of *California spotted owls, Northern goshawk, great gray owl, pallid bats, fringed myotis or Sierra martens*. There are no known spotted owl nest sites, marten den sites or bat hibernacula in the project area. The direct, and indirect effects of the project would slightly reduce habitat quality due to a loss of some important habitat elements, mainly snags and down woody material. However, there would be no change in the number of acres of suitable habitat for these species in the analysis area. Project design features would maintain large down woody material to at least 10 tons per acre. The project would therefore not threaten the survival of either individuals or the viability of the populations of these species at the project-level or watershed scales. No other Forest Service Sensitive Wildlife Species would be affected by this project.

Potential effects to Forest Service Sensitive Plant Species were considered in the Botany Biological Evaluation. It was determined that the proposed action **may affect** undiscovered individuals but is not likely to result in a trend toward federal listing or loss of viability for Tulare rockcress (Boechera tularensis), pygmy pussypaws (Calyptridium pygmaeum), Tulare County bleeding heart (Dicentra nevadensis), and short-leaved hulsea (Hulsea brevifolia). That determination was based on using pre-implementation surveys to locate and map any populations of these species in the project area. Populations of these plants would be flagged and the use of heavy equipment in those areas avoided to minimize potential for direct or indirect effects.

Cumulative Effects of the Proposed Action

The cumulative effects of the proposed action include the ongoing and reasonably foreseeable activities. Additionally, the proposed action would not happen in one year and would be broken into smaller projects over a 10-year time frame. The following generally describes the proposed action.

- Reforestation including mechanical fuels reduction – 1,000 -1,500 acres reforestation per year for 6-10 years.
- Mechanical treatment for fuels reduction – 1,000 acres per year for the next 2-3 years.
- Prescribed fire – 3,000 acres per year for 10 years
- Dead tree removal -1,000 acres per year for the next 4- 5 years

Ongoing and Reasonably Foreseeable Activities

The ongoing and foreseeable activities in the area overlap in space and time with the current proposed activities.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

The temporal and spatial bounds for cumulative effects analysis are 10 years of activities within the Castle Fire burn perimeter. On-going and estimated future projects in the vicinity or overlapping the project include recreation use, meadow restoration, Forest Service and County Road maintenance (including hazard tree removal), utility company and recreation special use hazard tree abatement and biomass removal, reforestation and grazing activities under permit, as summarized below:

- Region 5 Hazard Tree Project (DN 2022),
- Pier Fire Roadside Hazard Tree Mitigation Project (DM 2018),
- Lloyd Meadow Hazard Tree Mitigation Project (DM 2022),
- Castle Fire North Road Hazard Tree Mitigation Project (DM 2021) and
- Needles Lookout Road and Quaker Meadow Area Hazard Tree Mitigation Project (DM 2021)
- Fire and fire suppression damage repair deck removal
- Hazard tree felling and removal on roads, utility lines, and admin/special use sites – 500 acres per year per fire for 5 years.
- Meadow Restoration – approximately 2 per year for 5 years.
- On-going road maintenance and flood damage repair – USFS, County and Cal Trans.
- On-going permitted livestock use and associated infrastructure maintenance.
- On-going recreation trail and trail head maintenance and fire rehabilitation of trails and trail heads – 25 miles of trail per year.
- On-going recreation visitor use, camping, hiking, sightseeing – levels slowly increasing over time.
- Mountain Home and Save the Redwoods salvage logging, biomass removal and reforestation.
- Alder prescribed burn adjacent to the Castle fire perimeter.

These summaries include Giant Sequoia Emergency Response activities that are focused on fuels reduction in giant sequoia groves and ongoing hazard tree abatement projects within the fire perimeter.

On adjacent private and federal lands, particularly at Sequoia Crest and other cabin tracts, and at Mountain Home State Experimental Forest, activities including hazard tree removal, fuels reduction, and reforestation which have been going on since 2021 because of the Castle and other recent fires (i.e., Pier and Windy), drought, and wide-spread insect mortality; and are likely to continue for the next several years.

Under the proposed action, the direct and indirect effects as described in this EA along with the reasonably foreseeable actions near and overlapping the project area are likely to result in minor potential for cumulative effects to vegetation heterogeneity, resiliency, and wildlife disturbance and wildlife habitat diversity in the next several decades.

Under the proposed action, the proposed treatments are predicted to move the vegetation resources toward desired conditions for forest health particularly in terms of size class heterogeneity, resiliency to fire, and re-establishing key wildlife habitat components in the long term. The other reasonably foreseeable actions on NFS lands as well as the adjacent private properties are likely to help maintain and improve heterogeneity at both the small and large scale; and reduce fuel continuity across the landscape. The combination of projects is more likely to re-establish a more open stand structure with dense clumps of vegetation across the broader landscape that is more resilient to broad-scale insect

attack, drought, or a large wildfire event (i.e., prevent a large-scale stand replacing fire from destroying private and public property).

The proposed action in combination with reasonably foreseeable actions would result in beneficial long-term effects to forest health in terms of heterogeneity, resiliency, and wildlife habitat. The combination of treatments across the landscape would move the project area toward desired conditions faster than no action, especially due to the extensive areas proposed for reforestation.

The soils and watershed analyses found that the proposed activities are not expected to create serious or long-term effects on soil or water quality because design features would protect soil and water resources. The use of Best Management Practices, adherence to forest plan standards and guidelines, and project design features would minimize local and short-term effects. The watershed analysis included erosion modeling, wetland assessment, roads assessment, and cumulative watershed effects modeling. The analysis of the proposed action in combination with the reasonably foreseeable actions show no potential for cumulative watershed effects.

No cumulative effects would result in the number of acres of late seral closed canopy coniferous forest habitat or tree canopy closure class. There would be a reduction in the number of large down logs and large snags in late seral closed canopy coniferous forest habitat following hazard tree and other vegetation treatments (biomass removal, pile burning). However, the Project would impact less than one percent of the habitat available in the bioregion and therefore would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of California spotted owls, Sierra martens, Northern flying squirrels, or hairy woodpeckers across the Sierra Nevada bioregion.

Potential cumulative effects to Forest Service Sensitive animal species were considered in the Wildlife Biological Evaluation. It was determined that the proposed action may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability of California spotted owls, pallid bats, fringed myotis or Sierra martens. Project design features would maintain large down woody material to at least 10 tons per acre. The project combined with other reasonably foreseeable actions would therefore not threaten the survival of either individuals or the viability of the populations of these species at the project-level or watershed scales. No other Forest Service Sensitive animal species would be affected by this project and therefore there is no cumulative effect.

The limited effects to key habitat components and high-quality reproductive habitat for fisher would not threaten the survival of either individuals or the viability of the fisher population at the watershed or core area scales and have minimal cumulative effects. The minimal effects of the project in combination with the reasonably foreseeable project results in minimal potential of cumulative effects to the threatened, endangered and Forest Service sensitive wildlife habitat.

For remaining listed threatened and endangered wildlife and plant species the proposed action combined with the other reasonably foreseeable actions would have minimal to no effect on the species or habitat due to the design criteria in place to protect habitat. Appropriate implementation and use of Best Management Practices, and other design features will greatly minimize any potential direct and indirect impact to TESP, and Forest Service Sensitive plant species, and noxious weeds individuals, populations, habitats, and resources. Forest restoration will assist TESP and Forest Service Sensitive plant species in maintaining population numbers and prevents the spread of noxious weeds into sensitive, disturbed areas. Therefore, the proposed action and the other reasonably foreseeable activities may affect some individuals but is not likely to result in a trend toward federal listing, loss of viability in the planning area, or spread of noxious weeds for all species analyzed, and result in a minimal and beneficial cumulative effect to TESP and Forest Service Sensitive plant species.

Other Law, Regulation, and Policy Consistency

National Forest Management Act (NFMA) – Land Management Plan Consistency

Castle Fire Ecological Restoration Project proposes vegetation treatments, so compliance with provisions of the National Forest Management Act (NFMA) for vegetation management is required (16 USC 1604 (g)(3)(E) and (F)). In accordance with the National Forest Management Act (36 CFR 219.11) there are two sections to consider regarding timber management for this specific project within Forest Service authority and the inherent capability of the plan area:

(a) Lands not suited for timber production.

As described in the 2012 Giant Sequoia National Monument Management Plan, the 2000 Clinton Proclamation states:

> "No portion of the Monument shall be considered to be suited for timber production and no part of the Monument shall be used in a calculation of provision of a sustained yield of timber from the Sequoia National Forest. Removal of trees, except for personal use fuel wood, from within the Monument area may take place only if clearly needed for ecological restoration and maintenance or public safety." (Clinton 2000 p. 4)

As described in the effects analysis in this document and in the clear need determination for felling and removal, there is both a public safety concern due to fuels loading and ecological maintenance concern with leaving the dense stands of dead trees in the project area.

(d) Limitations on timber removal.

Though the Monument designation has made the area "not suitable" for timber production, the landscape is capable of growing trees. In this case, removal of biomass is a tool to assist in achieving objectives of the Monument to protect other multiple-use values, including fuels reduction and wildlife habitat improvement.

Under this limitation, timber removal would be for the purposes of ecological restoration, maintenance, or safety and subject to the clear need criteria described in the Monument Plan. Proposed treatments ensure the following:

a. Timber felling and removal would occur only where soil, slope, or other watershed conditions would not be irreversibly damaged;
b. Timber felling and removal would be carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources; [77 FR 21260, Apr. 9, 2012, as amended at 77 FR 44145, July 27, 2012; 78 FR 23492, Apr. 19, 2013; 81 FR 90737, Dec. 15, 2016].

The project complies with NFMA to protect soil and watershed conditions by using BMPs to minimize the potential for sedimentation. In compliance with NFMA, the proposed action includes removal of dead trees posing a falling hazard and that contribute to high fuel loads. In accordance with NFMA, a portion of the forest stands are likely to require regeneration activities to restore fully stocked stands of native conifer species. As documented in the Vegetation Report, the Castle Fire Ecological Restoration Project is consistent with restoring forest health in portions of the Monument and Sequoia National Forest.

The Monument Plan and Sequoia Forest Land Plan provide standards and guidelines for general vegetation management, timber management, and specific vegetation types. The applicable standards and guidelines for this project were used to inform the design features listed with the proposed action.

Economics

Many of the hazard trees that meet the 2012 Hazard Tree Guidelines are living and still hold value; this also includes recent dead trees that have not deteriorated past the point of non-merchantability. Given the incoming flood of burned and salvaged timber, there may not be a demand for more dead trees. The closest sawmill in proximity to the district would be the Sierra Forest Products mill in Terra Bella, California which is approximately forty miles from the project location.

Biomass is a low value product, and includes trees that have no merchantability, and a limited market where the haul distance is great. In addition, the species affects the value, which in this case is mainly lodgepole pine and red fir. The market for wood products varies as well which changes prices. The pricing changes affect the feasibility of removal mainly by how much the price of the wood product off-sets the haul cost. Where the cost of hauling the material is more than the value of the wood, then appropriated funds are needed to cover the balance.

Endangered Species Act

According to the Castle Fire Ecological Restoration Biological Assessment as summarized in the effects analysis the biologist reviewed the proposed action and made the determinations this project ***may affect, but is not likely to adversely affect fishers***, an endangered species. Consultation is ongoing with the USFWS because threatened, endangered, proposed species or designated critical habitat exist in the project area (Kelly 2023a).

Sensitive Species (FSM 2670)

According to the Castle Fire Ecological Restoration Project Terrestrial Wildlife Biological Evaluation as summarized in the effects analysis, the pertinent specialists reviewed the proposed action and determined that the project **may affect individuals** but is not likely to result in a trend toward Federal listing or loss of viability of *California spotted owls, pallid bats, fringed myotis or Sierra martens*. There are no known spotted owl nest sites, marten den sites or bat hibernacula in the project area (Kelly 2023b).

According to the Castle Fire Ecological Restoration Project Aquatic Biological Evaluation appropriate implementation of Sequoia National Forest Riparian Standards and Guidelines, use of Best Management Practices, and other design features will greatly minimize any potential impact aquatic sensitive species and their habitats. Forest restoration will increase watershed resilience by stabilizing soils and improving hydrologic function for aquatic species and their habitat. Therefore, the proposed action **May affect** individuals but is not likely to result in a trend toward federal listing or loss of viability in the planning area of foothills yellow-legged frog, relictual salamander, western pond turtle or Kern River rainbow trout (Gatto 2022).

According to the Botanical Evaluation and Analysis (BE/BA) For Castle Fire Ecological Restoration Project the determination for botanical species is that the project **may affect** undiscovered individuals but is not likely to result in a trend toward federal listing or loss of viability for species known to occur within the analysis area. That determination was based on using pre-implementation surveys to locate and map any populations of these species in the project area (Hubbard and Bonnette 2023).

National Historic Preservation Act – Section 106 Review

The North Zone Archaeologist reviewed the proposed action and determined that because the Castle Fire Ecological Restoration project is a large-scale multi-year project where the identification of and/or the effects on historic properties cannot be fully determined prior to its authorization, the use of the *National Programmatic Agreement Among The U. S. Department Of Agriculture Forest Service, The*

Advisory Council On Historic Preservation, And The National Conference Of State Historic Preservation Officers For Phasing Section 106 Of The National Historic Preservation Act For Large-Scale Multi-Year Undertakings (Phasing NPA) would be used to fulfill the forests obligations under Section 106 of the National Heritage Preservation Act.

Under this agreement, Forest Service personnel would defer the identification and evaluation of historic properties, assessment of effects, and resolution of adverse effects until after the project decision document (i.e., decision notice or record of decision). This requires a phased Section 106 approach, whereby Section 106 compliance activities begin before and continue after the project decision, while the project is implemented. Results of effects analyses would be reported at minimum on a yearly basis to consulting parties, and to the Forest Service internal system of record.

Consultation with Federally Recognized Tribes

Consultation with federally recognized tribes was on-going through-out development of the proposed action and environmental analysis. Tule River Indian Tribe is the one federally recognized tribe in the area, and this tribe along with several non-federally recognized tribal groups were notified of the project during scoping. A field trip to the proposed project area with tribal representatives occurred in August 2021.

Clean Air Act

Greenhouse Gas Emissions and Carbon sequestration

The scale of this project and the associated greenhouse gas emissions from operation of equipment and vehicles is extremely small in the context of global climate change and CO_2 emissions. Therefore, it is not presently possible to conduct a quantitative analysis of climate change effects from this project, nor is a quantitative analysis required by regulation or policy at this scale.

The material removed may become timber or other wood products, chipped, and spread as mulch, or used for bioenergy. Removing dead and dying trees as biomass or timber would sequester some carbon, which if left on site to decay would produce greenhouse gas emissions instead. Over time, the decaying tree would be offset by carbon sequestration from forest regeneration. Though removal of the trees also removes carbon from the forest, it reduces the potential for a pulse of carbon going into the atmosphere during a wildfire; and allows the remaining trees to grow more rapidly and sequester carbon at a more rapid rate. Active forest management that reduces wildfire risk and enhances long-term carbon sequestration through vegetation management has been shown to have large increases in carbon sequestration and storage within fire-prone forest stands in California. Additionally, use of conifer trees as wood products continues to store sequestered carbon in durable goods.

