Basic Information Form

Park Name: Sequoia & Kings Canyon NP
PEPC Project ID: 119282
Other Project ID: ____
Related Project(s):
119282 Created From 107200
Project Status: Proposed
Compliance Status: In Process
Sensitive: No
Project Target Start: 10/01/2024
Project Creation Date: 09/28/2023

Project Title: Re-establish Tree Seedlings in Dillonwood Grove

Project Description: This project will implement the Dillonwood Grove portion of the selected alternative identified within the Finding of No Significant Impact (FONSI; NPS 2023a) for the Re-Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (Revised EA; NPS 2023b), as amended.

As described below and in alignment with the FONSI, conditions in Upper Dillonwood Grove meet the decision tree criteria for taking action to plant sequoias and mixed conifer seedlings in the Grove.

- *Remote Sensing Data Analysis* (complete): Identification of contiguous patches of high severity fire effects in Upper Dillonwood Grove was completed immediately following the Castle Wildfire using the Rapid Assessment of Vegetation Condition after Wildfire, Standardized Composite Burn Index (RAVG 4 category CBI product). This remote sensing tool identified that this Grove had suffered high tree mortality and a portion of this Grove is vulnerable to conversion to shrub habitat. This information served as a basis for the original proposal to replant these areas.

- *Mortality and Regeneration Analysis* (complete): Post-fire field surveys in 2023 found 90% mortality of large sequoias within the 39.6 acre patch of Upper Dillonwood Grove that burned at high-severity following the 2020 Castle Fire (data from Soderberg and Das 2023). The 2023 survey data from Upper Dillonwood Grove also found an estimated mean of 58 sequoia seedlings/acre, equating to a 0% probability of being equivalent to the third-year seedling densities calculated by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the Revised EA), is as high as expected—reducing the likelihood of future seed rain and potential regeneration—and (2) actual seedling regeneration within the proposed action area does not meet the 90% probability of meeting the 6,718 sequoia seedlings/acre mean third-year seedling density determined by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). Based on these field surveys and findings, the NPS has determined that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout this portion of the Grove. See Revised EA for additional information and context.

- *Climate Assessment* (complete): Results of this analysis indicate that Upper Dillonwood Grove has a high likelihood of continuing to support forest under future climate conditions, although tree densities in some sites may be reduced to reduce future drought stress from lower water availability in the future.

Given the results summarized above, and in alignment with the decision tree outlined in the selected alternative and the determined minimum requirement for the administration of the area as wilderness (2024-MRA-15), the NPS will move forward with planting in up to 39.6 acres in Upper Dillonwood Grove. Sequoia and mixed conifer seedlings grown from seed collected both within and outside the local genetic community will be planted at roughly 75-200 seedlings/acre using hand tools according to methods outlined under the selected alternative in the FONSI (which incorporates Alternative 2 in the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Upper Dillonwood Grove.

One crew, of up to 15 people (including NPS staff and crews operating under an agreement with the NPS), will implement the planting plan over up to two weeks in fall 2024 or spring 2025. An additional crew of 2-5 people (operating under a research permit with the NPS) will complete monitoring at the same time or shortly thereafter as described below.

All crews will hike to and camp within close proximity of the project area, accessing all areas by foot. Tree seedlings, tools, and equipment will be transported to project area via two helicopter sling loads, and all gear will be flown off site at the end of the planting via one helicopter sling load. From the sling load delivery location, planting crews will transport seedlings to their planting locations on foot.

To prepare a safe administrative camp and sling load landing area, roughly six snags (i.e., dead trees) 35-60 inches dbh (those that may range from 150-200 feet tall), nine snags 16-32 inches dbh, and roughly four snags less than12 inches dbh that pose a safety hazard to administrative campers or sling load landing will be felled. As blasting has been determined to not be the safest tool to remove any of the identified tree hazards, chainsaws will be used to fell tree hazards greater than 12" dbh; hand tools will be used to fell 12" or lower dbh trees so long as the tree feller determines it is safe to do so using the Severity, Probability, Exposure (SPE) model. The NPS estimates that felling this number of snags with chainsaws will require roughly 2-3 hours of chainsaw run time. All use of camp and work areas will follow wilderness minimum impact restrictions.

If mortality after the first planting season is high (i.e., survival is less than 70%), subsequent replanting may occur for up to 2 years. During any successive planting years, it is anticipated that this total will decline in direct relation to the number of seedlings being replaced (e.g., if seedlings suffer 50% mortality or less, the annual planting time would be for roughly one week the first year and several days the next). The number of sling load deliveries would be 1 instead of 2 each successive year of planting though would be reevaluated depending on the number of seedlings being delivered. Tree hazards would not require felling in subsequent years as sites would be reused.

The NPS will also establish and implement a long-term monitoring protocol to track survivorship of planted seedlings and continue to understand regeneration within this area consistent with the selected alternative, as amended. This will include the establishment of 20 plots within the planting area (and tagging approximately 27 plants within each plot with a small plant tag) and 20 control plots (using same plots that USGS has been monitoring; these plots will be no plant plots as controls) that will be monitored by crews of up to five people twice in 2025, once per year from 2026-2029, and once every five years thereafter. These crews will access the locations by foot and will be on site for less than a week during each monitoring period. The NPS anticipates that this monitoring will be completed by outside researchers who will be issued a research permit.

See Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA and FONSI (NPS 2023b and NPS 2023a, respectively; PEPC 107200) for more information/background.

Project Leader: Meg Kargul
NEPA Specialist: Theresa Fiorino
NHPA Specialist: Linn Gassaway

Project Type: Restoration

Project Category:
Habitat Connectivity
Native Resource
Plant Communities (Vascular and Non-Vascular)
Research
Soil
Terrestrial Ecosystem
Threatened and Endangered Species
Vascular Plant
Vegetation
Wilderness
Wildlife

General Notes: _____

Locations

County/Borough, State	District, Section	Geo. Marker	Other	Tract ID
Tulare, CA				

File List

Title
• Site Planting Plan for Upper Dillonwood Grove and Map • Re-Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment • Finding of No Significant Impact for Re-Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment

Last Updated Date: 09/15/2024

Last Updated By: TFiorino

Works Cited:

National Park Service (NPS). 2023a. Finding of No Significant Impact for Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment. Sequoia and Kings Canyon National Parks. Planning, Environment and Public Comment (PEPC) 107200. Available at: https://parkplanning.nps.gov/document.cfm?parkID=342&projectID=107200&documentID=131953.

National Park Service (NPS). 2023b. Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment. Sequoia and Kings Canyon National Parks. Planning, Environment and Public Comment (PEPC) 107200. Available at: https://parkplanning.nps.gov/document.cfm?parkID=342&projectID=107200&documentID=131953.

Soderberg, D.N., and Das, A.J., 2023, Assessment of giant sequoia mortality and regeneration within burned groves in Sequoia and Kings Canyon national parks (ver. 2.0, January 2024): U.S. Geological Survey data release, https://doi.org/10.5066/P96Z1PBK.

Soderberg, D., Das, A., Stephenson, N., Meyer, M., Brigham, C. and Flickinger, J. 2024. Assessing giant sequoia mortality and regeneration following high-severity wildfire. https://doi.org/10.1002/ecs2.4789.

Stephenson, N.L., Caprio, A.C., Soderberg, D.N., Das, A.J., Lopez, E.L., Williams, A.P. 2024. Post-fire reference densities for giant sequoia seedlings in a new era of high-severity wildfires. Forest Ecology and Management. 562 (2024) 121916.

Restoration Planting Plan for Upper Dillonwood Grove

Purpose

This restoration plan documents planting prescriptions, including the densities, species mixes, and distribution of those mixes across planting areas as necessary to re-establish tree seedlings in the Upper Dillonwood Grove where the decision tree described and approved through the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (Revised EA)/Finding of No Significant Impact (FONSI) demonstrates insufficient regeneration. Please see attached map of SEKI Planting Units in these areas. We will use these planting prescriptions in conjunction with internal guidance and mitigations outlined in the Revised EA to guide on-site training of planters.