The Castle Fire emitted large amounts of greenhouse gases and significantly reduced carbon stored in dead and down logs and decreased the rate of carbon sequestration by trees in the burn area. The death of thousands of acres of green trees reduced the amount of carbon being sequestered and stored in the project area. Over time vegetation response in the form of shrubs and natural regeneration would begin to sequester carbon. Dead trees would start decaying and losing carbon. If the project area returns to a green forest, it would take decades, for the project area to sequester carbon at the same rate as before the Castle Fire. If large areas do not recover and convert to shrublands, carbon stored would be less than before the fire.

Project related prescribed burning would emit greenhouse gases in significantly lower amounts compared to the Castle Fire's emissions and if not conducted, the area would burn again in similar intensity and severity. Fuel reduction treatments would remove carbon from the site and reduce carbon stored on the site in the form of dead trees. In the short-term, proposed fuel treatments would reduce

stored carbon, but it would be in lower amounts compared to the large reductions caused by the Castle Fire. In the long-term, reforestation, and maintenance of a green growing forest through fuels and forest stand treatments would stabilize carbon storage and slowly increase carbon storage over time. However, to maintain a more stable carbon storage regime forested areas would need to be burned under conditions and in time periods that closely mimic the natural range of variation (variability) for the fire regime types in the Castle Fire area.

Clean Water Act

The Federal Clean Water Act (CWA) (33 U.S.C. § 1251 et seq.) is the foundation for surface water quality protection in the United States. The objective of the CWA, as articulated in section 101, is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (Clean Water Act, 2011, p. 1). This law uses a variety of regulatory and non-regulatory tools to control direct pollutant discharges from point sources and manage polluted runoff from nonpoint sources to waters of the United States. In the CWA, Congress gave States and tribes the option for taking primary responsibility for water pollution control. Section 313 of the Clean Water Act states that the Forest Service, as an agency of the Federal Government, is required to comply with all Federal, State, and local requirements for water pollution control in the same manner and to the same extent as any nongovernmental entity (Clean Water Act, 2011). The proposed action is consistent with the Clean Water Act.

Review of most recent section 303(d) list of impaired waterbodies shows that no listed waterbodies are located within or immediately downstream of the project area and project treatments would not impact listed pollutants.

Locations and mitigation plans for all SEPES (Significant Existing or Potential Erosion Sites) within the project area were requested by the California State Water Board for the Castle Project as part of the Notice Of Intent. Final comprehensive maps would be submitted as part of project permitting. Monitoring would occur during implementation.

This project is consistent with E.O. 11990 because soils/hydrology/fisheries Streamside Management Zones, where "no equipment use" zones or treatment buffers, as described in the project design features would protect wetlands from project activities.

Relevant Executive Orders

The applicable specialists have determined the proposed action follows the following Executive Orders (EO), which were deemed pertinent based on the nature of the project:

EO 13112, Invasive Species – An invasive species assessment was completed as part of the botanical species analysis and documented in the Botany Biological Evaluation for the proposed project.

EO 13186, Migratory Birds –This project may cause short-term adverse impacts to migratory birds due to a loss of snags as well as disturbance.

Finding of No Significant Impact

The key factors to consider whether this proposed action would have a significant effect on the human environment and for which an environmental impact statement would be prepared, or result in a Finding of No Significant Impact (FONSI) are:

a. Both short- and long-term effects.

The restoration activities are expected to have short term effects associated with felling and removal of individual trees on the human environment. As described in the resource-by-resource narrative, the main effects are fuels reduction activities within ¼ to ½ mile of key recreation areas or roads. Effects to fuels, vegetation, soils, watershed, and wildlife habitat would be minimal and of short duration. No long-term effects are anticipated beyond fuels reduced or maintained at a lower level, which helps maintain safe access to forest areas, and may allow use of managed wildfire in the near future.

Scoping surfaced no controversy regarding the magnitude or nature of effects of the action alternative. However, the scoping respondents raised concerns that the prescribed burning, thinning and other mechanical fuels reduction activities were not necessary after the Castle Fire and unsupported by science. A literature review of the science raised by the scoping respondents and other applicable current science resulted in additional documentation in the environmental assessment to addresses this concern and minor adjustments to the Proposed Action through design features. The effects analysis discussed in this document display that the proposed treatments affect less than half of the fire footprint and are limited in scope to focus on fuel reduction activities and planting approximately 1/3 of the total proposed treatment area.

There are few minor differences between the alternatives in terms of effects to the natural and cultural resources unless there is a stand-replacing wildfire event under the No Action Alternative. The magnitude and nature of potential to affect climate change is negligible under either alternative.

The Castle Fire Restoration Project proposes resource management activities under circumstances similar to numerous other fuels reduction projects that have been successfully implemented for many years. The nature and magnitude of the effects to the human environment from implementing the Proposed Action are well understood and do not pose highly uncertain, unique, or unknown risks as documented in the discussion of cumulative effects in this environmental assessment.

All the proposed management practices to reduce fuels and begin reforesting the area under the Castle Fire Restoration Project have been conducted both separately and in various combinations within similar landscapes and vegetation types. These management practices, as well as the project objectives, are envisioned by the Monument Plan and are consistent with applicable standards and guidelines as summarized by the design features in Appendix C of the environmental assessment. Therefore, the activities proposed in the Proposed Action are already well established and would not represent a decision in principle about future considerations or set a new precedent.

Regarding the potential for significant effects, the Sequoia National Forest has implemented such practices for many years (e.g., TRRP ROD 2015, Rough Plantation Maintenance and Restoration DM 2020, etc.). In addition, the neighboring Mountain Home State Research Forest and Tule River Indian Reservation have conducted fuels reduction projects that include mechanical and prescribed burns

in the vicinity for the past several decades. In each case this has been accomplished without producing significant effects by designing projects with protection measures to prevent such effects from occurring. Based upon the analysis of the action alternative, as documented herein, none of the proposed activities should result in significant effects.

Several impacts have occurred in the project area over the past several decades including grazing, wildfires, timber sales, recreation use, establishing and maintaining conifer plantations, road maintenance and drought. Present and reasonably foreseeable activities continuing in the project area are the same as the past activities as described in the environmental assessment. Based on the effects analysis in the environmental assessment, the ongoing and reasonably foreseeable uses in combination with the Proposed Action have not resulted in a potential for significant habitat loss or resource damage.

b. Both beneficial and adverse effects.

The project would reduce fuel loads and reduce the potential for catastrophic wildfires and associated risks to natural and human resources. The project reduces fuels which maintains and may improve vegetation health and wildlife habitat. Adherence to design features including best management practices would maintain soil and water quality and minimize adverse effects (Appendix C: Management Requirements and Project Design Features). Reduced fuels would improve safe access in the area for public recreation, and private landowners.

In terms of context and intensity, the Castle Fire Restoration Project has minimal effects on the various resources. This project is a site-specific project and was analyzed within the context of a portion of the Tule River watershed. Based on the specialist reports summarized in the effects analysis discussion of the environmental assessment all the impacts from this project would be minimal. None of them would be significantly beneficial or adverse as discussed under the cumulative effects analysis. Several existing impacts have occurred in the project area over the past several decades including grazing, wildfires, timber sales, recreation use, establishing and maintaining conifer plantations, road maintenance and drought. The magnitude of beneficial effects disclosed herein have not been significantly offset or reduced by the adverse effects of the proposed activities under the action alternative in the Castle Fire Restoration Project.

c. Effects on public health and safety.

Health and safety issues posed by the project to the human environment could potentially come from the tree felling, piling, and burning of piles due to noise, airborne debris, and smoke in the short term. The proposed action has the potential to affect firefighter safety in the short term, so mitigation measures are in place to reduce the hazard from falling trees or limbs during project implementation. Restricting public access from the active treatment zone would minimize the potential for activities to affect public safety. Felling and removing the trees reduces the risk of trees falling onto vehicles, or people hitting trees or branches while driving or recreating in the vicinity.

Removal of the trees and burning the piles would prevent increasing fire hazards from fuels build-up over time. The best management practices to retain and improve soil cover, and reforestation would maintain and improve water quality in the headwaters of this municipal watershed. In the short term there is likely to be no measurable difference in impacts on public health and safety in the project area under either alternative due to the limited impacts that the prescribed burning would have on the watershed and other resources.

In terms of air quality, the smoke can have a negative effect, so the timing and duration of this project has been designed to limit the potential to negatively affect public health. Burning would be scheduled to avoid the high ozone and high particulate matter (PM_{10}) periods. The burn windows would be set in compliance with the San Joaquin Air Quality Control Board allowable burn days.

Wildfire is an on-going issue in California because recent droughts continue to affect historic snow and rainfall amounts. Wildfires in the Sequoia National Forest are a result of both human-caused ignition and lightning strikes during the dry summer months. The Forest Service closely monitors weather and fire danger, and if evacuation is necessary, Kern and Tulare County Sheriff's Departments are trained to conduct such activities.

d. Effects that would violate Federal, State, or local laws protecting the environment.

None of the proposed activities under the Proposed Action would threaten violation of applicable Federal, State, or local environmental protection laws or requirements. Management requirements and constraints are set in place to protect wildlife, other resources, and people throughout the project area (See Appendix C, Management Requirements and Constraints of the environmental assessment). These requirements assure that all the activities in the action alternative are consistent with the Monument Plan by following the standards and guidelines during project implementation.

The Proclamation and subsequent 2012 Giant Sequoia National Monument Management Plan includes guidance to restore sequoia groves and the natural fire regime. The Monument Plan (USDA 2012) provides overall strategic guidance for managing the Monument by providing for the protection of 'the objects of interest' while encouraging continued public and recreation access and use consistent with the purposes of the Monument. The Monument Plan consists of four interrelated parts that work together to facilitate the use of adaptive management: Vision, Strategy, Design Criteria and Transportation Plan. Specifically, Part 3, Design Criteria, contains the guidance, laws and regulations, standards, and guidelines (36 CFR 219.11© and 219.13 through 219.29), and monitoring and evaluation procedures to be used during site-specific project planning and implementation. The Castle Fire Restoration Project applies this guidance in the design of the proposed activities which is anticipated to result in minimal cumulative effect to giant sequoias and the other objects of interest.

As described in the environmental assessment the Proposed Action would comply with the Clean Water Act, by implementing watershed best management practices (BMPs), and by keeping cumulative watershed effects below the threshold of concern in the long term, and the National Forest Management Act through the fuels reduction and reforestation activities to maintain forested landscapes.

The Castle Fire Restoration Project is not near park lands, prime farmlands, wetlands or known ecologically critical areas. However, a portion of the project is within, and treatments are proposed in, the Freeman Creek Botanical Area, and portions of Alder, Belknap, Freeman, Middle Tule Mountain Home, and Silver Creek sequoia groves. In compliance with the Moses Mountain Proposed Wilderness Area designation, managed wildfire is the only planned treatment in that area. The managed wildfire treatment area includes portions of Alder, Middle Tule, and Mountain Home sequoia groves.

The project area also includes known cultural resources, fisher habitat, geologic features such as Needles which along with the sequoia groves are objects of interest under the Giant Sequoia National Monument designation (Clinton 2000). The known cultural resources are discussed in the *Castle Fire Restoration Project Cultural Resources Specialist Report* and adherence to the protection

measures as described in Appendix C of the environmental assessment results in a determination of no adverse effect on the cultural resources. As discussed in the next section of this environmental assessment, according to the *Biological Assessment for Federally Listed Threatened and Endangered Plant Species and Biological Evaluation for Forest Service Sensitive Plant Species for the Castle Restoration Project* (Hubbard and Bonnette 2023) and *Biological Assessment and Biological Evaluation for the Castle Fire Restoration Project* (Kelly 2023a) proposed action and made the determinations this project ***may affect, but is not likely to adversely affect fishers***, an endangered species; and **may affect individuals** but is not likely to result in a trend toward Federal listing or loss of viability of *California spotted owls, pallid bats, fringed myotis or Sierra martens*. There are no known spotted owl nest sites, marten den sites or bat hibernacula in the project area. The determination for botanical species is that the project **may affect** undiscovered individuals but is not likely to result in a trend toward federal listing or loss of viability for species known to occur within the analysis area.

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Appendix A – Clear Need Determination

Clear Need Determination for Felling and Removing Trees from the Giant Sequoia National Monument

Eric LaPrice, District Ranger

I evaluated the removal criteria (Monument Plan page 81), and I determined there is a clear need to remove the trees from the Monument to restore ecological processes, maintain and develop future wildlife habitat, and create safe conditions to allow for reforestation activities (i.e., site prep, planting, release). Removal as defined in the Monument Plan can include chipping, burning, or hauling off the Monument as wood or forest products. In the project, a portion of fire-killed and fire-weakened trees would be removed as sawtimber, non-sawtimber, chipped, burned, and made available for firewood gathering. The applicable criteria are:

Table 1: Clear Need Rationale and Determination to Remove Trees

Plan Criteria	Determination
R1. Protection of Objects of Interest If keeping one or more trees on site would cause unacceptable fuels accumulation and fire severity effects; if removing trees would reduce the risk of wildfire to the giant sequoia groves, sensitive wildlife habitat, and adjacent communities at risk.	I determined the felled trees, if left in place, would increase the amount of surface fuel to a level incompatible with historic fire return intervals thereby increasing the risk of loss to the objects of interest, sensitive wildlife habitat and adjacent communities at risk. Fallen logs create a continuous fuel layer that would burn at high intensity and cause irreparable harm to the soils and would impact the ability of the area to reforest naturally or artificially.
R2. Resiliency If keeping one or more trees on site would provide a vector for insect or disease infestations at levels higher than currently known endemic levels.	I determined that removal of green trees is necessary to reduce habitat for continued high levels of bark beetle infestations across the landscape. In the low to unchanged burn severity areas, fuels treatments are necessary to minimize future risk of high severity fire and retain the remaining green trees. Some small diameter green trees would be cut and should be chipped, burned, or removed to limit beetle habitat.
R3. Public Safety If keeping one or more trees on site would create a public safety hazard or attractive nuisance.	I determined the large number of dead trees, if left in place, has been and would continue to be a threat to public safety during use and maintenance of the roads and recreation sites, and for dispersed and permitted uses across the landscape when the dead trees fall or where they make walking among them difficult and dangerous while standing. The felled trees also increase the amount of surface fuel to a level incompatible with historic fire return intervals. If these fuels are left in place, it would be a public safety hazard in the event of a wildfire as the material catches fire. The roads need to be passable for emergency equipment and community evacuations. Specific roads also need to be useable as anchor points and as fuel breaks in the event of a wildfire

Five criteria to apply when evaluating the need for tree felling in the Monument (Monument Plan pages 81-82). The following table shows the evaluation of the criteria, and that this ecological restoration project is consistent with the Monument Plan.

Table 2: Review and Compliance with Tree Felling Criteria

Criteria	Language	Evaluation
F1 Resiliency	If maintaining one or more standing trees on a site would deplete moisture, light or nutritional resources critical to the health and survival of the plant community or forest	The fuel loads created by the dead trees as they fall, along with the growth of shrub species, set the stage for a high intensity stand-replacing wildfire across much of the landscape. The areas burned at high intensity are likely to reburn at high intensity with current fuel loading. As a result, much of the area would likely convert to chaparral for the next several decades instead of retaining forested habitat. In the unburned and low severity patches, fuels removal and cutting of ladder fuels and or thinning is important to reduce the probability of a future high severity fire. Removal of dead trees and controlling shrub growth on some of the project area with thinning of the understory green trees that are ladder fuels in the low and unchanged burned areas would reduce fuel loading and thereby increase the stand's resiliency to fire or insects. The project would reduce fuel loading so that future management can use prescribed burning as the tool for maintaining the forest.
F2 Regeneration	If maintaining one or more standing trees on a site would adversely affect the regeneration, longevity, or growth of giant sequoias and other desired species.	In the high and moderate severity burned areas, dead tree felling and removal is necessary to create areas favorable for giant sequoia and other conifer regeneration and long-term survival. If dead trees are left to stand, they would fall over and create a jack strawed environment that along with the growth of shrub species would set the stage for a high intensity stand-replacing wildfire across the sequoia groves with the results described in F1. Whether established by natural or artificial regeneration, young sequoia and other conifer seedlings, saplings and poles would be at risk.
F3 Heterogeneity	If maintaining one or more standing trees on a site would adversely affect the desired diversity or structure of a stand or forest.	The combination of dense stands of dead conifers, the growth of shrubs and increasing potential for a broad-scale high intensity fire threaten to convert the forest habitat to chaparral for several decades. Felling and removing a portion of the dead trees and controlling the growth of shrubs would reduce the risk to native hardwoods and the conifer seedlings, saplings, and poles. Felling and removal of the dead trees in pine dominated plantations would allow a mix of native species to be planted and/or seed-in to reestablish more heterogeneity at the stand level.
F4 Public Safety	If maintaining one or more standing trees on site would create a public safety hazard. Forest Service policy is to	As explained in R3, the consequences of leaving dead trees to fall or to walk among are threats to public safety. Hazard trees along roads and trails and in reforestation areas (high severity burned areas) need to be cut to reduce the hazards to forest

	mitigate safety hazards from recreation sites, administrative sites and the public transportation system of roads and trails, including trees or tree limbs identified as hazardous (FSM 2330.6(a))	visitors, users, and workers. If a dead giant sequoia is found that is a public safety hazard it would be felled and left in the Monument where it is not a safety or operability issue.
F-5 Recreation and Administrative Sites	Other projects that may be proposed in the Monument that could require tree felling include recreation or administrative site development and maintenance, scenic vistas and road access and parking for these sites.	The consequences of leaving dead trees to fall in these areas are threats to public safety. If a dead giant sequoia is found that is a public safety hazard it would be felled and left in the Monument where it is not a safety or operability issue.

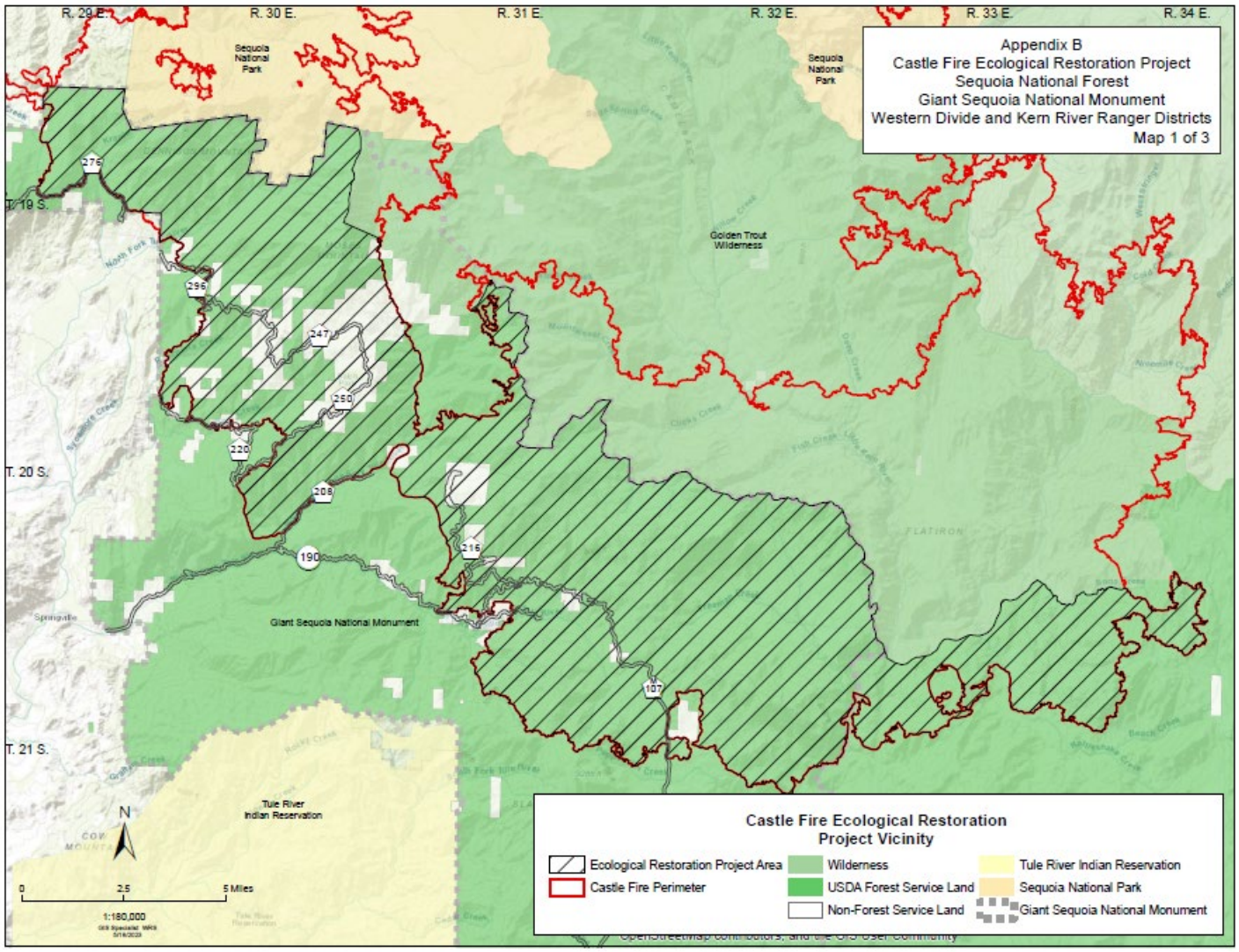
Supplementary material to Stephenson et al., "Patterns and correlates of giant sequoia foliage dieback during California's 2012-2016 hotter drought", Forest Ecology and Management Article in Press, 2017.)

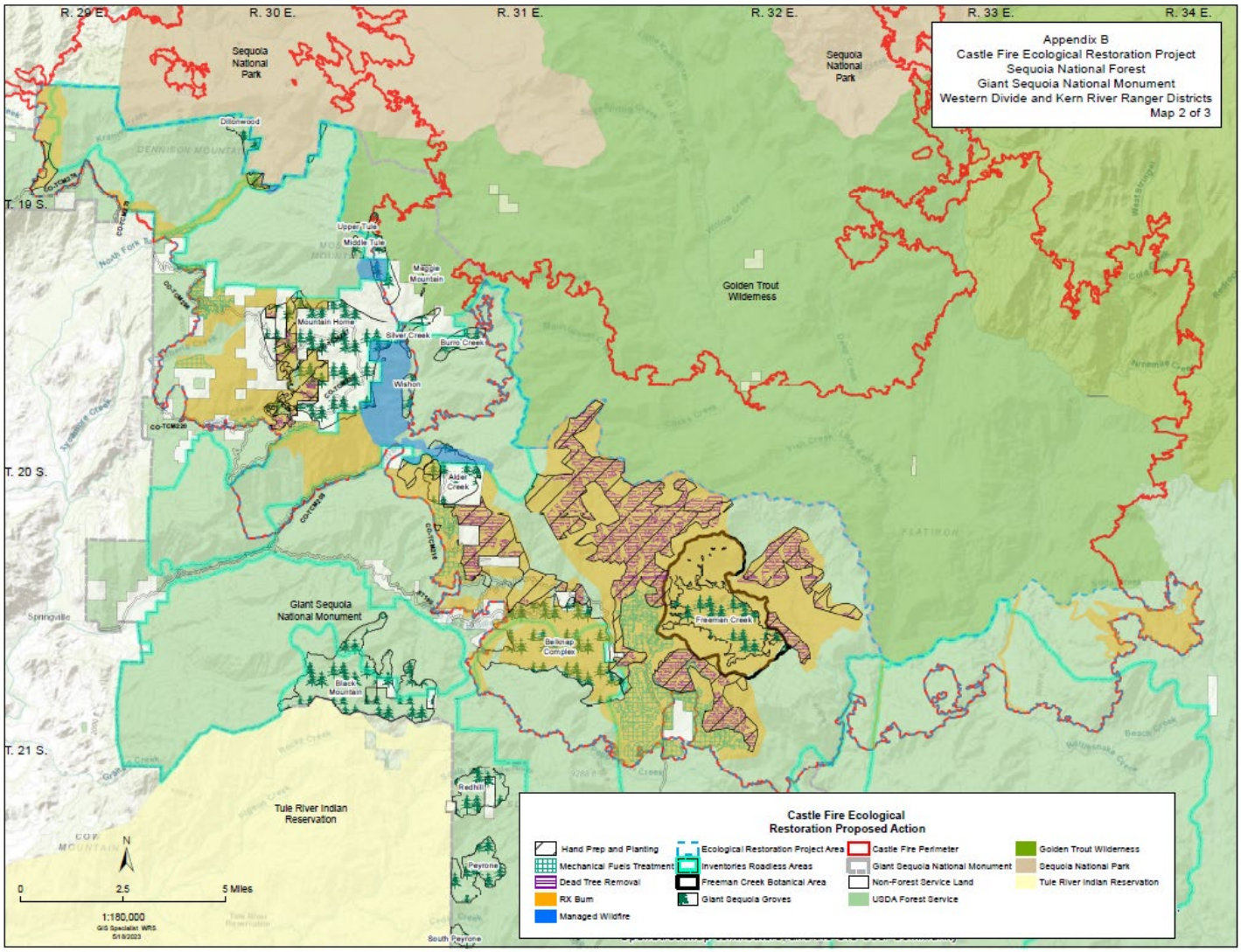
A decision tree evaluation was used to determine which methods of forest restoration and maintenance should apply at different locations (Monument Plan page 83). The following table evaluates the four considerations and how they were evaluated. The actions for this ecological restoration project are consistent with the Monument Plan.

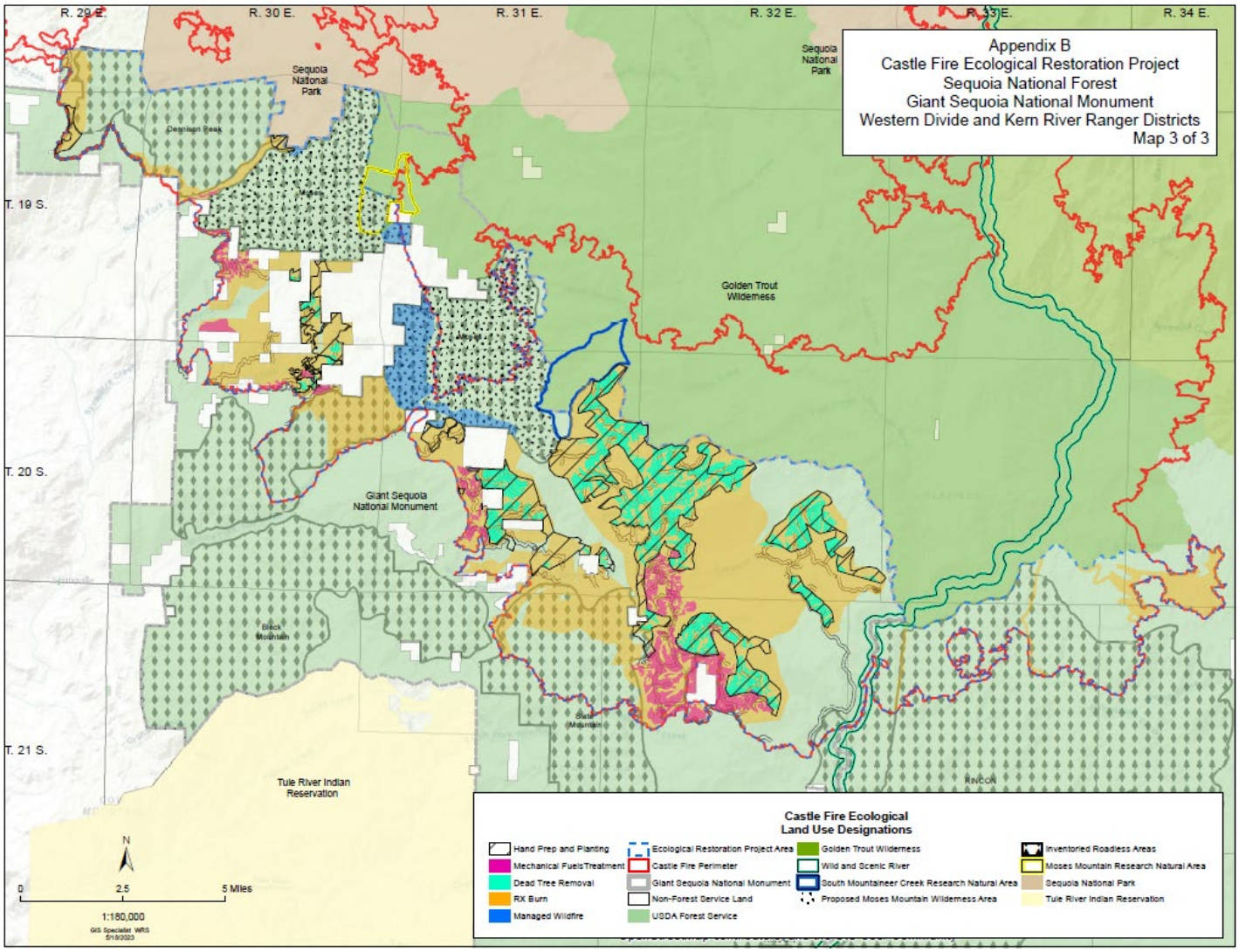
Table 3: Decision Tree Evaluation for the Castle Fire Ecological Restoration Project

Decision Point	Evaluation Related to Project
1 – Use of Managed Wildfire	Managed wildfire is not feasible for eliminating the dead trees because of the uncertainty of when a wildfire may occur in this specific area. The increasing fuel loads across this landscape make use of wildfire infeasible as it is highly likely to be a broad-scale, high intensity event that would not meet the purpose and need.
2 – Use of Prescribed Burning	Prescribed burning is feasible in portions of the project area where the fuel loading is low to moderate and control lines can be established at a reasonable cost, but it does not fully meet the purpose and need. Burning is not feasible where the fuels are or are becoming high, such as in the pine plantations, or dense stands of live and dead trees and shrub species where fire behavior would be high intensity and resistant to control. Portions of the project area would need mastication or tree felling and removal before burning is feasible such as adjacent to private properties (cabins, etc.).
3 – Use of Mechanical Treatment without Tree Removal	Mechanical treatment without tree removal does not meet the purpose and need for the project area. The dead conifers would continue to fall, and shrubs are expected to grow rapidly in the more open stands and high and moderate severity burned areas. Leaving all the down trees, whether felled or naturally fallen, increases the fuel load across the landscape and increases the surface fuel to a level incompatible with historic fire return intervals, resulting in the probability of high severity burn.
4 – Use of Mechanical Treatments with Tree Removal	As explained in Table 2, it is necessary to remove trees to meet the purpose and need for Resiliency, Regeneration, Heterogeneity, and Public Safety. Removal would be a combination of burning in place, reducing to chips, and hauling off the Monument. Also, material may continue to be cut and stacked for the public to take as firewood.