Planting Prescriptions

Common to all planting units

Planting spacing will follow the individuals, clumps, and openings pattern using a field fit approach rather than plantation style planting with set spacing. Within each planting unit, planters will plant 30% of seedlings as scattered individuals and 70% of seedlings in clumps, prioritizing microsites as described below. We will determine clump location, size, and spacing based on microsites. Clumps will typically be made of 3 – 15 individuals of the same species spaced 6 – 24 inches apart depending on the type and size of microsite (e.g., we will put more individuals in larger microsites like wet areas or along larger logs creating shade). Because seedlings planted near shade objects are more likely to die if the object combusts during a fire, 20% of all seedlings (both individuals and clumps) will be planted away from combustible shade objects (e.g., we will plant by boulders and in open areas). Planting scattered individuals and clumps will naturally create openings of different shapes and sizes throughout the planting units. These openings are important in creating heterogenous stand structure rather than a homogenous structure typical of plantation planting. We will not plant in areas that are determined to have significant regeneration. We will not plant within 50m of a living mature giant sequoia tree as we expect ample seed rain within that range in the future.

We will prioritize planting in microsites including the North side of shade/nurse objects (e.g., snags, logs, stumps, rocks), depressions (e.g., giant sequoia potholes), and wet areas (e.g., stream edges). Shrubs can either facilitate or inhibit seedling establishment dependent on environmental conditions. We will plant some seedlings directly within small shrub patches, on all aspect types, to ensure that seedlings are distributed throughout the landscape and not just on the edges of large shrub patches.

We split the landscape into five (5) landscape units (ridge, canyon bottom/drainage and Northeast mid-slope <30 percent, Southwest mid-slope <30 percent, Southwest mid-slope >30 percent, and Northeast mid-slope >30 percent) that have different planting densities (Table 1). We will plant at higher densities in canyon bottom/drainages and Northeast aspects and lower densities on ridges and Southwest aspects. Transitions zones between aspect types, canyon bottom/drainages to Southwest aspects, and ridges to Northeast aspects occur across the planting units, and we will make field-based decisions on planting density in these zones (e.g., plant more individuals in a canyon bottom/drainage and fewer individuals where it transitions to a Southwest aspect).

We used the dominant vegetation type, as mapped before these wildfires, to create species mixes (Table 2). Together, we used the dominant vegetation and landscape unit to create the planting prescription for each planting unit (Table 3). We will use planting unit maps and a field fit approach to plant appropriate species and densities within a planting unit, as there is variation within a planting unit (e.g., transition zones, increasing or decreasing slope, different vegetation types or suitable habitat). For planting units called shrub dominant on the map, we will plant at a lower density (75 tpa). If no snags are present within the shrub patch, we will not plant in the shrubs but rather in areas around the shrub patch, but if snags are present, then we will plant within the shrub patch.

For giant sequoia of nonlocal genotypes, we will only plant within designated locations and mark where they are in the field. We will not mix the nonlocal genotypes throughout the entire landscape but rather have them contained to discrete identifiable locations. We will not mix seedlings of local and nonlocal genotypes at any given location (i.e., they will be planted separately from each other).

Sequoia Groves: Upper Dillonwood

The Dillonwood Grove—which includes portions of the Garfield Grove located in the same drainage—totals 1,160 acres and covers lands managed by NPS and USFS on steep north and south facing slopes of Mt. Dennison in the Tule River. With 39.6 acres burned at high severity, this portion of Upper Dillonwood Grove will be replanted at a density of 75-200 trees per acre with different planting densities and species mixes for the five planting units (see Table 1 for details).

Table 1. Planting acreage, density, species mixes and proportions for each landscape unit in Upper Dillonwood Grove

Landscape Unit	**Planting Acreage**	**Planting Density (tpa)**	**Species**
Canyon bottom/drainage and Northeast mid-slope <30 percent	16.2	200	More giant sequoia, white fir, and incense cedar
Northeast mid-slope >30 percent	2.9	150	More giant sequoia, white fir, and incense cedar
Southwest mid-slope <30 percent	1	100	Less white fir and incense cedar, more ponderosa pine
Southwest mid-slope >30 percent	19.5	75	Less white fir and incense cedar, more ponderosa pine
Ridge	0	75	Less giant sequoia, more ponderosa pine and sugar pine
Total	**39.6**		

Table 2. Species mixes and proportions for different vegetation alliances.

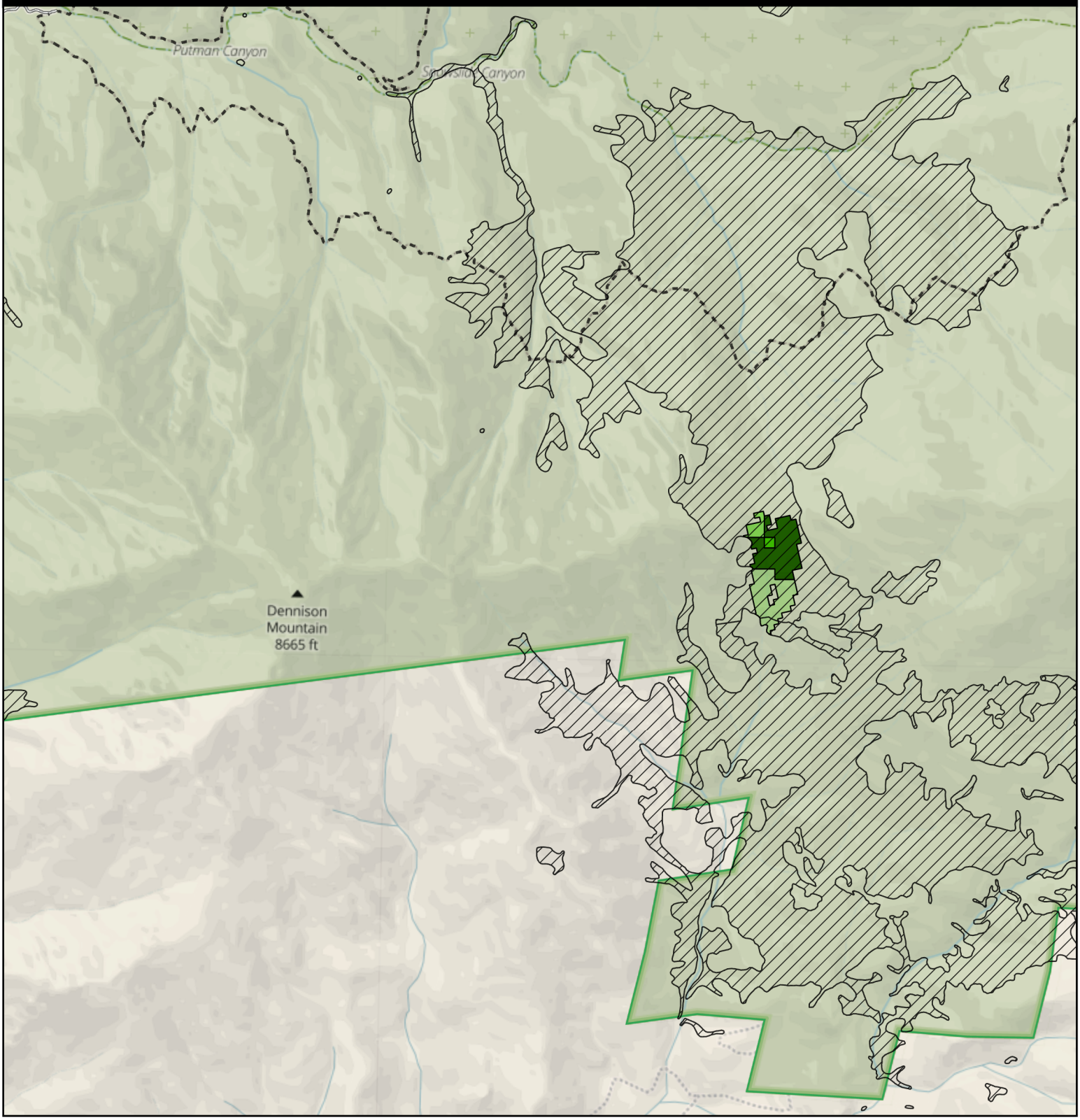
Vegetation Alliance	Giant Sequoia	Sugar Pine	Ponderosa Pine	Jeffrey Pine	White Fir	Incense Cedar
Giant Sequoia	66.67%	9.52%	7.14%	7.14%	4.76%	4.76%

Table 3. Species Mix Proportions of Different Vegetation Alliances and Landscape Units for Upper Dillonwood Grove.