Appendix B - Project Maps




Appendix B
Castle Fire Ecological Restoration Project
Sequoia National Forest
Giant Sequoia National Monument
Western Divide and Kern River Ranger Districts
Map 2 of 3
R. 29 E.
R. 30 E.
R. 31 E.
R. 32 E.
R. 33 E.
R. 34 E.
T. 19 S.
T. 20 S.
T. 21 S.
Sequoia National Park
Golden Trout Wilderness
Giant Sequoia National Monument
Tule River Indian Reservation
Springville
Dillonwood
Upper Tule
Middle Tule
Maggie Mountain
Mountain Home
Silver Creek
Burro Creek
Wishon
Alder Creek
Freeman Creek
Bellnap Complex
Black Mountain
Redhill
Peyrone
South Peyrone
0
2.5
5 Miles
1:180,000
Castle Fire Ecological
Restoration Proposed Action
Hand Prep and Planting
Mechanical Fuels Treatment
Dead Tree Removal
RX Burn
Managed Wildfire
Ecological Restoration Project Area
Inventories Roadless Areas
Freeman Creek Botanical Area
Giant Sequoia Groves
Castle Fire Perimeter
Giant Sequoia National Monument
Non-Forest Service Land
USDA Forest Service
Golden Trout Wilderness
Sequoia National Park
Tule River Indian Reservation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Giant Sequoia National Monument
Western Divide and Kern River Ranger Districts
Map 3 of 3
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R. 30 E.
R. 31 E.
R. 32 E.
R. 33 E.
R. 34 E.
T. 19 S.
T. 20 S.
T. 21 S.
Sequoia National Park
Golden Trout Wilderness
Giant Sequoia National Monument
Tule River Indian Reservation
Castle Fire Ecological Land Use Designations
Hand Prep and Planting
Mechanical FuelsTreatment
Dead Tree Removal
RX Burn
Managed Wildfire
Ecological Restoration Project Area
Castle Fire Perimeter
Giant Sequoia National Monument
Non-Forest Service Land
USDA Forest Service
Golden Trout Wilderness
Wild and Scenic River
South Mountaineer Creek Research Natural Area
Proposed Moses Mountain Wilderness Area
Inventoried Roadless Areas
Moses Mountain Research Natural Area
Sequoia National Park
Tule River Indian Reservation
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1:180,000

Appendix C - Management Requirements and Project Design Features

Applicable Forest Plan and Monument Plan standards and guidelines, national core and state best management practices (BMPs), standard operating procedures (SOPs), and project-specific measures would be implemented as part of the proposed action. BMPs are those methods found to be the most effective and practical in meeting objectives (e.g., minimizing erosion). BMPs are not one-size-fits-all, can be an effective adaptive-management tool, and are therefore not listed here. SOPs are practices carried out regularly based on law, regulation, policy, and planning documents. SOPs describe workflow processes and roles and responsibilities for project implementation. Standards and Guidelines from the Monument Plan and Forest Plan are incorporated into the proposed action to ensure land management plan compliance and are identified with (Monument Plan or Forest Plan) respectively. Conservation measures identified in the Fish and Wildlife Service Programmatic Biological Opinion on Nine Forest Programs in the Sierra Nevada of California for the Endangered Sierra Nevada Yellow-legged Frog, Endangered Northern Distinct Population Segment of the Mountain Yellow-legged Frog and Threatened Yosemite Toad would be followed. Project-specific measures to avoid or minimize potential impacts resulting from the Castle Fire Ecological Restoration project proposed activities are included in Table C - 1. Project-specific design features. Standard Operating Procedures are included in Table C - 2.

All Project-specific design features would be implemented under the Proposed Action.

Table C - 1. Project-specific design features

Measure	Description
Air	
AR-1	To maintain air quality, fire managers would cooperate with Federal, State, and local regulatory agencies to protect air quality as required by the Clean Air Act and state and local rules. Prescribed burning would comply with the San Joaquin Valley Unified Air Pollution Control District, Rule 4106, Prescribed Burning and Hazard Reduction Burning (2001), and other applicable rules. Burning would only be initiated on “burn days” designated by the Air Pollution Control District when satisfactory wind dispersion conditions prevail.
Aquatic Wildlife	
AW-1	When working within mapped or potential habitat, inspection of the work site would take place to locate any sensitive species individuals that have moved into the area. If individuals (dead or alive) are located in the project area, activities would be temporarily halted until the individual(s) can be moved to a safe location. Notify the district aquatic biologist of any sightings as soon as practical. Personnel shall avoid injuring, harassing, or harming sensitive species.
AW-2	Trees would be felled in a way that minimizes dispersal barriers to riparian and aquatic species, especially if they are left on site.
AW-3	Slash or brush piles shall be located outside of habitats occupied by aquatic threatened, endangered, or sensitive species unless approved by a qualified biologist.
AW-4	If any materials (e.g., slash, brush piles) are left on site, they would be placed so they do not create a dispersal barrier to any aquatic threatened, endangered, or sensitive species. To further minimize dispersal barriers or the covering of burrows or overwintering habitat, minimize lop and scatter of felled materials. No chipping or mastication would occur within occupied habitats.
AW-5	The storage of heavy mechanical equipment would occur outside of habitats occupied by aquatic threatened, endangered, and sensitive species unless specific locations are authorized by a qualified biologist.
AW-6	Do not store equipment fuels, hydraulic fluid, oils, fire ignition fuels, and other toxic materials within habitats occupied by aquatic threatened, endangered, and sensitive species unless specific locations are authorized by a qualified biologist.
AW-7	All operations would cease for at least 48 hours after measurable rainfall occurs (more than 0.1 inch) to allow for dispersal across occupied and suitable terrestrial habitats.

AW-8	In habitat occupied by an aquatic sensitive, threatened or endangered species, streams would only be crossed by motorized vehicles or equipment at existing roads with culverts or other approved temporary bridges or protective crossing device, perpendicular to the stream.
AW-9	Outside of the GSNM, apply Riparian Conservation Objective widths of consideration by stream type as stated (SNFPA FSEIS ROD (USDA 2004), Appendix A, page 62). Implement appropriate mechanical free zone as stated in Sequoia National Forest Riparian Standards and Guidelines for perennial and intermittent creeks.
AW-10	Skidding or end-lining would not occur within SMZ / AMZs of occupied habitats unless coordinated with the aquatic biologist. At a minimum, no skidding within 50 feet of streams or meadows.
AW-11	If management activities are proposed in a CAR or RCA, site-specific mitigation measures would be designed to (1) minimize risk of sediment entry into aquatic systems and (2) minimize impacts to habitat for aquatic- and riparian-dependent species.
AW-12	A limited operating period may be established to ensure that negative impacts to Mountain yellow-legged frog (breeding period April to July in suitable habitat) may be avoided; contact provisions can also be used to close down operations during adverse operating condition.
AW-13	Due to toxicity to fish, ester formulations of herbicides (i.e., triclopyr ester (Garlon 4)) are prohibited from use in streamside or wetland areas where fisheries and aquatic dependent (tadpoles) amphibian life stages occur.
AW-14	Ground application of herbicide would not occur within 50 feet of a water body. If adult Foothill yellow-legged frog, California red-legged frog, California Tiger Salamander are identified, limit pesticide applications to cases where project-level analysis indicates that pesticide applications are consistent with RCOs. Within 50 feet of known occupied sites for the California red-legged frog, foothill yellow-legged frog, California Tiger Salamander or Yosemite Toad or mountain yellow-legged frog, design pesticide applications to avoid adverse effects to individuals and their habitats.
Terrestrial Wildlife	
WL-1	Prior to project implementation, the District or Forest Biologist would review existing information about sensitive species and habitat, and whether surveys are necessary in the specific areas planned for activity. Appropriate avoidance, timing restrictions, or other design elements would be recommended at that time.
WL-2	The LOP may be waived, where necessary, to allow for early season prescribed burning in up to 5 percent of the California spotted owl PACs on a national forest per year.
WL-3	Within tree removal areas, an average of 4 large snags (over 12 inches dbh where available) per acre would be retained on site for wildlife habitat. Snags would be retained in patches or clumps with an average of at least 4 of the largest snags per acre averaged within treatment units for wildlife resources. Snag retention patches or clumps would include live trees where possible. Snags would not be retained if they pose a safety hazard (Monument Plan).
WL-4	Ten (10) to 20 tons per acre of large down logs (12 inches diameter and larger) would be retained on site for wildlife habitat (Monument Plan).
WL-5	Prior to project implementation in suitable California spotted owl habitat with unknown occupancy, surveys would be conducted in accordance with Pacific Southwest Region survey protocol. Designate California spotted owl protected activity centers (PACs) where appropriate based on survey results (Monument Plan).
WL-6	Maintain a limited operating period (LOP), prohibiting activities within approximately ¼ miles of active California spotted owl nests during the breeding season (March 1 through August 15).
WL-7	Home range core areas (HRCAs) would be established surrounding each territorial California spotted owl activity center detected after 1986. Home range core area size is 600 acres on the Sequoia National Forest (Monument Plan).
WL-8	Prior to undertaking vegetation treatments in suitable northern goshawk nesting habitat that is not within an existing California spotted owl or northern goshawk PACs, surveys would be conducted using Pacific Southwest Region survey protocols. Suitable northern goshawk nesting habitat is defined as follows: stands with an average tree size of 11 inches dbh or greater and at least 40 percent canopy cover (Monument Plan).
WL-9	Maintain a limited operating period (LOP), prohibiting activities within approximately ¼ miles of active northern goshawk nests during the breeding season (February 15 through September 15). The LOP does not apply to existing road and trail use. The LOP may be waived, where necessary, to allow

	for early season prescribed burning in up to five percent of the northern goshawk PACs in on a national forest per year.
WL-10	In California spotted owl and northern goshawk PACs, and California spotted owl HRCAs located outside the defense zone of the wildland urban intermix zone: 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 that have an average flame length of 4 feet or less. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1- to 2-acre area surrounding known nest trees, as needed, to protect nest trees and trees in their immediate vicinity (Monument Plan).
WL-11	In California spotted owl and northern goshawk PACs located inside the defense zone of the wildland urban intermix zone: Prohibit mechanical treatments within a 500-foot radius buffer around the California spotted owl activity center or northern goshawk nest tree. Allow prescribed burning within the 500-foot radius buffer. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1- to 2-acre area surrounding known nest trees, as needed, to protect nest trees and trees in their immediate vicinity. The remaining area of the PAC may be mechanically treated to achieve the fuels reduction outcomes described for the General Monument land allocation (Monument Plan).
WL-12	Great Gray Owl surveys would be conducted if reliable sightings are reported. If a great gray owl nest is found, a PAC would be delineated and LOPs would be followed according to the Monument Plan.
WL-13	Manage California condor habitat following the most current USWS California Condor Recovery Plan. Protect roosting and potential nesting sites.
WL-14	Manage wetlands and meadow habitat for willow flycatchers and other species following the standards and guidelines from the 1988 Forest Plan, as modified by the 1990 MSA, the 2004 SNFPA and Monument Plan.
WL-15	If an eagle nest occurs within or adjacent to a proposed action area, activities would be restricted to comply with the Bald and Golden Eagle Protection Act (US Code, 1940), including avoidance buffers and timing restrictions.
WL-16	Upon detection (photograph, track plate, or sighting verified by a wildlife biologist) of a wolverine or Sierra Nevada red fox, conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. For a 2-year period following the detection, restrict activities that are determined in the analysis to have an adverse effect from January 1 to June 30 (Monument Plan).
WL-17	Habitat fragmentation affecting old forest associated species (particularly fisher and marten) would be assessed prior to implementation, with mitigations to provide shrub cover in the short-term and mature forest in the long-term. In particular, address bottlenecks in habitat connectivity that burned such as riparian areas, ridgetop saddles, and canyons (Monument Plan). Consider identifying and managing some areas to serve as short-term corridors between existing habitat patches. Manage conifer restoration or reforestation on other areas to recover lost mature forest habitat: *For short-term corridors that facilitate fisher movement across disturbed areas:* a. Look for areas that can provide 40 to 60 percent total canopy (understory and overstory) b. Consider managing shrub patches and leaving down logs to create corridors to allow movement between stepping-stone patches such as unburned patches. c. Consider leaving untreated areas greater than 100 yards wide where shrubs can grow, and snags can naturally fall to create complex cover to support fisher movement and hiding.
WL-18	In areas containing potential fisher denning habitat, LOPs would be maintained for mechanical activities (thinning, biomass removal, mechanical piling) from March 1 through June 30.
WL-19	A limited operating period of March 1-May 1 applies for prescribed fire in fisher denning habitat (overlaps with fisher LOP discussed in Programmatic Biological Assessment). The limited operating period after May 1 is waived to allow for a broader burn window in these PACs.
Botany	

BT-1	If new occurrences of any threatened, endangered, proposed, candidate, or sensitive species (terrestrial, aquatic, or botanical) are found during project implementation, project actions must stop immediately, and the appropriate Forest Service biologists/botanists should be contacted as soon as possible to advise on how to implement the species protection measures. Additional Endangered Species Act consultation may need to be conducted prior to continuing work.
BT-2	Field surveys for TESP plants would be conducted: 1) in project treatment units where suitable habitat could be impacted and 2) prior to project implementation. Surveys would be conducted according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11).
BT-3	Known *Clarkia springvillensis* occurrences would be flagged and avoided by a minimum 50-foot buffer for all project activities. Potentially suitable habitat would be surveyed before project implementation to ensure no impacts to this species.
BT-4	Known occurrences of sensitive plant species would be flagged and avoided for project activities by a minimum 25-foot buffer. Trees would be felled directionally away from known sites. Prior to implementation the project botanist would be consulted to determine if broadcast burning would be allowable through specific occurrences (e.g., disturbance-tolerant, fire-adapted) during non-flowering times.
BT-5	Fens would be surveyed for, if potential exists for unknown fen sites, in proposed treatment units prior to implementation and mapped for avoidance. Criteria for defining fens include, but are not limited to, presence of sphagnum moss (*Sphagnum* spp.), presence of mosses in the genus *Meesia*, or presence of sundew (*Drosera* spp.).
BT-6	Meadow features, including fens, would be protected by the following features to the maximum extent possible. If an implementation need arises where one or more of the following features cannot be followed, the project botanist would be contacted, and a specific measure would be implemented to reduce adverse impacts: e. Pilling and pile burning would not occur within meadows, or within 100 feet of meadows, however broadcast burning would be allowed to back into features where needed. f. Fell trees away from meadows to the further extent possible. g. No skid trails or ground-based mechanical equipment in meadows.
BT-7	When possible, where roads intersect meadows, strive to maintain vegetation to provide visual cover between meadows from the road.
BT-8	Any sites planned for use of water drafting must be reviewed by the project botanist before use to develop measures for avoiding damage to plants (e.g., botanical survey, flag and avoid, etc.).
BT-9	Consult with a botanist prior to implementation of work within the Freeman Creek botanical area. Treatments would be designed to align with the strategies outlined in the Monument Plan.
BT-10	When applying herbicides within 50 feet of sensitive and TESP plants, spot treat via hand-held wands, backpack sprayers, wick, etc. using an herbicide that does not persist in the soil and protect sensitive and TESP plants from herbicide drift; for example, cover plant with plastic when spraying herbicide or use a wick applicator.
NNIS-1	All equipment and vehicles used for project implementation must be free of soil (as much as possible) and invasive plant material before moving into the project area and/or leaving known infested areas. Equipment would be considered clean when visual inspection does not reveal soil, seeds, plant material or other such debris. Cleaning shall occur at a vehicle washing station or cleaning facility before the equipment and vehicles enter the project area.
NNIS-2	Locally (specific on-site) collected materials are preferred to the greatest extent possible for seeding, mulch, and straw. For imported materials, only certified weed-free erosion control materials would be used, and only to the minimum extent needed to stabilize bare soil. A certificate from the county of origin stating the material was inspected is required.
NNIS-3	On-site sand, gravel, or rock would be used where possible to reduce the likelihood of weed introduction.
NNIS-4	Conduct follow-up inspections of ground-disturbing activities for a minimum of 2 years.
NNIS-5	High priority invasive plant sites in the project area (including but not limited to Italian plumeless thistle, yellow star-thistle, bull thistle, Maltese star-thistle, and any weeds near high value habitat (e.g., TESP habitat, sequoia groves, and SMZs) would be flagged prior to implementation and would

	be avoided for ground-disturbing activities (e.g., ground-based mechanical equipment, piling, pile burning, skidding) as much as possible. Avoidance areas maps would be created and distributed to contractors prior to implementation of activities. Noxious weeds inside of reforestation units would be treated manually, mechanically, or chemically. Noxious weeds outside of reforestation units would be treated using manual or mechanical means as needed based on a case-by-case evaluation. If ground-disturbing activities within the infestation cannot be avoided, the project botanist would be contacted to implement a plan for minimization such as pre-treatment of occurrence, only hand work (e.g., hand felling, hand removal of materials) allowed work in an infested area allowed followed by equipment washing before moving out of infested zone, etc.
NNIS-6	If a previously unknown/unmapped invasive plant occurrence is found in a project unit during implementation, the occurrence should be flagged for avoidance (minimum 150-foot buffer) until the project botanist is consulted and the appropriate measures are identified.
Heritage	
CR-1	If any unrecorded cultural resources (artifacts, features, or sites, including areas of traditional use, concern, or significance for the local Native Americans) are encountered because of project operations, all activities in the vicinity of such finds would immediately cease pending an examination by the Forest or District Archaeologist. The heritage resources would be recorded, clearly delineated, and protected.
CR-2	Adequate cultural resource surveys, either intensive or non-intensive in accordance with Stipulation 7.4c of the PA, would be completed prior to the onset of project activities to ensure that any potentially at-risk cultural resources are not harmed. In areas where vegetation is too dense to perform cultural resource surveys prior to the onset of project activities, adequate surveys would be performed after fuels reduction project activities in accordance with Appendix H of the Programmatic Agreement.
CR-3	All proposed activities, facilities, improvements, and disturbances shall avoid all National Register of Historic Places eligible or unevaluated cultural resource sites. “Avoidance” means that no activities associated with the project that may affect heritage resource sites would occur within a site’s boundaries, including any defined buffer zones. Portions of the project may need to be modified, redesigned, or eliminated to properly avoid heritage resource sites. In areas where avoidance is not a reasonable option, the site would be protected by any other means necessary to preserve the integrity of the site.
CR-4	All heritage resource sites within the area of potential effect would be clearly delineated in planning documents prior to implementing any associated activities that have the potential to affect heritage resource sites. Planning documents would not be made public and would only be accessible to those who need them for site protection. Buffer zones may be established to ensure added protection where the Forest or District archaeologist determines that they are necessary. The use of buffer zones in conjunction with other avoidance measures are particularly applicable where setting contributes to the property's eligibility under 36 CFR 60.4, or where it may be an important attribute of some types of heritage resource sites (e.g., historic buildings or structures; historic or heritage properties important to Native Americans). The size of buffer zones needs to be determined by the Forest or District archaeologist on a case-by-case basis.
CR-5	When any changes in proposed activities are necessary to avoid heritage resource sites (e.g., project modifications), these changes would be completed prior to initiating any activities.
CR-6	Monitoring during project implementation, in conjunction with other measures, may be used to enhance the effectiveness of protection measures.
CR-7	The Forest or District Archaeologist may approve the use of mechanical equipment to remove brush or woody material from within specifically identified areas within site boundaries under prescribed measures designed to prevent or minimize effects. Vegetative or other protective padding may be used in conjunction with the Forest or District Archeologist authorization of certain equipment types within site boundaries.
CR-8	Upon approval of the Forest or District Archaeologist, existing breaches within linear sites may be designated on the ground and reused for project activities.

CR-9	Roads and trails that currently overlie historic linear sites may continue to be used as transportation routes without notification. However, if there are activities that would change the morphology of the existing road or trail (that is overlaying a historic linear site), these activities need to be reviewed by the Forest or District Archaeologist.
CR-10	Roads proposed to be decommissioned that extend through archaeological sites would need to be blocked instead of sub-soiled.
Transportation	
TR-1	Treatment units that have an existing road/landing infrastructure established in past projects would be used to minimize the need for construction of temporary routes.
TR-2	Skid trails and landings or disposal sites would be stabilized and closed at the end of project treatments.
TR-3	BMPs would be used to avoid, minimize, or mitigate adverse effects to soil, water quality, and in-stream resources that may result from road management activities.
TR-4	Locate, design, construct, and maintain permanent and temporary roads, parking, landings, staging areas and water crossings to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
TR-5	Avoid or minimize erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities; Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials.
TR-6	Existing roads and landings would be used wherever possible. No new permanent system roads would be constructed for this project. Roads would be maintained and graded as necessary to allow log truck and equipment access using minimum disturbance methods and minimum clearing widths. Road maintenance would include brushing, out-sloping roads, and clearing culverts and ditches as needed.
TR-7	All skid trail construction, decommissioning of non-system roads, and road re-conditioning would be conducted during appropriate periods of weather and soil moisture to protect water quality and avoid adverse effects.
TR-8	Existing non-system roads in the project area may be used for access only. These non-system roads are considered temporary and, if used for hauling, would be rehabilitated following project activities.
TR-9	Store closed roads not needed for at least 1 year (Intermittent Stored Service) and decommission unneeded roads in a hydrologically stable manner to eliminate hydrologic connectivity, restore natural flow patterns, and minimize soil erosion.
Public Health and Safety	
SA-1	Herbicides would be used in accordance with U.S. Environmental Protection Agency (EPA) label instructions and restrictions. Label restrictions on herbicides are developed to mitigate, reduce, or eliminate potential risks to humans and the environment. Label information and requirements include personal protective equipment, user safety, first aid, environmental hazards, directions for use, storage and disposal, general information, mixing and application methods, approved uses, weeds controlled, and application rates. It is a violation of federal law to use an herbicide in a manner inconsistent with its labeling.
SA-2	Adhere to all guidelines and protection measures in the Forest Service Manual 2150, Pesticide Use Management and Coordination, and in the Forest Service Handbook 2109.14, Pesticide Use Management and Coordination Handbook.
SA-3	Applicators or operators must wear all required protective gear listed on the label of the herbicide they are using (FSH 6709.11).
SA-4	Application would be conducted or supervised by licensed applicators or trained technicians, as required by law.
SA-5	Prior to the start of application, all spray equipment would be calibrated to ensure the accuracy of delivered amounts of pesticide. Spray nozzles would be required that produce a relatively large droplet. A low nozzle pressure (15 psi) would be required. Spray nozzles would be kept within a vertical distance of 24 inches of vegetation being sprayed. A pressure gauge or a pressure regulator would be required on backpack sprayers. Periodically during application, equipment would be rechecked for calibration.

SA-6	Operators would calibrate spray equipment at regular intervals to ensure proper rates of herbicide applications.
SA-7	The local herbicide coordinator would maintain daily records of herbicide use, including temperature, wind speed and direction, herbicide and formulation uses, quantity of herbicide and diluting agents applied, location and method of application, acreage, and persons applying herbicides.
SA-8	Procedures for mixing, loading, and disposal of pesticides and a spill plan would be followed (Label and FSH 2109.14, 43). All herbicide storage, mixing, and post-application equipment cleaning is completed in such a manner as to prevent the potential contamination of any perennial or intermittent waterway, unprotected ephemeral waterway, or wetland. Herbicide applicators shall carry spill containment equipment and be familiar with and carry an herbicide emergency spill plan
SA-9	Areas commonly used by the public would be posted for a minimum of 72 hours following herbicide applications. This includes developed and dispersed recreation areas, recreation special use areas, trailheads, parking areas, and forest products gathering areas determined by the tribes, as well as administrative sites.
SA-10	Use indicator dye for herbicide applications to reduce the chance of the public entering treated areas.
SA-11	Triclopyr BEE application would not occur in temperatures that exceed 80 degrees Fahrenheit.
SA-12	Application would occur only when wind speeds are less than 6 mph (or per label instruction). Spray drift is largely a function of droplet particle size, release height, air temperature and wind speed. Incorporate these factors into project design to reduce the risk of drift.
SA-13	Herbicide application would be restricted to ground-based application. Backpack sprayers without a boom would be used to apply spray in sweeping motions. With the method proposed, the herbicide is released through a handheld wand with a trigger that is controlled by the applicator. This allows the applicator to apply the herbicide over the target plant by moving their arm in a motion that covers the plant then to release the trigger stopping spray emission before moving on to the next target plant. The spray would be applied directly to targeted plants. Spraying would be stopped when moving between plants.
Range	
RG-1	Range improvements would be identified and protected in project specific decisions, contracts, burn plans or other implementation documentation. Unavoidable or inadvertent damage to range improvements through mechanical treatments or the use of prescribed fire would be replaced by the contractor or Forest Service.
RG-2	If possible, design mechanical and prescribed fire treatments to occur during allotment grazing rest periods.
RG-3	Permittees would be given notification prior to implementation of prescribed fire, log truck/equipment hauling schedules, and mechanical treatments to avoid potential conflicts with grazing schedules, cattle drives, and to address other concerns.
RG-4	Post-fire livestock grazing may be excluded from high severity burn and treatment areas if determined necessary for resource protection. This would be done in an appealable decision document by a line officer, in consultation with a Rangeland Management Specialist and other inter disciplinary team members. Methods of grazing exclusion and the responsibilities for construction and maintenance of infrastructure to facilitate exclusion, if necessary, would be addressed in the decision document using adaptive management techniques.
RG-5	Livestock and Forest Service trails used for distributing or gathering livestock would be identified and cleared within 10 working days if blocked by treatment activities, unless there is prior agreement in place.
RG-6	If hazard trees or other fuels are treated with a lop and scatter method, trees would be bucked and moved to maintain access for livestock to get off roads and access forage (primarily meadows) and water. A maximum of 100 feet between access and egress points would be established for livestock.
Recreation	
RE-1	Trail tread would be protected on all system trails. Trail tread affected by project implementation would be repaired to Standard Specifications for Construction and Maintenance of Trails EM-7720-103, (USDAFS 1996), prior to operations.
RE-2	Protect trail from increased runoff caused by uphill activities.