Site	Vegetation Alliance	Landscape Unit	Giant Sequoia	Sugar Pine	Ponderosa Pine	Jeffrey Pine	White Fir	Incense Cedar
Upper Dillonwood Grove	Giant Sequoia	Canyon/ NE < 30	66.67%	9.52%	7.14%	7.14%	4.76%	4.76%
Upper Dillonwood Grove	Giant Sequoia	NE > 30	66.67%	9.52%	7.14%	7.14%	4.76%	4.76%
Upper Dillonwood Grove	Giant Sequoia	SW < 30	66.67%	9.52%	14.29%	9.52%	0%	0%
Upper Dillonwood Grove	Giant Sequoia	SW > 30	66.67%	9.52%	14.29%	9.52%	0%	0%

SEKI Planting Map 2024
Upper Dillonwood

Sequoia and Kings Canyon National Parks
National Park Service
U.S. Department of the Interior



Trails
Sequoia Groves
Park Boundaries

Planting Units 2024

Alliance & Landscape Description

- Giant Sequoia Forest Alliance Canyon/Drainage Bottom/Midslope NE <30% slope
- Giant Sequoia Forest Alliance Midslope NE >30% slope
- Giant Sequoia Forest Alliance Midslope SW <30% slope
- Giant Sequoia Forest Alliance Midslope SW >30% slope

Produced by: NPS, SEKI GIS; TS;3/29/2024

Map of the planned planting units that were newly added for the 2024 year.

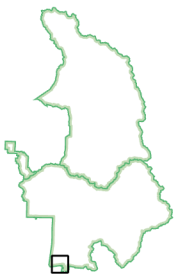
North

0 0.4 Kilometers

0 SCALE 1:32,000 0.4 Miles

Where 1 inch equals 2,666.67 feet
And 1 cm equals 320 meters
NAD 1983 UTM Zone 11N

MAP FRAME EXTENT



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ENVIRONMENTAL SCREENING FORM (ESF)

Updated Sept 2015 per NPS NEPA Handbook

A. PROJECT INFORMATION

Project Title: Re-establish Tree Seedlings in Dillonwood Grove
PEPC Project Number: 119282
PMIS Number:
Project Type: Restoration (REST)
Project Location:
County, State: Tulare, California
Project Leader: Meg Kargul

B. PROJECT DESCRIPTION

This project will implement the Dillonwood Grove portion of the selected alternative identified within the Finding of No Significant Impact (FONSI; NPS 2023a) for the Re-Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (Revised EA; NPS 2023b), as amended.

As described below and in alignment with the FONSI, conditions in Upper Dillonwood Grove meet the decision tree criteria for taking action to plant sequoias and mixed conifer seedlings in the Grove.

- *Remote Sensing Data Analysis* (complete): Identification of contiguous patches of high severity fire effects in Upper Dillonwood Grove was completed immediately following the Castle Wildfire using the Rapid Assessment of Vegetation Condition after Wildfire, Standardized Composite Burn Index (RAVG 4 category CBI product). This remote sensing tool identified that this Grove had suffered high tree mortality and a portion of this Grove is vulnerable to conversion to shrub habitat. This information served as a basis for the original proposal to replant these areas.

- *Mortality and Regeneration Analysis* (complete): Post-fire field surveys in 2023 found 90% mortality of large sequoias within the 39.6 acre patch of Upper Dillonwood Grove that burned at high-severity following the 2020 Castle Fire (data from Soderberg and Das 2023). The 2023 survey data from Upper Dillonwood Grove also found an estimated mean of 58 sequoia seedlings/acre, equating to a 0% probability of being equivalent to the third-year seedling densities calculated by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the Revised EA), is as high as expected—reducing the likelihood of future seed rain and potential regeneration—and (2) actual seedling regeneration within the proposed action area does not meet the 90% probability of meeting the 6,718 sequoia seedlings/acre mean third-year seedling density determined by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). Based on these field surveys and findings, the NPS has determined that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout this portion of the Grove. See Revised EA for additional information and context.

- *Climate Assessment* (complete): Results of this analysis indicate that Upper Dillonwood Grove has a high likelihood of continuing to support forest under future climate conditions, although tree densities in some sites may be reduced to reduce future drought stress from lower water availability in the future.

Given the results summarized above, and in alignment with the decision tree outlined in the selected alternative and the determined minimum requirement for the administration of the area as wilderness (2024-MRA-15), the NPS will move forward with planting in up to 39.6 acres in Upper Dillonwood Grove. Sequoia and mixed conifer seedlings grown from seed collected both within and outside the local genetic community will be planted at roughly 75-200 seedlings/acre using hand tools according to methods outlined under the selected alternative in the FONSI (which incorporates Alternative 2 in the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Upper Dillonwood Grove.

One crew, of up to 15 people (including NPS staff and crews operating under an agreement with the NPS), will implement the planting plan over up to two weeks in fall 2024 or spring 2025. An additional crew of 2-5 people (operating under a research permit with the NPS) will complete monitoring at the same time or shortly thereafter as described below.

All crews will hike to and camp within close proximity of the project area, accessing all areas by foot. Tree seedlings, tools, and equipment will be transported to project area via two helicopter sling loads, and all gear will be flown off site at the end of the planting via one helicopter sling load. From the sling load delivery location, planting crews will transport seedlings to their planting locations on foot.

To prepare a safe administrative camp and sling load landing area, roughly six snags (i.e., dead trees) 35-60 inches dbh (those that may range from 150-200 feet tall), nine snags 16-32 inches dbh, and roughly four snags less than12 inches dbh that pose a safety hazard to administrative campers or sling load landing will be felled. As blasting has been determined to not be the safest tool to remove any of the identified tree hazards, chainsaws will be used to fell tree hazards greater than 12" dbh; hand tools will be used to fell 12" or lower dbh trees so long as the tree feller determines it is safe to do so using the Severity, Probability, Exposure (SPE) model. The NPS estimates that felling this number of snags with chainsaws will require roughly 2-3 hours of chainsaw run time. All use of camp and work areas will follow wilderness minimum impact restrictions.

If mortality after the first planting season is high (i.e., survival is less than 70%), subsequent replanting may occur for up to 2 years. During any successive planting years, it is anticipated that this total will decline in direct relation to the number of seedlings being replaced (e.g., if seedlings suffer 50% mortality or less, the annual planting time would be for roughly one week the first year and several days the next). The number of sling load deliveries would be 1 instead of 2 each successive year of planting though would be reevaluated depending on the number of seedlings being delivered. Tree hazards would not require felling in subsequent years as sites would be reused.

The NPS will also establish and implement a long-term monitoring protocol to track survivorship of planted seedlings and continue to understand regeneration within this area consistent with the selected alternative, as amended. This will include the establishment of 20 plots within the planting area (and tagging approximately 27 plants within each plot with a small plant tag) and 20 control plots (using same plots that USGS has been monitoring; these plots will be no plant plots as controls) that will be monitored by crews of up to five people twice in 2025, once per year from 2026-2029, and once every five years thereafter. These crews will access the locations by foot and will be on site for less than a week during each monitoring period. The NPS anticipates that this monitoring will be completed by outside researchers who will be issued a research permit.

See Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA and FONSI (NPS 2023b and NPS 2023a, respectively; PEPC 107200) for more information/background.

C. RESOURCE IMPACTS TO CONSIDER:

Resource	Potential for Impact	Potential Issues & Impacts
Air Air Quality	None	
Biological Migratory birds	Potential	Issue: See impacts to wildlife, below.
Biological Nonnative or Exotic Species *Invasive Species and Soil Pathogens*		Issue: Introductions of invasives and pathogens through planting and workers. Impact: Minor potential negative effects are expected to be as described in the Revised EA (page 11 as applicable to Dillonwood Grove). Mitigations/best management practices will be implemented to minimize the potential for any impacts.
Biological Sequoias *Sequoia Recovery and Resilience*	Potential	Issue: Planting of sequoia grove. Impact: Beneficial effects are expected to be as described in the Revised EA (pages 52-54 as applicable to Dillonwood Grove).
Biological Species of Special Concern or Their Habitat *Fisher and Spotted Owl*	Potential	Issue: Removal of trees and disturbance. Impact: Minor potential negative effects of removing large snags (150-200' in height) to support administrative camping or sling-load delivery are expected to be consistent with, if slightly less, than those described on pages 12-15 of the Revised EA due to fewer large trees being removed overall (6 in the size class of that could reach a height of 150 feet or more in height and of a diameter used by these species (>35" conifers for fisher or > 40' diameter conifers for spotted owl)). While a total of 9 other trees (ranging from 16-32 inches) would be removed with chainsaw, as well as several smaller trees likely to be removed with handsaw (see 2024-MRA-15), the total noise disturbance impacts are not expected to exceed the 3 hours analyzed in the Revised EA, nor would the disturbance occur during the denning and nesting Limited Operating Periods for these sensitive species.
Biological Species of Special Concern or Their Habitat *Forest adapted species*	Potential	Issue: Forest recovery Impact: Though the extent to which fisher utilize sequoia groves specifically is unknown, spotted owl are known to use these forests extensively and specifically are known to select mature sequoia trees for nesting. In either case, forest recovery would be expected to have beneficial effects for these species of special concern (spotted owl, fisher). This is especially the case where forest is vulnerable to conversion from forest to a shrub dominated system as is the case with this patch of sequoia grove.
Biological Vegetation *Understory Vegetation—*	Potential	Issue: Work crews moving through project site and replanting seedlings Impact: Minor negative and beneficial effects are expected to be as described on pages 16-17 of the Revised EA, as amended, and as