	If trails intersect high-severity burn areas there would be functioning drainage per Forest Service trail specifications and Trail Management Objective prescriptions prior to the rainy season or first snow whichever is first.
RE-3	National Forest System roads and trails throughout the project area would be kept open for public access during project implementation within the limits of safety and operability (e.g., prescribed burn closures). If closures are necessary, the public would be notified via notices posted at key locations adjacent to and within the project area, online, through news releases, and/or social media as appropriate.
RE-4	Provide public notifications of treatment implementation timeframes, areas closures, locations of herbicide use, prescribed fire, and haul routes.
RE-5	Hauling would be prohibited on major holidays or weekends.
RE-7	Coordinate treatment timing to minimize conflicts with recreation use.
RE-8	To the extent possible use of developed, dispersed recreation sites or trailheads should be avoided. If used, a plan for rehabilitation would be made, this may include such things as removing debris, re-contouring disturbed areas, seeding, weed treatment, and resurfacing parking areas.
RE-9	Minimize overlaying skid trails/haul roads on non-motorized system trails. If trails are used as skid trails/haul roads, trail cleanup/rehabilitation would be included in the contract.
RE-10	Temporary road and/or skid trail crossings across designated forest trails and roads would be kept to a minimum. Any crossings would be perpendicular to designated forest trails and roads. To reduce the potential for establishment of user created routes, rehabilitation must be completed in a timely manner to ensure the public does not begin using them for motorized or non-motorized recreation. The rehabilitation plan should include returning to natural contour, scarification, seeding with native mix and installing natural barriers.
RE-11	Trail width should not be increased. Changes to trail alignment and surfacing would be minimized; the trail would not be straightened, or its surface changed with an alternate material unless such actions are needed to enhance the trail and protect resources.
RE-12	Character trees and trees that define the trail corridor should be retained wherever feasible.
RE-13	Warning signs would be placed on all access points and along trails and roads where activities are occurring.
RE-14	The public would be notified about upcoming herbicide treatments via the Forest Service website, fliers, individual notifications, or posting signs. Signs regarding herbicide use would be placed at treatment areas and access points prior to initiating treatment. Signs would list herbicides to be used, effective dates, and name and phone number of Forest contact.
RE-15	Herbicide treatments at special use sites, developed recreation sites, and areas of concentrated public use would avoid holidays and high used periods. Recreation Manager and permittees would be notified prior to treatments so that treatments can be scheduled to minimize conflicts.
Soils	
SO-1	Reuse existing landings and skid trails wherever possible.
SO-2	Pivoting of machinery should be avoided in order to prevent soil displacement in high severity burn areas.
SO-3	Placement of landings, skid trails and temporary roads should avoid, where possible, high soil burn severity areas within units.
SO-4	All temporary roads would be scarified and rehabilitated. Cut/fill slopes and crossings would be reshaped to natural contours. Available slash and large wood material (>3 inches) would be applied to the recontour surface (slash is considered "available" where the equipment can reach it from the working area where the rehabilitation is occurring).
SO-5	Limit total soil detrimental disturbance (compaction, displacement, and total porosity loss) to less than 15 percent of the management activity area. Temporary roads, landings and skid trails would be considered part of the activity area.
SO-6	Limit all mechanical operations to slopes less than 35 percent and to within ¼ of roads. Limit all mechanical operations to slopes less than 25 percent on soil map units 665 and 700 (reference map and shapefile for these areas in the project record). Minimize soil displacement and reduce the risk

	of soil erosion by smoothing or water barring ruts or trenches exceeding 6 inches in depth and 25 feet in length on slopes greater than 35 percent.
SO-7	Soil cover needs to be maintained at an average accumulation of 50 percent on slopes less than 35 percent to minimize soil erosion and uphold surface organic matter accumulation (soil cover components include the 1 to 100-hour fuels with some 1,000-hour fuels up to 10-inch diameter). Within treated areas on slopes greater than 35 percent and on soils with High soil burn severity and moderate to high erosion hazard ratings (Unit TR 30; reference map and shapefile for these areas in the project record), 70 percent soil cover needs to be maintained. This applies to fuels reduction areas as well as tree removal areas. Where shrub species predominate, attempt crushing prior to piling to create small woody fragments left scattered over the site for soil cover and erosion protection (USDA 2012b). • Soil cover includes organic surface materials, living vegetation less than 3 feet tall (grasses, forbs and low growing shrubs), surface rock fragments larger than ¾ inch or where needed applied mulches (USDA, 2012b); • In special areas such as fuel breaks and defense zones, immediate post-treatment soil cover levels less than 50 percent would be allowed as long as the site conditions and actual cover level would prevent erosion.
SO-9	Within treatment areas that are whole tree yarded, backhaul slash onto skid trails for soil cover and surface stabilization.
SO-10	After mechanical treatments, grapple pile, crush, and/or lop and scatter on slopes greater than 25 percent while still maintaining fuels objectives, generated materials left behind would help achieve or maintain recommended soil cover.
SO-11	Limit mechanical treatments to periods of low soil moisture, this is especially important in Soil Map Unit 681.
SO-12	Prescribed burning (ex. pile burning and/or under burning) would occur only during periods of higher soil moisture to protect soil productivity.
SO-13	Do not grind masticated material into the soil.
SO-14	Remove from the site, or pile and burn, masticated wood chips over four inches deep.
SO-15	Potentially sensitive soils and wet areas (aka wetness model outputs; see Hydro report for more information) would be ground verified prior to implementation to determine site suitability for heavy equipment (areas can be eliminated from ground truthing if mapped with >35 percent slope)
Water Resources	
WR-1	No endlining of trees near rock outcrops or on steeper slopes where surface gouges or trenches form water bar soil displacements if they exceed 6 inches in depth and 25 feet in length. Lop and scatter fuels below rock outcrops that have the potential to generate runoff into management activity areas and cause erosion, loping and scattering fuels within these areas would maximize soil cover and surface organic matter retention (USDA, 2012b).
WR-2	In areas where sustained slopes exceed 35 percent, limit mechanical operations such as skidding, tractor piling, grapple piling, and mechanized tree felling except where supported by on-the-ground evaluation by an interdisciplinary team that includes a watershed specialist. (BMP Veg-2 (USDA 2012b))
WR-3	The following design features would apply to prescribed burning activities in the RCA: • Fire lines would not be constructed within RCAs. • There would be no direct lighting of riparian vegetation but backing fires would be allowed to burn into the riparian vegetation (SNFPA ROD Standard and Guide #111). The parts of the Riparian Conservation Areas that have non-riparian vegetation can be directly fired. • The target burn severity within the RCA is low burn severity. Patches of moderate-high severity burn may occur incidentally but should be contained to less than 20 percent moderate and less than 10 percent high severity burn. • A minimum average of 50 percent groundcover would be maintained within the RCAs.
WR-4	No skidding and other mechanized heavy equipment access routes down ephemeral draws. Designated skid routes must be perpendicular to the draw. Jackpot piles would be kept at least 50 feet from ephemeral draws. Skid trails in ephemeral draws within areas of sustained high and

	moderate soil burn severity and greater than 25 percent slope would also receive slash or other erosion control as described in WR-5.
WR-5	Treatment units, adjacent to non-functioning SMZ's would require additional mitigation measures to prevent a CWE response. These measures include: • Any skid trail that is within 25-feet (or less) of an SMZ should have: ▪ Decreased waterbar spacing to one-half of the normal BMP specification. For example, if the normal waterbar spacing (based on soil and slope conditions,) is 45-feet, it would be reduced to 22.5-feet. Decreased waterbar spacing should be used from the SMZ boundary to a 50-foot distance along the skid trail away from the SMZ boundary or, if the skid trail parallels the SMZ, for the length that the skid trail is within 25-feet of the SMZ. ▪ >90 percent ground cover of slash and/or certified weed-free straw mulch[1] distributed on the skid trail from the SMZ boundary to a 50-foot distance along the skid trail away from the SMZ boundary or, if the skid trail parallels the SMZ, for the length that the skid trail is within 25-feet. ▪ In areas of high soil burn severity (i.e., RAVG mortality of >75 percent) where soil cover is less than 50 percent, waterbar outlets should have slash and/or certified weed-free straw mulch and/or wattles distributed at the outlet for 50-feet downslope to prevent accelerated erosion on the adjacent unprotected hillslopes. ▪ Non-functioning SMZ's in high soil burn severity areas (i.e., <50 percent ground cover) adjacent to treatment units may require supplemental erosion control material such as weed-free straw wattles and/or straw or wood mulch.
WR-6	Project Specific Prescription for Streamside Management Zones; see Table C - 3- SMZ buffer widths (BMP Veg-3 (USDA 2012b)): a. Streamside Management Zones (SMZ) shall be included on Project implementation maps and flagged on the ground. b. Streams, springs, wetlands, and meadows not mapped but discovered on-the-ground during planning, layout, and/or implementation shall receive SMZ buffers as described in Table C - 3 below. c. No mechanized heavy equipment is permitted in SMZs. This applies to all treatment activities. Hand fell trees and leave in place or end-line. d. Avoid piling and burning within SMZs to the extent feasible. e. Hand piles would not be placed in areas that contain riparian vegetation. Limit pile fire spread by placing piles where vegetation is relatively sparse. Felling should be away from the SMZs wherever feasible. f. Maintain, fuel, and stage saws and equipment outside of SMZs. g. Ground cover shall be added where necessary (lopped/chipped material from felled trees) within the SMZs and the large woody debris component shall be maintained. h. No landings, staging areas, and temporary roads are permitted within SMZs unless approved by a qualified hydrologist. i. Stream crossings with heavy equipment would be avoided per compliance with heavy equipment exclusion in the SMZ. However, temporary stream crossings may be permissible on a case-by-case basis if approved by qualified hydrologist and only where the following conditions apply: stream is non-fish-bearing, slopes are less than 25 percent, soil burn severity is low or unburned, temporary crossings are fully rehabilitated, and connecting skid trails within the SMZ would be fully repaired with slash and/or other erosion control as required and approved by qualified hydrologist.
WR-7	Rehabilitation of heavy equipment use (i.e. repair rutting/furrowing) shall occur where needed to prevent concentrated flow or hillside erosion. (BMP Veg-4 (USDA 2012b))
WR-8	Maintain 100 percent soil cover in a 100-foot-wide buffer below rock outcrops that have the potential to generate runoff into management activity areas and cause erosion. (BMP Veg-2

[1] A Forest Service botanist should be consulted prior to the procurement of any straw mulch to ensure that it is weed free.

	(USDA 2012b))
WR-9	Trees are permitted to be hand-felled and end-lined on slopes over 35 percent, but any furrow produced by the end-lining that exceeds 25 feet long x 6" deep shall be recontoured ("filled in") to prevent concentrated flow and hillslope erosion. (BMP Veg-2 (USDA 2012b))
WR-10	No fuel storage shall take place within Riparian Conservation Areas (RCA), which are generally defined as 300 feet from special aquatic features and perennial streams, and 150 feet from seasonally flowing streams, except at designated administrative sites. Refueling would take place in these zones only where there is no other alternative. (BMP Road-10 (USDA 2012b)).
WR-11	Landings and skid trails shall comply with Forest Service management direction including use of existing landings, designation and use of temporary skid trails, and closure using waterbars, etc., to prevent unauthorized use and erosion. (BMP Veg-4 (USDA 2012b))
WR-13	Avoid or minimize the risk of herbicide/pesticide delivery to surface water or groundwater when treating areas near waterbodies (BMP Chem-3, USDA 2012b). Designate adequate exclusion zones or buffers to further minimize adverse impacts from runoff or drift following and during application. In addition, toxic material storage and sprayer re-filling should occur outside of RCAs or at a safe distance from nearby waterbodies.
WR-14	Follow herbicide label restrictions regarding use near functioning potable water sources. Herbicides can have varying setback restrictions near functioning/active potable water intakes. For example, labels of glyphosate products registered for aquatic weed control state, "Do not apply this product in flowing water within 0.5 mile up-stream of active potable water intake".
WR-15	Ground herbicide terrestrial applications would maintain a 50-foot buffer around all water sources/wellheads unless the formulations are approved for "in or near water".
WR-16	Locate vehicle service and fuel areas, chemical storage and use areas, and waste dumps and areas on gentle upland sites. Mix, load, and clean on gentle upland sites. Dispose of chemicals and containers in state-certified disposal areas. (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2)
WR-17	During use periods, inspect chemical transportation, storage, or application equipment for leaks. If leaks occur, report them, and install emergency traps to contain them and clean them up. Refer to FSH 6709.11, chapter 60 for direction on working with hazardous materials. Report chemical spills and take appropriate clean-up action in accordance with applicable state and federal laws, rules and regulations. Contaminated soils and other material shall be removed from NFS lands and disposed of in a manner according to state and federal laws, rules, and regulations (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2).
WR-18	Use only aquatic-labeled chemicals in the water influence zone (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2).
WR-19	Spray only when heavy rain is not expected, per label directions.
WR-20	If spraying towards a waterway, clearly mark the edge beforehand.
WR-21	Carry herbicide only in secure containers. If non-original containers are used, the product must be clearly identified with accompanying label present.
WR-22	Only add surfactants specified on the label to herbicides registered for aquatic use.
WR-23	Mix chemicals and rinse equipment well away from the waterway.
WR-24	The following design features would apply to water drafting activities: • Coordinate all water drafting with the unit hydrologist or fisheries biologist. • Designate drafting sites in locations where vehicle approach and water removal have minimal effects on the stream. • Where overflow may enter the stream, erosion control devices shall be installed. • Water drafting vehicles must carry spill kits including petroleum-absorbent pads. Drafting vehicles would be inspected daily for leaks and repaired when needed to prevent petroleum leaks in the SMZ. • Maintain a minimum flow of 1.5 cfs downstream of all drafting locations. • Drafting pumps must be placed a minimum of 5 feet from the top of the stream bank OR be placed in a spill containment tray. They must have a low entry velocity and be fitted with a 2mm screen.
Vegetation	

VE-1	Utilize the 2011 US Forest Service, Region 5, Forest Health Protection Report # RO-11-01 Marking Guidelines for Fire-Injured Trees in California to assist with identifying trees that are likely to survive fire related injuries.
VE-2	Utilize Borate stump treatments to prevent Heterobasidion root disease (HRD) on stumps of green trees, recent (<18 months) fire mortality, and dead trees with needles outside of Streamside management zones (SMZ) and in the following areas: - >3" diameter stumps within giant Sequoia groves and within 1700' of monarch giant Sequoia trees - >3" diameter stumps within recreation and administrative sites - >14" diameter ponderosa pine and Jeffrey pine stumps within 1700' of known HRD infection - >14" true fir stumps - >14" diameter ponderosa pine and Jeffrey pine stumps within roadside and powerline corridors (not necessary in areas of high severity fire) - >14" stumps within areas low to moderate severity fire
VE-3	Silvicultural treatments require a silvicultural prescription (FSM 2478.3). Silvicultural treatments include planting, thinning, harvest, and most fuels treatments. Additionally, burn plans within a forest vegetation setting are to be reviewed by a certified silviculturist.
VE-4	Consult with Forest Health Protection on suppression activities in the event that bark beetle outbreak related to fire affected trees.
VE-5	Utilize seedlings from the appropriate tree seed zone. Plant an appropriate species mix in order to promote desired conditions and silvicultural objectives of the planting area and vegetation type.
VE-6	All cut conifer stumps (from live and recently dead trees) greater than three inches in diameter (outside bark) within and/or adjacent to developed recreation sites, trailheads, giant sequoia groves, rust resistant sugar pines, private or State land, and other high value areas, and outside SMZs shall be treated with a registered borate compound (*FSM R5 Supplement 2300-92-1 modified by FSH R5 Supplement 3409.11-2010-1*).
VE-7	Follow all applicable label requirements, all Federal and California laws and regulations, and Forest Service policies and direction for application of borate compounds. Only EPA and California-registered fungicides shall be used (currently only Sporax or Cellu-Treat). Basic Forest Service policy and direction on the use of pesticides is found in FSM 2150 Pesticide-Use Management and Coordination as well as in FSH 2109.14 Pesticide-Use Management and Coordination Handbook. There is also a R5 supplement to FSM 2150. There is additional information in FSH 6709.11 Health and Safety Code Handbook. California pesticide regulations are found in the California Code of Regulations Title 3, Division 6 (CCR) and can be found on-line at https://www.cdpr.ca.gov/docs/legbills/calcode/chapter_.htm.
VE-8	Dead Tree Removal activities would not occur in areas of successful regeneration, unless necessary to meet WUI or Fuels Removal objectives. Prior to Dead Tree Removal, regeneration surveys would be conducted to identify if regeneration is successful. The following stocking levels would be applied for the project area. Successful seedling stocking meets the following minimum levels: - Ponderosa/Jeffrey Pine (Site Class 0-3): 200 seedlings per acre - Ponderosa/Jeffrey Pine (Site Class 4-5): 150 seedlings per acre - True Fir: 300 seedlings per acre - Douglas-fir: 225 seedlings per acre - Mixed Conifer: 200 seedlings per acre Areas treated with Dead Tree Removal activities would be followed by artificial regeneration treatments if the post-treatment seedling stocking levels do not meet these minimum levels. Regeneration surveys would be conducted per the standards identified in FSM 2470.
Giant Sequoia Groves	
GS-1	Forest Service timber sale administrator (TSA) or harvest inspector (HI) shall clearly identify areas where heavy equipment operation is authorized within a giant sequoia grove by approving the location of all landings and skid trails prior to construction and use. The TSA or HI shall monitor and assess operator compliance in approved areas within a giant sequoia grove.
GS-2	Heavy equipment should not be operated within ten feet of the drip line (area on the ground below the outermost reaching crown of the tree) (25 feet of the bole) of a live giant sequoia tree greater than twelve inches dbh to avoid damaging root systems or damage any giant sequoia trees. Any

	exposed roots should be avoided. If operations within this area are necessary to remediate a safety hazard, the operators shall consult immediately with the harvest inspector or timber sale administrator.
GS-3	During prescribed burning, fuels reduction, and dead tree removal in high severity areas, naturally regenerating and planted trees will be maintained as much as possible. Regenerating giant sequoias shall be protected to the extent feasible.

Table C - 2. Standard Operating Procedures and Standards and Guidelines.

Standard Operating Procedure	Description
SOP-1	Water Resources. Appropriate Standards and Guidelines (S&Gs) and Best Management Practices (BMPs) from the Giant Sequoia National Monument Management Plan and National Best Management Practices shall be applied.
SOP-2	Water Resources. National Core BMPs designed to protect water resources (USDA 201b2).
SOP-3	Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004) or the Giant Sequoia National Monument Plan, as applicable. Specific design criteria and protection measures for the Castle Fire restoration project are found above.

Table C - 3. Streamside Management Zones definitions and buffer widths by percent slope

Stream Class	**SMZ (Equipment Exclusion) Width by Percent Slope**					**Stream Order**
	<30%	>30%	>40%	>50%	>70%	
Meadows, Seeps, Springs, Bogs					1.5X distance to slope break	-
I	100	150	200	250	1.5X distance to slope break	4+
II	100	100	150	200		3-4
III	50	100	100	150		2-3
IV	<50	<50	75	100		1-2
V	<50	<50	<50	<50		1-0

Appendix D – Comment Period Disposition

On February 1, 2023, the Castle Fire Ecological Restoration Project Preliminary Environmental Assessment was published for public comment. The District Ranger received 4 letters in response, which are filed in the project record at the Western Divide Ranger Station.

The respondents were:

C-1 Ben Blom, Save the Redwoods League
C-2 Rene Voss, Sequoia Forest Keeper, and Kern-Kaweah Chapter of Sierra Club
C-3 Chad Hanson, John Muir Project, and Center for Biological Diversity
C-4 Mary Merriman
C-5 Barbara Brydolf, Ph.D

No.	Respondent/Comment	Response
C-1.1	Allow for dead tree removal and mechanical treatments in strategic "buffer" areas within designated grove boundaries. The established grove boundaries within the GSNM include significant "buffer" areas that do not contain giant sequoias. More recent grove delineations completed via remote sensing by Rodney Hart (presented at the 2022 Giant Sequoia Lands Coalition annual meeting) provide more accurate data for where sequoias are actually found on the ground. We recommend that the updated Rodney Hart grove delineations be used to delineate areas to be excluded from mechanical treatments, instead of the original GSNM grove boundaries. Again, we believe this would allow for critical fuels treatments that could moderate fire behavior within groves and facilitate the reintroduction of prescribed fire.	The Proposed Action includes dead tree removal within the administrative boundary of the Forest Service portion of Mountain Home giant sequoia grove where necessary and in compliance with the Monument Plan. The Monument Plan carries forward the grove boundary designations developed under the 1990 Mediated Settlement Agreement (MSA) to the Sequoia Forest Plan. The MSA (p.13) states "Any naturally occurring giant sequoia (1 foot or larger dbh) which is located within 500 feet of at least 3 other giant sequoias (each 1 foot or larger dbh), shall always be included within the hypothetical perimeter line; provided, however that the Grove Boundary Team may reasonably adjust the perimeter line of a specific Grove so long as there is a rational basis for the adjustment (such as topographic features) and all participating team members agree to the adjustment." Crews, using the best technology of the time, recorded via GPS the tree line where they could safely access, and did it via helicopter where it was too steep. Where no data could be collected, GIS was used to establish the boundary (see northern edge of Converse Basin Grove where Cabin Creek dives into the Kings River gorge). Per the MSA, buffers were applied around each grove to further protect them from logging and road construction (the main concerns at the time). The grove boundaries were developed by a committee that looked at the giant sequoias AND other resources to protect. A good example is Indian Basin Grove which includes Indian Basin meadow, which has never included giant sequoias, but is an important riparian area to protect. Isolated giant sequoias are beyond 500 feet from the nearest group of sequoias and are therefore excluded from the grove designation, though still warrant protection measures (MSA p.20). Any changes to the grove boundaries would require an amendment to the Monument Plan and is outside the scope of this project.
C-1.2	We recommend that the EA be amended to explicitly allow for the use of air curtain burners as an alternative method for removing excessive fuels from treatment areas. In addition, the combustion process in an air curtain burner can yield biochar, which can be reapplied to the forest floor as a soil amendment. We recognize that this tool is not feasible in all project areas,	The proposed action was modified to clarify that use of air curtain burners may be used where feasible.

	but should be considered where road access and existing landings allow for its use in combination with either manual or mechanical fuels reduction.	
C-1.3	Allow for tree and biomass removal within mechanical treatment areas and along existing roads within manual treatment areas. It is unclear if the EA intends to allow biomass removal within mechanical treatment units. While this is explicitly described in the Dead Tree Removal section of the Proposed Action, we suggest clarifying that both dead and green trees (selected for removal as part of understory thinning) could be removed within mechanical treatment areas. This material could be sold as sawtimber or as biomass. We also believe that this should be allowed within manual treatment areas where equipment can be operated from existing roads.	The proposed action was revised to clarify that thinning includes tree removal from the forest, and that tree and biomass removal isn't allowed in the manual treatment areas because these areas are steep, or not easily accessed for tree removal.
C-1.4	Allow for flexibility to modify mechanical treatment boundaries based on ground truthing.	Planning areas are based on a combination of satellite and field data, so unit boundaries are often refined during layout and implementation based on more site-specific ground truthing.
C-2.1	Corrections are needed with regard to Land Use Designations in the EA and Maps, and any prescriptions in the proposed Moses Mountain Wilderness should be dropped from the proposal. [Regarding proposed Moses Mtn. addition to Golden Trout Wilderness] That entire area should be managed as proposed Wilderness, which is really the same as managing for Wilderness, meaning the prescribed burning treatments should be excluded from that area. These "RX Burn" proposals must be dropped from the proposed action to be consistent with the assertion that actions in EA that the [Moses, Slate and Dennison Mountain] IRAs were "initially considered but subsequently removed from the proposal." The "RX Burn" proposed is very close or overlaps the [South Mountaineer Creek] RNA, which should not be permitted. Such actions can only authorized by regional or Washington decision-makers in the Forest Service. And the "RX Burn" overlaps the [Freeman Creek Grove] Botanical Area. Please also update the map to show those	The EA and maps have been updated to clarify which treatments are proposed in specific land allocations. The proposed action was revised to clarify that only managed wildfire would be allowed on approximately 2,056 acres in the proposed Moses Mountain addition to Golden Trout Wilderness outside the Moses Mountain Research Natural Area. Prescribed burning is planned on approximately 1,706 acres of Moses Mountain IRA outside the proposed wilderness portion. Prescribed burning is also planned on approximately 2,266 acres of Slate Mountain, 260 acres of Rincon and 576 acres of Dennison Peak Inventoried Roadless Areas. No treatments are planned in South Mountaineer Creek Research Natural Area.
C-2.2	Drop prescribed burning proposals from Giant Sequoia Groves, which would kill naturally-regenerating Sequoia seedlings.	The proposed action has been clarified regarding prescribed burning in giant sequoia groves. Burning is planned only where fuel accumulations put resources, including the advanced giant sequoia

		regeneration, at risk. The burn prescriptions will be developed to prevent killing the majority of sequoia seedlings, especially where the Castle Fire killed all the seed source that would provide additional seedlings.
C-2.3 & C-3.8	Neither the EA nor Specialist Reports respond to the Issues [and dissenting science] we presented – neither the [Vegetation] report nor the EA specifically respond to each of these concerns directly and merely present an analysis, based on a forestry and forest health perspective, and which does not base its analysis on ecological restoration goals. A large and growing body of scientific evidence and opinion concludes that post-fire logging/clearcutting makes wildfires spread faster and/or burn more severely, and this puts nearby communities at greater risk.	The EA, Wildlife Biological Evaluation, Fuels Report and Vegetation Report have been updated to clarify how the concerns raised during scoping and comment periods are addressed.
C-2.4	The Castle Fire achieved much of the ecological restoration prescribed in the GSNM Plan, and the proposal must acknowledge this fact as a premise in any analysis.	The EA alternatives eliminated from detailed study section was updated to respond to this concern. The document "Background Information on Giant Sequoia National Monument" that accompanied the President's Monument Proclamation identified prescribed fire projects and cultural treatments as consistent with the goals of the Monument and said these kinds of maintenance will continue for the protection of the Monument resources. The Science Advisory Board which informed the Monument Plan regarding Undesirable Fire Effects as a "catastrophic fire" defined as a fire of an extent and severity beyond that which is consistent with the values for which the Monument was created (SAB 2003 Advisory IX), (Monument Plan p. 78). The EA on pages 2-3 acknowledges the ecological restoration prescribed in the GSNM Plan.
C-2.5	Complex Early Seral Forest as Rare and Important Habitat Must be Acknowledged in the Analysis	The Monument FEIS Tables 65 and 66 documented that all vegetation types, except chaparral in sequoia grove was mostly in mid-seral stage (GSNM FEIS Vol. 1 pp. 164-165), and the Monument Plan desired conditions are to have approximately 10 percent of each vegetation type in early seral stage (Monument Plan p. 23). According to Bernal et al. (2022), about 35 percent of their plots in the Castle Fire footprint mapped by RAVG as moderate and 85 percent mapped as high severity were actually high severity, which increased the amount of early seral vegetation, and therefore trending away from desired conditions. EA, p. 3, discusses the desired conditions for this project within the monument which is "…forested stand is diversity in composition (species, size, age class, distribution) and spatial distribution that are expected to be more resilient to climate change over time." As described in California's Wildfire and Forest Health Crisis: A State of Emergency in Our National Forests (USDA 2023) the Forest Service found that high-severity burns and their resulting early-seral habitats (e.g., shrublands) are becoming more extensive, decreasing avian diversity locally and shifting community composition away from forest-associated species.
C-2.6	The proposal fails to be consistent with the Ecological Restoration provisions in the GSNM Plan and those expressed in the	The document "Background Information on Giant Sequoia National Monument" that accompanied the President's Monument Proclamation identified prescribed fire projects and cultural

	SAB Advisories & in the GSNM FEIS Chapter 4, pp. 392-408.	treatments as consistent with the goals of the Monument and said these kinds of maintenance will continue for the protection of the Monument resources. The Science Advisory Board which informed the Monument Plan regarding Undesirable Fire Effects as a "catastrophic fire" defined as a fire of an extent and severity beyond that which is consistent with the values for which the Monument was created (SAB 2003 Advisory IX) (Monument Plan p. 78). A discussion of reforestation is included in Chapter 12 of Volume III of the 1996 Sierra Nevada Ecosystem Project (SNEP): Final Report to Congress, which includes numerous citations to the scientific literature on that topic. This project follows the Clear Need Criteria on pages 78-84 of the Monument Plan. The Clear Need Determination is in Appendix A of the EA. As mentioned above, The EA on pages 2-3 acknowledges the ecological restoration prescribed in the GSNM Plan. The Plan was written for a green forest not severely impacted by wildfire, with the term "trees" describing live, green trees and "snags" describing dead trees. The term "snag" has been used synonymously with "dead trees" in this assessment. While Table 46 of the GSNM Plan (p. 79) describes diameter limits for ecological restoration across different land allocations, there are no diameter limits for dead trees/snags. In the GSNM Plan's FEIS there are several references to the cutting and removal of dead trees/snags of all sizes to manage for wildlife habitat and ecological restoration (p. 446 and 502). The Plan does not have a diameter limit for dead trees/snags, stating simply "In areas burned by wildfire, including high- and mid-severity patches, manage snag levels to meet ecological restoration objectives, with consideration for the spatial arrangement and density of snags for wildlife needs" (p. 89).
C-2.7 & C-3.3	Post-fire tree removal is not "clearly needed" for ecological restoration, under the GSNM Proclamation & GSNM Plan because tree felling and removal would set back natural regeneration/restoration for decades. Even though there is a discussion of the GSNM Plan felling and removal criterion in an appendix, those discussions are biased by the desired outcome presented in the proposal and should be invalid for that reason. They are arbitrary and capricious in violation of the plan and proclamation because they are inconsistent with the letter and intent of the GSNM's strictures that logging should not be used, which is not "clearly needed" for ecological restoration.	The clear need determination is based on law, regulation and policy guiding management of the Monument. (Monument Plan pp. 78-84.) The Clear Need Determination is in Appendix A of the EA. The document "Background Information on Giant Sequoia National Monument" that accompanied the President's Monument Proclamation identified prescribed fire projects and cultural treatments as consistent with the goals of the Monument and said these kinds of maintenance will continue for the protection of the Monument resources. A discussion of reforestation is included in Chapter 12 of Volume III of the 1996 Sierra Nevada Ecosystem Project (SNEP): Final Report to Congress, which includes numerous citations to the scientific literature on that topic. In addition to the above, the Monument Plan, in Standards/Guidelines for giant sequoias, No. 12. Protect and manage giant sequoias to perpetuate the species and preserve old growth specimen trees. The EA, pages 9-10 talks about giant sequoia regeneration. The Castle Fire Ecological Restoration Project is designed to support Standard/Guideline No. 12.
C-2.8	The Monument Proclamation and Plan Require Ecological Restoration from Logging, Not by Logging using Alternative Measures. Instead, the Forest Service is proposing to use the same logging that it is supposed to "counteract" with the needed restoration to justify its approach. It is therefore failing to understand or apply different	Thinning and limbing are silvicultural practices that are also key suggested methods to help trees be resilient to drought, climate change, and other stressors. The Castle Project is expected to reduce the number of shade-tolerant species, but not eliminate these trees from the treatment areas, as they are important components of the mixed conifer forest. Thinning small trees, while leaving large and moderate trees in the overstory, would lead to improved stand health, and a variety of canopy layers.