Including Special Status Plants or Shrub Communities		applicable to the Dillonwood Grove. Mitigations will be implemented to avoid or minimize, impacts.
Biological Wildlife and/or Wildlife Habitat including terrestrial and aquatic species *Wildlife Disturbance and General Wildlife Habitat*	Potential	Issue: Presence of Work Crews. Removal of Trees. Impact: Potential for minor negative impacts are expected to be as described on pages 12-14 of the Revised EA, as amended, and as applicable to the Dillonwood Grove. See also, species of special concern.
Cultural Archeological Resources	None	
Cultural Cultural Landscapes	None	
Cultural Ethnographic Resources	None	
Cultural Museum Collections	None	
Cultural Prehistoric/historic structures	None	
Geological Cave Resources	None	
Geological Geologic Features	Potential	Issue: Foot traffic and planting. Impact: Minor negative and beneficial effects are anticipated, consistent with those described on pages 11-12 of the Revised EA, as amended, as applicable to the Dillonwood Grove. Mitigations will be implemented to minimize, if not avoid, potential impacts from foot traffic.
Geological Geologic Processes	None	
Lightscapes Lightscapes	None	
Other Human Health and Safety	Potential	Issue: Work in a severely burned area. Impact: There are inherent risks associated with working in the wilderness. Particularly when working in areas recently burned by wildfire. These risks will be mitigated to the maximum extent feasible through training and mitigations such as PPE as described in the Revised EA, as amended.

Paleontological Paleontological Resources	None	
Socioeconomic Land Use	None	
Socioeconomic Minority and low-income populations, size, migration patterns, etc.	None	
Socioeconomic Socioeconomic	None	
Soundscapes Soundscapes	Potential	Issue: Sound disturbance. Impact: See impacts to wilderness quality: Opportunities for Solitude or Primitive and Unconfined Recreation.
Viewsheds Viewsheds	None	
Visitor Use and Experience Recreation Resources	None	
Visitor Use and Experience Visitor Use and Experience	Potential	Impact: See impacts to wilderness quality: Opportunities for Solitude or Primitive and Unconfined Recreation.
Water Floodplains	None	
Water Water Quality or Quantity	None	
Water Wetlands	None	
Wilderness (Recommended) Wilderness *Natural Quality*	Potential	Issue: Planting tree seedlings across roughly 40 acres of recommended wilderness and monitoring. Impact: Long term beneficial effects are anticipated to be consistent with those described on pages 67-68 of the Revised EA, as amended, as relevant to Upper Dillonwood Grove (see also impacts from Alternative 2 in 2024-MRA-15). The cumulative effects to wilderness character within the Hockett Area Recommended Wilderness are likewise consistent with the Revised EA. There would be no impacts in the John Krebs Wilderness from this action but for overflights as described in the Revised EA.

Wilderness (Recommended) Wilderness *Opportunities for Solitude or Primitive and Unconfined Recreation*	Potential	Issue: Sights and sounds of ongoing project work (i.e., crew presence, overflights, and use of motorized tools). Impact: Temporary negative impacts are anticipated to be consistent with those described on page 69 of the Revised EA, as amended, as relevant to Upper Dillonwood Grove (see also impacts from Alternative 2 in 2024-MRA-15). The number of overflights (impacting this quality) remains the same as assumed in the Revised EA. Cumulative impacts to the John Krebs Wilderness and Hockett Area Recommended Wilderness are likewise consistent with the Revised EA.
Wilderness (Recommended) Wilderness *Undeveloped Quality*	Potential	Issue: Motorized and Mechanized Tools and Monitoring. Impact: Temporary negative impacts are anticipated to be generally consistent with those described on pages 66-69 of the Revised EA, as amended, as relevant to Upper Dillonwood Grove (see also impacts from Alternative 2 in 2024-MRA-15), except that two additional landings within recommended wilderness (as opposed to *adjacent* to recommended wilderness) would occur beyond that anticipated in the Revised EA. These additional landings would only occur should mortality require additional planting in in subsequent years as described in 2024-MRA-15. Should these flights occur, each landing will result in an additional 2-5 seconds of impact to the undeveloped quality at this site specifically; the total number of landings for the entire "Re-establish Tree Seedlings" project remains below those estimated for the purposes of analysis in the Revised EA and is not significant in the context of either this site or the wilderness as a whole. In addition, tree wells will not be created around each seedling in this area, thereby reducing anticipated impacts to the undeveloped quality that were anticipated in the Revised EA. Cumulative impacts within Hockett Area Recommended Wilderness are likewise consistent with the Revised EA, as amended.
Wilderness (Recommended) Wilderness *Untrammeled Quality*	Potential	Issue: Planting tree seedlings across roughly 40 acres of recommended wilderness, felling 19 snags/tree hazards, and planting up to 20% non-local genetic material. Impact: Temporary negative impacts are anticipated to be consistent with those described on page 67 of the Revised EA, as amended, as relevant to Upper Dillonwood Grove (see also impacts from Alternative 2 in 2024-MRA-15). Cumulative impacts within the John Krebs Wilderness and Hockett Area Recommended Wilderness are consistent with the Revised EA, as amended.

IDT Team Members:

Andrew Bishop – Original Project Leader
Elizabeth Boerke - NEPA Coordinator
Juanita Bonnifield - NHPA Specialist
Christy Brigham - Chief of Resources Management and Science
Elle Farias - NHPA Specialist
Theresa Fiorino - NEPA Specialist

Linn Gassaway - NHPA Specialist
Rebecca Green - Wildlife Biologist
Meg Kargul - Restoration Ecologist; New Project Leader

Memo To File

A. Project Information

Park Name: Sequoia and Kings Canyon National Parks
PEPC Project Number: 119282
Project Title: Re-establish Tree Seedlings in Dillonwood Grove
Project Location:
County, State: Tulare, California

Project Leader: Meg Kargul

B. Description of the Current Action (Project Description)

In alignment with the decision tree outlined in the selected alternative within the FONSI associated with Reestablish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA and the determined minimum requirement for the administration of the area as wilderness (2024-MRA-15), the NPS will move forward with planting in up to 39.6 acres in Upper Dillonwood Grove. Sequoia and mixed conifer seedlings grown from seed collected both within and outside the local genetic community will be planted at roughly 75-200 seedlings/acre using hand tools according to methods outlined under the selected alternative in the FONSI (which incorporates Alternative 2 in the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Upper Dillonwood Grove.

One crew, of up to 15 people (including NPS staff and crews operating under an agreement with the NPS), will implement the planting plan over up to two weeks in fall 2024 or spring 2025. An additional crew of 2-5 people (operating under a research permit with the NPS) will complete monitoring at the same time or shortly thereafter as described below.

All crews will hike to and camp within close proximity of the project area, accessing all areas by foot. Tree seedlings, tools, and equipment will be transported to project area via two helicopter sling loads, and all gear will be flown off site at the end of the planting via one helicopter sling load. From the sling load delivery location, planting crews will transport seedlings to their planting locations on foot.