	approaches that are available for ecological restoration. In fact, the proclamation's statement here almost mandates that the Forest Service at least consider an alternative that approaches restoration without logging, which the EA fails to even consider. …also violates NEPA and the intent of the Monument Proclamation and Plan.	The Decision Tree on page 83 of the Monument Plan, a part of the Clear Need criteria for ecological restoration, was developed to help determine which treatment methods would meet the purpose and need. See Appendix A of the EA.
C-2.9	Planting is not necessary for ecological restoration	As described in in California's Wildfire and Forest Health Crisis: A State of Emergency in Our National Forests, in large high severity burn patches, natural forest regeneration may be hampered because there are few or no live trees nearby to provide seeds, and any seedlings that do establish may struggle to compete with fast-growing brush. Reforestation may be necessary in these areas. Strategic and timely reforestation efforts can greatly improve opportunities for stand recovery while minimizing potential for long-term conversion of forest to shrublands (USDA 2023). Reforestation is addressed in the EA.
C-2.10	The proposed actions will likely harm the endangered Pacific fisher, Little Kern golden trout, spotted owls, and goshawks. Moreover, the package of specialist reports in support of the EA lacks the wildlife biological evaluation, which should have analyzed impacts on species of conservation concern.	As described in the Final EA, the USDI, Fish and Wildlife Service concurs with the determination that the proposed project *may affect* but is not likely to adversely affect the fisher and its proposed critical habitat, the mountain yellow-legged frog, and the Little Kern golden trout. The Planning, Appeals and Litigation System (PALS) website has been updated to display the Biological Evaluation.
C-2.11	Opening and reconstructing Non-System roads is inconsistent with post-fire ecological restoration and should not be allowed. Any temporary road construction should be strictly prohibited.	In accordance with the Clinton proclamation (Clinton 2000) the Monument Transportation Plan allows reconstruction or new roads and trails to be authorized which further the purposes of the monument. Use of previously used skid trails and temporary roads in this project allows access to key areas for restoration activities. As stated in the EA, these routes must comply with applicable best management practices, during use and when reclosed.
C-2.12	The project must ensure that a minimum of 10-20 tons/acre of large down logs are retained.	The EA was clarified to show this Standard/Guideline will be met as applicable.
C-2.13 & C-3.5	Fuel reduction must be focused immediately around structures, and thinning in the WUI will increase rather than decrease fire risk.	The purpose of this project is to reduce fuels and restore ecological processes both outside and within the wildland urban interface (WUI). A WUI is defined under the Healthy Forest Restoration Act (HFRA) in 2003 as a community "…within 1 ½ mile when mitigating circumstances exist, such as sustained steep slopes or geographic features aiding in creating a fire break." This project is not within a housing development, but adjacent to and/or upslope of State Highway 190 and scattered rural residences and private inholdings. The area within 200 feet of privately owned structures is generally on private property and therefore outside the authority of Forest Service management. The risk of a fire start is mainly to the wildlands upslope of the highway. Mr. Cohen's research regarding fire risk is not applicable to this project.
C-2.14 & C-3.2	The Forest Service must prepare an Environmental Impact Statement (EIS) because the proposal is likely to have significant impacts.	The key factors leading to a Finding of No Significant Impact (FONSI) are described in the project effects summary portion of the EA.

C-2.15	The EIS must analyze the greenhouse gas (GHG) emissions generated by the proposal and their effects on climate change.	Greenhouse gas emissions and potential for effect to climate was analyzed in accordance with USDA Forest Service and Council on Environmental Quality recommendations as updated by the National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change (January 9, 2023).
C-3.1	We request that you withdraw the post-fire logging, commercial thinning, and artificial planting components of the proposal, and focus on hazard tree felling along main public roads, leaving felled hazard trees on the ground for wildlife habitat, carbon storage, and nutrient cycling.	Withdrawing the thinning and planting and retaining only the hazard tree felling would not meet the purpose and need of the project to improve forest health and diversity and remove excess fuels.
C-3.4	Numerous studies also document the cumulative impacts of post-fire logging on natural ecosystems, including…accumulation of logging slash that can add to future fire risks	The project design acknowledges and incorporates areas that are desirable for passive management for natural regeneration of early seral habitat while also identifying areas where restoration of desired conditions is important and feasible. This project design was guided by the Postfire Restoration Framework for National Forests in California (USDA 2021), is consistent with California's Wildfire and Forest Health Crisis: A State of Emergency in Our National Forests (USDA 2023) and best available science for determining where reforestation activities should be prioritized by evaluating the site conditions for distance to available seed source, site quality, and changing climate and fire regimes. The result of the delineated snag retention, green tree retention, high value habitat, and early seral habitat no treatment areas across the project area with the areas proposed for restoration through active management would result in meeting desired conditions for a mosaic of habitat types and seral stages across the landscape; and reduce the risk of additional large scale high severity fire.
C-3.6	The Analysis in the Preliminary EA is Inadequate and Fails to Take a Hard Look at Impacts- The EA fails to consider a reasonable range of alternatives, including alternatives that could better accomplish stated objectives, based on the evidence presented above, including natural post-fire regeneration for giant sequoias, roadside hazard tree felling without removal of large, downed logs, and prescribed fire or wildland fire use instead of commercial thinning. The EA fails to take a hard look at impacts of logging live, healthy old-growth trees from use of a 0.7 probability of mortality standard for tree removal (see p. 4 of EA), especially since the referenced USFS report did not pertain to trees at more than 3 years post-fire and the EA states (p. 4) that implementation will likely begin after 2023 (i.e., 4 or more years post-fire and will go for 10-15 years (p. 4). The EA is incomprehensible.	According to the Council on Environmental Quality, "Reasonable alternatives means a reasonable range of alternatives that are technically and economically feasible and meet the purpose and need for the proposed action." National Environmental Policy Act NEPA Implementing Regulations, May 20, 2022 (doe.gov) Relying only on natural regeneration in giant sequoia groves, no removal of large down logs and use of only fire without thinning would not meet the purpose and need as evidenced by the effects analysis in the EA. No live, healthy old-growth trees are proposed for removal.
C-3.7	The EA's fire/fuels report repeatedly cites to Coppoletta et al. (2016) to promote	The Castle Fuels Report did not misrepresent Coppoletta et al. (2016), instead it summarized the findings that "in areas where

	post-fire logging, and creation of tree plantations, in mature forests that experienced high-severity fire, but the EA's report misrepresents that study.	frequent high-severity fire is undesirable, management activities such as thinning, prescribed fire, or managed wildland fire can be used to moderate fire behavior not only prior to initial fires, but also before subsequent reburns." (Coppoletta et al. p.1)
C-4.1 & 5.4	Maps of the "project area" are woefully inadequate. All landmarks, elevation lines and geographic features are obscured by heavy shading. Maps are too small and cannot be zoomed or enlarged.	The maps have been updated for better clarity regarding botanical species and landmarks.
C-4.2 & 5.10	It is evident that Slate Mountain Botanical Area is not included in the project area. Is that correct? [several rare plants] Jordan Peak is home to several rare plants. It is not clear if that is included in the "project area". [Fawn Lily, Mineral King Draba, and others] Greenhorn Fritillary: 1B.3 Multiple locations for this rare plant cannot be evaluated from the project map.	A map showing Slate Mountain outside of the project units has been added to Appendix A of the Botanical BE/BA. Although Castle Fire did burn through some of the botanical area. Part of Jordan Peak area is included in a planting unit and a fuel unit. Areas with documented rare plants will be avoided and will not be planted on to reduce the risk of harm to the rare plant populations on Jordan Peak. There's a map in Appendix A showing the location of Jordan Peak in relation to the project units.
C-4.3 & 5.13	Was the Needles outcrop preserved from burn? Is the Needles excluded from the "project area"? If Needles is excluded from the "project area", then how far away would the project be? [Eriogonum breedloveii var shevockii, Eriogonum twisselmannii, Erigeron aequifolius, Boechera shevocki]	The Needles area and the Needles Lookout is excluded from the project units. A map in Appendix A in the botanical BE/BA shows the location in relation to the project units. However, the Needles area is within the Castle fire footprint. The Needles Lookout area is about ½ mile away from the nearest project unit, which is a fuels unit
C-4.4 & 5.7	Not finding a rare plant in the 2021 survey is not sufficient reason to exclude it from consideration. It does not take into consideration what may be in the seed bank or in locations with appropriate habitat that have not been surveyed in 2021. A one summer survey cannot accurately identify all locations. Historical accounts cannot be dismissed after only one survey	Management requirements are in place to protect known habitat. Language has been added in the BE/BA to reflect these actions. Documented occurrences of rare plants will be avoided even if they are not found during surveys, the suitable habitat in which the occurrence is documented will be avoided so that underground plant parts and seed banks will not be disturbed. This is assuming that the plant was dormant at the time of survey.
C-4.5	Cinna bolanderi: 1B.2 Recorded from Freeman Creek Grove only. This is in the project area. No reason to assume it is extirpated after only one survey in 2021.	Documented occurrences will be monitored after initial surveys to make sure nothing was missed due to plant dormancy cycles. Language has been added to the BE/BA to describe this.
C-4.6	Lewisia disepala: Occurs on rocky outcrops. Same questions as Needles Buckwheat. Are these outcrops automatically excluded from "project area"? Were all of them surveyed?	The Needles area and Needles Lookout area is excluded from the project units, the lookout area was surveyed but the Needles areas were not surveyed in 2021 since they fall outside of the project units and will not have work done in that area. Rocky outcrops are avoided due to the nature of the habitat. Rare plants will be identified and avoided should any unexpected activities occur in the Needles area.
C-4.7	Hulsea breviflora: one occurrence in the 1980's along 31E14 which seems to have been overgrown by a pine plantation based on the description given by Jim Shevock- North of North Click's Creek. Was that included in 2021 surveys? It should be surveyed specifically. It was discarded from the list as NFA but that	This area was surveyed in 2021, documented occurrences will be monitored after initial surveys to make sure they weren't missed due to plant dormancy cycles. The general survey area can be referenced on the survey map in Appendix A of the botanical BE/BA. NFA (No Further Analysis) was changed to NFDS (Not Found During Survey) on the Botanical BE/BA to make sure we are considering plant dormancy cycles vs. not present.

	plant thrives in post-burn situations. Populations increased dramatically in at least one area in the Rough Fire footprint in Sequoia National Forest.	
C-5.1	I don't know exactly what "local seed zones" are, but seedlings for replanting should be locally sourced (within 10 miles of restoration activity).	The Forest Service has very strict guidelines for sourcing seeds by elevation and seed zone to ensure local genetic integrity. A seed zone is an area where plant materials can be transferred with little risk of being poorly adapted to their new location. Forest Service tree seed zones were developed using models with data from common garden studies. This data allowed for the creation of seed zones for species in specified geographic areas.
C-5.2	Plantations are monocultures. They provide little to no ecosystem function, and many of them are planted with elevation inappropriate species (such as Ponderosa pine in the Red fir zone). If plantations are to be revegetated, it should be to restore the area to the appropriate species composition and size and age range for the area.	Older plantations were often planted as monocultures to grow pines needed for lumber quickly and efficiently. However, as described in the Vegetation report and EA, reforestation will use the native species mix to restore the mixed conifer based on site conditions, including red fir where appropriate and the low severity burned plantations have been identified for fuels reduction to increase the diversity of the plantation.
C-5.3	Ponderosa and Jeffery pine do not belong in the red fir belt above 7000'. They should not be planted there.	Jeffery pine naturally occur between 6,000 and 9,000 feet, and ponderosa pine between 2,000 and 8,500 feet in the southern Sierra Nevada as documented in multiple published books and observed growing mixed with red fir by District foresters
C-5.5	Often, precisely because rare plants are rare, the elevational and soil range of the species is poorly known. Elevational and soil range of a rare species is not sufficient grounds for its elimination from further consideration.	Agreed. Botanists would have surveyed for all botanical species in the survey area that was present at the time of surveys.
C-5.6	Surveys were conducted for Threatened and Endangered Species and for Species of Conservation Concern in 2021. However, no information is given about these surveys- when they were conducted and where, or the methods or expertise of those conducting the surveys.	The Botany BE was updated to clarify that Forest Service botany crews conducted the surveys using standard protocols to ensure surveys were conducted at peak bloom periods and using known locational data as required. (Botany BE/BA p. 33)
C-5.8	How will the project workers flag and avoid geophyte species? (Calochortus westonii, Erythronium pusaterii, Fritillaria brandegeei).	Flagging for avoidance occurs once plants have emerged and includes a buffer to prevent damage to the known population for the duration of the project. Surveys are timed to hit the peak blooming periods for the species. Documented geophyte species that were not found during initial surveys will have the suitable habitat flagged and avoided as a precautionary practice, assuming plants may be in dormancy cycles at the time of surveys.
C-5.9	Shirley Meadows star-tulip (Calochortus westonii) is found in the project area. The USFS has a species management plan for this one, but this isn't mentioned in the Botany BE/BA. Are the design features in the restoration plan in alignment with the management plan?	The Forest Service species management plan for *Calochortus westonii* was considered in the Botany BE/BA, the design features are aligned with the management plan, more language was added to clarify this in the Botany BE/BA.
C-5.11	According to the Botany BEBA: E. pusaterii above ground vegetative structures are only present for **1-2 weeks** out of the	The Botany BE/BA was updated to clarify that though the plant may flower between April and June, dependent on-site specific condition,

	year--- This must be a mistake. I find records for two months out of the year and Jepson eflora lists the flowering time as April-June	an individual plant may be in flower for only 1 to 2 weeks during that timeframe.
C-5.12	Pierpoint Springs Dudleya is mis-labeled. It is listed as Dudleya abramsii but this is not the correct name. The correct name is Dudleya cymosa ssp. costatifolia, or the more recent nomenclature- Dudleya cymosa ssp. costifolia. Dudleya abamsii is not a CNPS listed rare plant, whereas Dudleya cymosa ssp. costifolia is CNPS rank 1B.2. The species account should be reviewed to make sure that it is correct and not mischaracterized as a result of being mislabeled. The Rationale for its characterization as NFA is as follows: "Known occurrence(s) &/or project area is within species range but species only in carbonate outcrops that will not be affected by proposed action." However, there are some plants in this population that occur lower in the carbonate outcrop that could be affected by fertilizer runoff or pesticide overspray that may be used in the area. Therefore, it should not be categorized as NFA	Pierpoint Springs Dudleya was corrected to the current accepted name of *Dudleya cymosa* ssp*. costatifolia*. This was changed from from NFA (No Further Analysis) to NFDS (Not Found During Surveys). The BE/BA was updated to show that the species accounts listed were for species that most likely could occur in the elevational range and habitat but doesn't necessarily mean that the species couldn't occur within the described area.
C-5.14	Field Ivesia (*Ivesia campestris*) does not appear in Table 1 of the Botany BEBA report, so it is not possible to know its determination or the rationale.	*Ivesia campestris* was added to Table 1 in the Botany BE/BA. *Ivesia campestris* was not found during the surveys.