To prepare a safe administrative camp and sling load landing area, roughly six snags (i.e., dead trees) 35-60 inches dbh (those that may range from 150-200 feet tall), nine snags 16-32 inches dbh, and roughly four snags less than12 inches dbh that pose a safety hazard to administrative campers or sling load landing will be felled. As blasting has been determined to not be the safest tool to remove any of the identified tree hazards, chainsaws will be used to fell tree hazards greater than 12” dbh; hand tools will be used to fell 12” or lower dbh trees so long as the tree feller determines it is safe to do so using the Severity, Probability, Exposure (SPE) model. The NPS estimates that felling this number of snags with chainsaws will require roughly 2-3 hours of chainsaw run time. All use of camp and work areas will follow wilderness minimum impact restrictions.

If mortality after the first planting season is high (i.e., survival is less than 70%), subsequent replanting may occur for up to 2 years. During any successive planting years, it is anticipated that this total will decline in direct relation

to the number of seedlings being replaced (e.g., if seedlings suffer 50% mortality or less, the annual planting time would be for roughly one week the first year and several days the next). The number of sling load deliveries would be 1 instead of 2 each successive year of planting though would be reevaluated depending on the number of seedlings being delivered. Tree hazards would not require felling in subsequent years as sites would be reused.

The NPS will also establish and implement a long-term monitoring protocol to track survivorship of planted seedlings and continue to understand regeneration within this area consistent with the selected alternative, as amended. This will include the establishment of 20 plots within the planting area (and tagging approximately 27 plants within each plot with a small plant tag) and 20 control plots (using same plots that USGS has been monitoring; these plots will be no plant plots as controls) that will be monitored by crews of up to five people twice in 2025, once per year from 2026-2029, and once every five years thereafter. These crews will access the locations by foot and will be on site for less than a week during each monitoring period. The NPS anticipates that this monitoring will be completed by outside researchers who will be issued a research permit.

See Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA and FONSI (NPS 2023b and NPS 2023a, respectively; PEPC 107200) for more information/background.

C. Description of Previous Compliance Documentation

Decision Document Name:	FONSI associated with Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA, as amended by CE 3.3.B.1 Changes or amendments to an approved action when such changes would cause no or only minimal environmental impact
Decision Document PEPC ID:	107200 (FONSI) and 119393 (amendment)
Decision Document Approval Date:	October 4, 2023, amended October 10, 2023

D. Notes

This project will implement a portion of the selected alternative identified within the FONSI for the Re-Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (Revised EA), as amended, as it pertains to the Dillonwood Sequoia Grove.

As described below and in alignment with the FONSI, conditions in Upper Dillonwood Grove meet the decision tree criteria for taking action to plant sequoias and mixed conifer seedlings in the Grove.

- *Remote Sensing Data Analysis* (complete): Identification of contiguous patches of high severity fire effects in Upper Dillonwood Grove was completed immediately following the Castle Wildfire using the Rapid Assessment of Vegetation Condition after Wildfire, Standardized Composite Burn Index (RAVG 4 category CBI product). This remote sensing tool identified that this Grove had suffered high tree mortality and a portion of this Grove is vulnerable to conversion to shrub habitat. This information served as a basis for the original proposal to replant these areas.

- *Mortality and Regeneration Analysis* (complete): Post-fire field surveys in 2023 found 90% mortality of large sequoias within the 39.6 acre patch of Upper Dillonwood Grove that burned at high-severity following the 2020 Castle Fire (data from Soderberg and Das 2023). The 2023 survey data from Upper Dillonwood Grove also found an estimated mean of 58 sequoia seedlings/acre, equating to a 0% probability of being equivalent to the third-year seedling densities calculated by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the Revised EA), is as high as expected—reducing the likelihood of future seed rain and potential regeneration—and (2) actual seedling regeneration within the proposed action area does not meet the

90% probability of meeting the 6,718 sequoia seedlings/acre mean third-year seedling density determined by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). Based on these field surveys and findings, the NPS has determined that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout this portion of the Grove. See Revised EA for additional information and context.

- *Climate Assessment* (complete): Results of this analysis indicate that Upper Dillonwood Grove has a high likelihood of continuing to support forest under future climate conditions, although tree densities in some sites may be reduced to reduce future drought stress from lower water availability in the future.

E. Conclusion

I certify that the existing NPS NEPA documentation (EA, FONSI, and CE amendment) has been reviewed and there are no substantive differences between the current proposal and its associated environmental impacts and the proposal and impacts (as pertinent to a subset of the proposal within Dillonwood Grove) as described in the existing NEPA documents and associated decision documents. Mitigations from the previous decision document, and any additional from the site specific MRA are considered integral to the project scope and will be implemented via standard operations within the National Park Service and via agreements and/or contracts.

Superintendent: Clayton F. Jordan Digitally signed by CLAYTON JORDAN Date: 2024.09.23 18:58:01 -07'00'

Clayton F. Jordan

Works Cited:

Soderberg, D.N., and Das, A.J., 2023, Assessment of giant sequoia mortality and regeneration within burned groves in Sequoia and Kings Canyon national parks (ver. 2.0, January 2024): U.S. Geological Survey data release, https://doi.org/10.5066/P96Z1PBK.

Soderberg, D., Das, A., Stephenson, N., Meyer, M., Brigham, C. and Flickinger, J. 2024. Assessing giant sequoia mortality and regeneration following high-severity wildfire. https://doi.org/10.1002/ecs2.4789.

Stephenson, N.L., Caprio, A.C., Soderberg, D.N., Das, A.J., Lopez, E.L., Williams, A.P. 2024. Post-fire reference densities for giant sequoia seedlings in a new era of high-severity wildfires. Forest Ecology and Management. 562 (2024) 121916.

ASSESSMENT OF ACTIONS HAVING AN EFFECT ON HISTORIC PROPERTIES

A. DESCRIPTION OF UNDERTAKING

1. Park: Sequoia and Kings Canyon National Parks

2. Project Description:

Project Name: Re-establish Tree Seedlings in Dillonwood Grove
Prepared by: Linn Gassaway **Date Prepared:** 04/26/2024 **Telephone:**
PEPC Project Number: 119282
Locations:
County, State: Tulare, CA
County, State: Fresno, CA
Describe project:
This project will implement the Dillonwood Grove portion of the selected alternative identified within the Finding of No Significant Impact (FONSI; NPS 2023a) for the Re-Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (Revised EA; NPS 2023b), as amended.

As described below and in alignment with the FONSI, conditions in Upper Dillonwood Grove meet the decision tree criteria for taking action to plant sequoias and mixed conifer seedlings in the Grove.

- *Remote Sensing Data Analysis* (complete): Identification of contiguous patches of high severity fire effects in Upper Dillonwood Grove was completed immediately following the Castle Wildfire using the Rapid Assessment of Vegetation Condition after Wildfire, Standardized Composite Burn Index (RAVG 4 category CBI product). This remote sensing tool identified that this Grove had suffered high tree mortality and a portion of this Grove is vulnerable to conversion to shrub habitat. This information served as a basis for the original proposal to replant these areas.

- *Mortality and Regeneration Analysis* (complete): Post-fire field surveys in 2023 found 90% mortality of large sequoias within the 39.6 acre patch of Upper Dillonwood Grove that burned at high-severity following the 2020 Castle Fire (data from Soderberg and Das 2023). The 2023 survey data from Upper Dillonwood Grove also found an estimated mean of 58 sequoia seedlings/acre, equating to a 0% probability of being equivalent to the third-year seedling densities calculated by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the Revised EA), is as high as expected—reducing the likelihood of future seed rain and potential regeneration—and (2) actual seedling regeneration within the proposed action area does not meet the 90% probability of meeting the 6,718 sequoia seedlings/acre mean third-year seedling density determined by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). Based on these field surveys and findings, the NPS has determined that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout this portion of the Grove. See Revised EA for additional information and context.

- *Climate Assessment* (complete): Results of this analysis indicate that Upper Dillonwood Grove has a high likelihood of continuing to support forest under future climate conditions, although tree densities in some sites may be reduced to reduce future drought stress from lower water availability in the future.

Given the results summarized above, and in alignment with the decision tree outlined in the selected alternative and the determined minimum requirement for the administration of the area as wilderness (2024-MRA-15), the NPS will move forward with planting in up to 39.6 acres in Upper Dillonwood Grove. Sequoia and mixed conifer seedlings grown from seed collected both within and outside the local genetic community will be planted at roughly 75-200 seedlings/acre using hand tools according to methods outlined under the selected alternative in the FONSI (which incorporates Alternative 2 in the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Upper Dillonwood Grove.

One crew, of up to 15 people (including NPS staff and crews operating under an agreement with the NPS), will implement the planting plan over up to two weeks in fall 2024 or spring 2025. An additional crew of 2-5 people (operating under a research permit with the NPS) will complete monitoring at the same time or shortly thereafter as described below.

All crews will hike to and camp within close proximity of the project area, accessing all areas by foot. Tree seedlings, tools, and equipment will be transported to project area via two helicopter sling loads, and all gear will be flown off site at the end of the planting via one helicopter sling load. From the sling load delivery location, planting crews will transport seedlings to their planting locations on foot.

To prepare a safe administrative camp and sling load landing area, roughly six snags (i.e., dead trees) 35-60 inches dbh (those that may range from 150-200 feet tall), nine snags 16-32 inches dbh, and roughly four snags less than12 inches dbh that pose a safety hazard to administrative campers or sling load landing will be felled. As blasting has been determined to not be the safest tool to remove any of the identified tree hazards, chainsaws will be used to fell tree hazards greater than 12" dbh; hand tools will be used to fell 12" or lower dbh trees so long as the tree feller determines it is safe to do so using the Severity, Probability, Exposure (SPE) model. The NPS estimates that felling this number of snags with chainsaws will require roughly 2-3 hours of chainsaw run time. All use of camp and work areas will follow wilderness minimum impact restrictions.

If mortality after the first planting season is high (i.e., survival is less than 70%), subsequent replanting may occur for up to 2 years. During any successive planting years, it is anticipated that this total will decline in direct relation to the number of seedlings being replaced (e.g., if seedlings suffer 50% mortality or less, the annual planting time would be for roughly one week the first year and several days the next). The number of sling load deliveries would be 1 instead of 2 each successive year of planting though would be reevaluated depending on the number of seedlings being delivered. Tree hazards would not require felling in subsequent years as sites would be reused.

The NPS will also establish and implement a long-term monitoring protocol to track survivorship of planted seedlings and continue to understand regeneration within this area consistent with the selected alternative, as amended. This will include the establishment of 20 plots within the planting area (and tagging approximately 27 plants within each plot with a small plant tag) and 20 control plots (using same plots that USGS has been monitoring; these plots will be no plant plots as controls) that will be monitored by crews of up to five people twice in 2025, once per year from 2026-2029, and once every five years thereafter. These crews will access the locations by foot and will be on site for less than a week during each monitoring period. The NPS anticipates that this monitoring will be completed by outside researchers who will be issued a research permit.

See Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA and FONSI (NPS 2023b and NPS 2023a, respectively; PEPC 107200) for more information/background.

Area of potential effects (as defined in 36 CFR 800.16[d]): Updated 4/26/2024

Area of Potential Effect for Dillonwood Grove consists of a total of approximately 216 acres in Sequoia National Park. This area consists of approximately 39.6 acres of Sequoia Planting areas in Upper Dillonwood Grove, areas of proposed camping (for planning purposes these areas are broad to account for potential avoidance of resources and still be able to accommodate crews and allow for dispersed camping where hazard tree removal is reduced). Campsites are to accommodate up to 20 people. Multiple proposed helicopter landing/ sling zones consist of a150 ft buffer from a central point, to accommodate both the helicopter and hazard tree removal. Numerous water sources and staging area locations are identified and also received a 150 ft buffer around a centroid, to accommodate hazard tree removal. Access routes consisting of limited access or existing trails to and from work areas to camps, staging areas, helispots or water sources were given 20 ft buffer. Vertical APE is 12 inches below surface.

This is adequate to assess potential effects from all anticipated activities required to conduct planting activities, including direct and indirect effects.

3. Has the area of potential effects been surveyed to identify historic properties?

___ **No**

X **Yes**

Source or reference: SEKI2014A
SEKI2004 Dillonwood

4. Potentially Affected Resource(s):

Archeological Resources Present: Yes

Archeological Resources Notes: Dennison Ridge/Summit Lake trail (Linear Feature 1 [LF1]) as well as a spur trail (Linear Feature 2 [LF2])

Historical Structures/Resources Present: No

Cultural Landscapes Present: No

Ethnographic Resources Present: No

5. The proposed action will: (check as many as apply)

No Destroy, remove, or alter features/elements from a historic structure

No Replace historic features/elements in kind

No Add non-historic features/elements to a historic structure

No Alter or remove features/elements of a historic setting or environment (inc. terrain)

No Add non-historic features/elements (inc. visual, audible, or atmospheric) to a historic setting or cultural landscape

No Disturb, destroy, or make archeological resources inaccessible

No Disturb, destroy, or make ethnographic resources inaccessible>

No Potentially affect presently unidentified cultural resources

No Begin or contribute to deterioration of historic features, terrain, setting, landscape elements, or archeological or ethnographic resources

No Involve a real property transaction (exchange, sale, or lease of land or structures)

___ Other (please specify): _____

6. Supporting Study Data:
(Attach if feasible; if action is in a plan, EA or EIS, give name and project or page number.)

B. REVIEWS BY CULTURAL RESOURCE SPECIALISTS

The park 106 coordinator requested review by the park's cultural resource specialist/advisors as indicated by check-off boxes or as follows:

[X] 106 Advisor
Name: Linn Gassaway
Date: 08/14/2024

Check if project does not involve ground disturbance **[ ]**
Assessment of Effect: __No Potential to Cause Effect __No Historic Properties Affected __X__No Adverse Effect __Adverse Effect __Streamlined Review
Recommendations for conditions or stipulations:

Doc Method: Standard 4-Step Process

[X] Archeologist
Name: Juanita Bonnifield
Date: 09/03/2024

Check if project does not involve ground disturbance **[ ]**
Assessment of Effect: __No Potential to Cause Effect __No Historic Properties Affected __X__No Adverse Effect __Adverse Effect __Streamlined Review
Recommendations for conditions or stipulations:

Doc Method: Standard 4-Step Process

REVIEW AND RECOMMENDATIONS

1. Assessment of Effect:

_____ No Potential to Cause Effects

_____ No Historic Properties Affected

X No Adverse Effect

_____ Adverse Effect

2. Documentation Method:

[X] A. Standard 36 CFR Part 800 Consultation
Further consultation under 36 CFR Part 800 is needed.

[ ] B. Streamlined Review Under the 2008 Servicewide Programmatic Agreement (PA)
The above action meets all conditions for a streamlined review under section III of the 2008 Servicewide PA for Section 106 compliance.

Applicable Streamlined Review Criteria
(Specify 1-16 of the list of streamlined review criteria.)

[ ] C. Undertaking Related to Park Specific or Another Agreement
The proposed undertaking is covered for Section 106 purposes under another document such as a park, region or statewide agreement established in accord with 36 CFR 800.7 or 36 CFR 800.14.

[ ] D. Combined NEPA/NHPA Process
Process and documentation required for the preparation of an EA/FONSI or an EIS/ROD to comply with Section 106 is in accord with 36 CFR 800.8.c.

[ ] E. Memo to Project File

3. Consultation Information

SHPO Required: Yes
SHPO Sent: Jul 16, 2024
SHPO Received: Aug 29, 2024

THPO Required:
THPO Sent:
THPO Received:

SHPO/THPO Notes:

Advisory Council Participating: No
Advisory Council Notes:
Additional Consulting Parties: No

4. Stipulations and Conditions: Following are listed any stipulations or conditions necessary to ensure that the assessment of effect above is consistent with 36 CFR Part 800 criteria of effect or to avoid or reduce potential adverse effects.

None identified. No impacts to historic properties.

5. Mitigations/Treatment Measures:

All mitigations outlined in the 2024MRA15, the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA are considered integral to the project scope and will be implemented. In addition:

- Consider noise effects when scheduling project work (e.g., establish quiet hours on visitors, employees, and park natural and cultural resources).
- Wildlife biologist should be consulted for flight path in order to reduce disturbance to bighorn sheep. This is unlikely given the location of the project.
- Monitoring installations would be removed as soon as possible: all monitoring plot markers would be moved if high resolution GPS improves to such an extent that physical markers are no longer required for precisely identifying plot boundaries, and plant tags would be removed as seedlings/trees die, grow to a size such that a plant tag is no longer needed to identify precise individual, or if high resolution GPS improves to such an

extent that physical markers are no longer required for precisely identifying the individual seedling/tree that is monitored.
- Submit monitoring reports to research and monitoring program.
- Follow up reporting form on total duration of chainsaw use to be submitted upon project completion.

6. Assessment of Effect Notes: None.

D. RECOMMENDED BY PARK SECTION 106 COORDINATOR:

Compliance Specialist:
NHPA Specialist
Linn Gassaway

LINN GASSAWAY
Digitally signed by LINN GASSAWAY
Date: 2024.09.20 12:36:11 -07'00'

E. SUPERINTENDENT'S APPROVAL

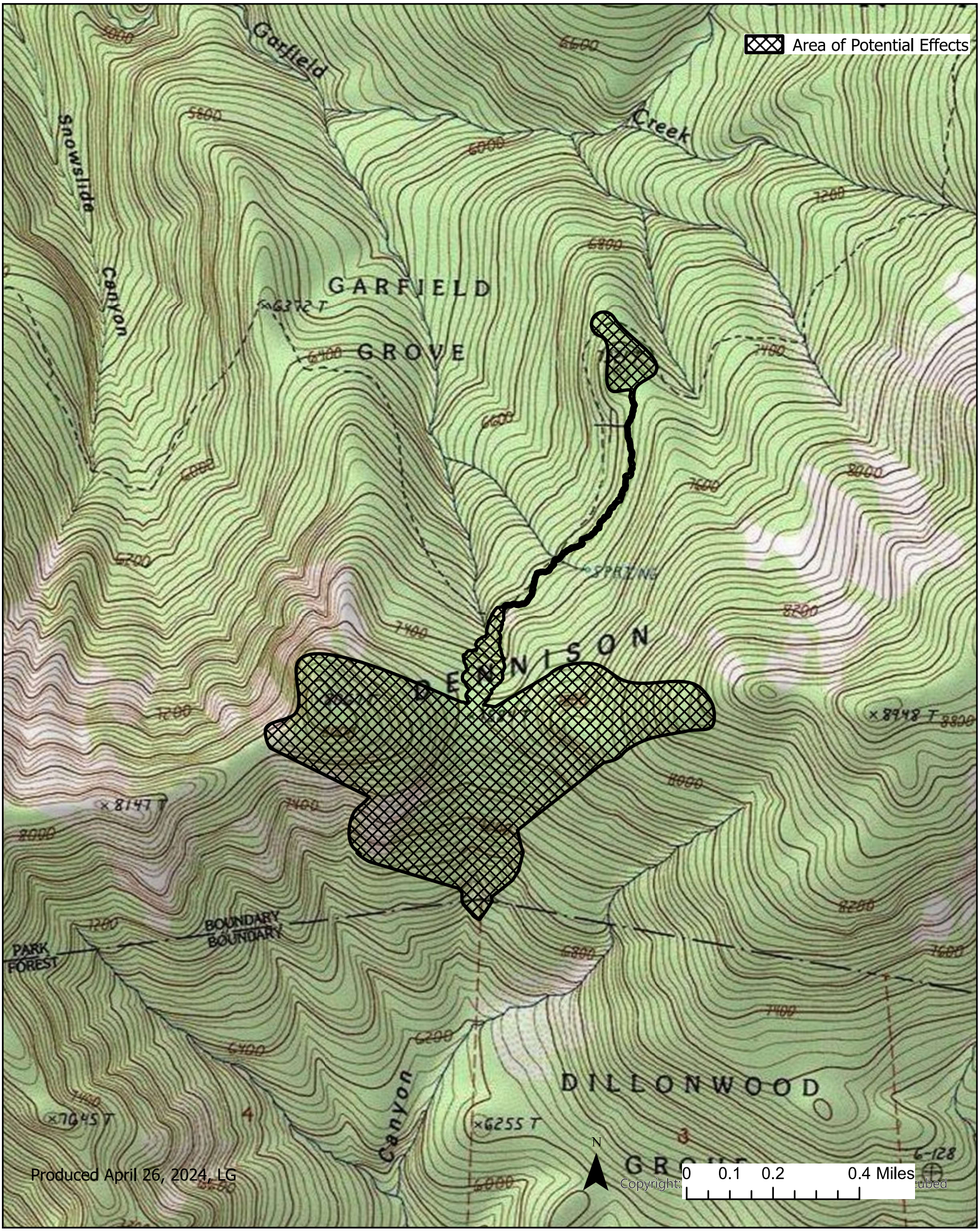
The proposed work conforms to the NPS *Management Policies* and *Cultural Resource Management Guideline*, and I have reviewed and approve the recommendations, stipulations, or conditions noted in Section C of this form.

Superintendent Signature:

Clayton F. Jordan
Digitally signed by CLAYTON JORDAN
Date: 2024.09.23 18:58:01 -07'00'

Clayton F. Jordan

Area of Potential Effect
Dillonwood Grove Planting



Other Compliance/Consultations Form

Park Name: Sequoia and Kings Canyon National Parks
PEPC Project Number: 119282
Project Title: Re-establish Tree Seedlings in Dillonwood Grove
Project Type: Restoration
Project Location:
County, State: Tulare, CA
Project Leader: Meg Kargul

ESA

Any Federal Species in the project Area?
If species in area: Not Likely to Adversely Affect
Was Biological Assessment prepared? Yes
If Biological Assessment prepared, concurred?
Formal Consultation required? No
Formal Consultation Notes:

Formal Consultation Concluded:
Any State listed Species in the Project Area?
Consultation Information:
General Notes: The NPS initiated Section 7 consultation for proposed actions related to this proposal that may affect the endangered fisher on July 7, 2023. The USFWS responded on August 21, 2023, concurring with the determination that the project (which includes potential action in 5 other areas) may affect but is not likely to adversely affect fisher for the following reasons: 1) The proposed project area currently does not contain suitable fisher habitat due to the impacts of recent fires, and therefore, fishers are not expected to be present in the project area. 2) The small scope of noise disturbance from creating safety zones and delivering supplies via helicopter will not cause long-term disturbance in the planting areas. Fishers in the vicinity of these areas may avoid the immediate area for a short time, but they would use other areas available during this time and this is not expected to result in a disruption of necessary foraging and other activities. 3) Although denning fishers are not expected in the project area, avoiding the limited operating period for felling of trees with den features will further ensure no adverse impacts to denning fishers occur. 4) Restoration of habitat connectivity and fire-resilient forest conditions is expected to provide an overall benefit to fisher (FWS-2023-0111204-S7-001).

The proposed threatened Sierra Nevada Distinct Population Segment of California Spotted Owl may occur in the project area. As the owl is not currently listed, the NPS is not required to consult under Section 7 at this time. Should the owl be listed before the project is completed and should the NPS determine there may be an effect from project work components requiring consultation, this documentation will be updated to reflect consultation outcomes.

Data Entered By: Theresa Fiorino **Date:** May 1, 2024

ESA Mitigations

Mitigations are included in the associated EA.

Floodplains/Wetlands/§404 Permits

Question	Yes	No	Details
A.1. Is project in 100- or 500-year floodplain or flash flood hazard area?		No	Not in floodplain or flash flood hazard area.
A.2. Is Project in wetlands as defined by NPS/DOI?		No	Not in wetland as defined by NPS/DOI.
B. COE Section 404 permit needed?		No	No placement of fill in waters of the United States.
C. State 401 certification?		No	
D. State Section 401 Permit?		No	**Issue Date:** **Expiration Date:**
E. Tribal Water Quality Permit?		No	
F. CZM Consistency determination needed?		No	**Date Review Requested:** **Date Reply Received:** **Date State Concurred:**
G. Erosion & Sediment Control Plan Required?		No	
H. Any other permits required?		No	**Permit Information:**
Other Information:			

Data Entered By: Theresa Fiorino **Date:** May 1, 2024

Floodplains & Wetlands Mitigations

No Floodplains & Wetlands mitigations are associated with this project.

Wilderness

Question	Yes	No	
A. Does this project occur in or adjacent to Designated, Recommended, Proposed, Study, Eligible, or Potential Wilderness?	Yes		
B. Is the only place to conduct this project in wilderness?	Yes		
C. Is the project necessary for the administration of the area as wilderness?	Yes		

D. Would the project or any of its alternatives adversely affect (directly or indirectly) Designated, Recommended, Proposed, Study, Eligible, or Potential Wilderness? (If Yes, Minimum Requirements Analysis required)	Yes		
E. Does the project or any of its alternatives involve the use of any of the Wilderness Act Section 4(c) prohibited uses: commercial enterprise, permanent road, temporary road, motor vehicles, motorized equipment, motorboats, landing of aircraft, mechanical transport, structure, or installation? (If Yes, Minimum Requirements Analysis required)	Yes		
If the answer to D or E above is "Yes" then a Minimum Requirements Analysis is required. Describe the status of this analysis in the column to the right.			**Initiation Date:** **Completed Date:** **Approved Date:**
Other Information: 2024MRA15 was drafted to determine the minimum requirement for transport and safe administrative zones; the proposed minimum requirement of this MRA has be integrated as the final description for the selected action in Upper Dillonwood Grove.			

Data Entered By: Theresa Fiorino **Date:** May 1, 2024

Other Permits/Laws *Questions A & B are no longer used.*

Question	Yes	No
C. Wild and scenic river concerns exist?		No
D. National Trails concerns exist?		No
E. Air Quality consult with State needed?		No
F. Consistent with Architectural Barriers, Rehabilitation, and Americans with Disabilities Acts or not Applicable? (If N/A check Yes)	Yes	
G. Other:		No

Other Information:

Data Entered By: Theresa Fiorino **Date:** May 1, 2024

MINIMUM REQUIREMENTS ANALYSIS FRAMEWORK WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

— Section 4(c), Wilderness Act of 1964

Re-Establish and Monitor Tree Seedlings in Upper Dillonwood Grove (2024-MRA-15)

Step 1: Determine If Administrative Action May Be Necessary

Issue Statement

The Upper Dillonwood Grove—which includes portions of the Garfield Grove located in the same drainage—totals 1,160 acres and covers lands managed by NPS and USFS on steep north and south facing slopes of Mt. Dennison in the Tule River (Willard 2000). All of the grove acres on NPS land are within Sequoia National Park and the Hockett Area Recommended Wilderness. Upper Dillonwood Grove is thought to have some of the lowest elevation sequoias in the world—at 4,600 feet (Willard 2000). Prior to the 2020 Castle Fire, STI data for Upper Dillonwood Grove included 1,099 living trees, with 407 of these at least four feet dbh (Hammon, Jensen, and Wallen Mapping and Forestry Services 1973). However, 102 acres (8.8%) of Upper Dillonwood Grove burned at high severity during the Castle Fire. In the high severity areas that were surveyed, sequoia mortality was 90% in a continuous 39.6 acre patch following the fire. Measured sequoia seedling densities within the portion surveyed of Upper Dillonwood Grove during year three post-fire had a mean estimate of the probability distribution of 58 seedlings per acre (data from Soderberg and Das 2023). See Figure 4 of Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (Revised EA; NPS 2023b) for a fire severity map of the Upper Dillonwood Grove. See pages 61-64 and Appendix C: Evaluating Ecological Intervention Proposals in Wilderness in the Revised EA for further information and background.

In applying the Decision Tree outlined in selected alternative in the Finding of No Significant Impact (FONSI; NPS 2023a) for the Revised EA (see page 20 and Figure 7 of the Revised EA), the NPS has determined, as follows, that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout the Grove.

- *Remote Sensing Data Analysis (complete):* Identification of contiguous patches of high severity fire effects in Upper Dillonwood Grove was completed immediately following the Castle Wildfire using the Rapid Assessment of Vegetation Condition after Wildfire, Standardized Composite Burn Index (RAVG 4 category CBI product). This remote sensing tool identified that the Grove had suffered high tree mortality and is vulnerable to conversion to shrub habitat. This information served as a basis for the original proposal to replant these areas.

- *Mortality and Regeneration Analysis (complete):* Post-fire field surveys in 2023 found 90% mortality of large sequoias within the 39.6 acre patch of Upper Dillonwood Grove that burned at high-severity following the 2020 Castle Fire (data from Soderberg and Das 2023).

The 2023 survey data from Upper Dillonwood Grove also found an estimated mean of 58 sequoia seedlings/acre, equating to a 0% probability of being equivalent to the third-year seedling densities calculated by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the Revised EA), is as high as expected—reducing the likelihood of future seed rain and potential regeneration—and (2) actual seedling regeneration within the proposed action area does not meet the 90% probability of meeting the 6,718 sequoia seedlings/acre mean third-year seedling density determined by Stephenson et al. 2024 (data from Soderberg and Das 2023; likelihood analysis NPS 2024 following protocol of Soderberg et al 2024). Based on these field surveys and findings, the NPS has determined that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout this portion of the Grove. See Revised EA for additional information and context.

- *Climate Assessment (complete):* Results of this analysis indicate that Upper Dillonwood Grove has a high likelihood of continuing to support forest under future climate conditions, although tree densities in some sites may be reduced to reduce future drought stress from lower water availability in the future.

As described above, conditions in Upper Dillonwood Grove meet the decision tree criteria for taking action (i.e., planting) in these areas in alignment with the Minimum Requirement Analysis (MRA) (see Appendix D of Revised EA) and FONSI for the Revised EA. Similarly consistent with these documents, there is a scientific need to (1) evaluate success of planting based on criteria established in the Revised EA and (2) subsequently determine if additional planting is necessary (looking for at least 70% survivorship in year one and less than 10% mortality in years 2-4). The purpose and need for monitoring is further documented within the Revised EA (page 35) and is further supported by the extensive public comments received on the EA that questioned the science behind, most notably, sequoia ecology and regeneration.

Considering the above, this MRA refines and supplements the minimum requirement for administering the Hockett Area Recommended Wilderness as recommended wilderness associated with the initial project phases (including planting and monitoring regeneration, survival, and growth of the replanting efforts) in the high severity areas of Upper Dillonwood Grove and successive actions associated with replanting sequoia and other mixed conifer seedlings in the area. See the FONSI, Revised EA, and Appendix D of the Revised EA, for more information/background.

Options Outside of Wilderness

Can the issue be resolved or addressed outside of wilderness?

☐ YES **STOP – EXPLAIN BELOW AND DO NOT TAKE ACTION**

☒ NO **EXPLAIN BELOW AND PROCEED TO THE NEXT SECTION**

Of the 102 acres of the Upper Dillonwood Grove that burned at high severity, 39.6 acres are considered for replanting and occur entirely within the Hockett Area Recommended Wilderness. Therefore, taking action outside of lands managed as wilderness would not address the mortality and low seedling regeneration in the Upper Dillonwood Grove. Similarly, monitoring the impact of the fire or the success of planting outside of areas managed as wilderness would not address

where the fire impacts or planting occurred and would not provide a robust data set to understand regeneration and seedling survivorship and growth across the planting area.

Criteria for Determining Necessity

Based on the legal requirements in Section 4(c) of the Wilderness Act, one or more of the factors A-D below must be met for any action to be considered.

Do any of the criteria below apply?

A. Wilderness Character

Based on the Issue Statement, are any of the qualities of wilderness character degraded, impaired, or threatened to a degree that it is necessary to analyze potential action otherwise prohibited by Section 4(c) to address the issue?

Untrammeled

☐ YES ☒ NO

This quality is currently not degraded in the action area.

Undeveloped

☐ YES ☒ NO

This quality is currently not degraded in the action area.

Natural

☒ YES ☐ NO

Giant sequoia is an attribute of the natural quality of wilderness character of the Hockett Area Recommended Wilderness. High severity fire has contributed to the death of 180 large (> 4 feet in diameter) sequoia trees and reduced the intact acreage of Upper Dillonwood Grove by roughly 9% (see Table 5 in the Revised EA); resulting in diminished natural quality of wilderness character. A documented lack of seedling regeneration leaves the Grove highly vulnerable to long-term type conversion to shrub-dominated systems. Because sequoia already have limited distribution (as recognized in the parks' enabling legislation), taking action is necessary to prevent conversion of Upper Dillonwood Grove to non-forest and direct this area—over a period of centuries—toward recovery of pre-fire distribution and population levels of large giant sequoias, thus preserving in the long term, the natural quality of wilderness character.

Monitoring the affected area is also critical for directing management actions that are both reactive and preventative. The plot network, which is designed with statistically valid rigor

and captures baseline forest information useful for a diversity of questions, will also act as a resource for other researchers in the parks to inform other conservation needs.

Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

☐ YES ☒ NO

This quality is currently not degraded in the action area.

Other features of value

☐ YES ☒ NO

This quality is currently not degraded in the action area.

B. Valid Existing Rights

Is action necessary to satisfy a valid existing right? If so, cite the specific right, terms and conditions, and source.

☐ YES ☒ NO

C. Special Provisions of Wilderness Legislation

Is action necessary to satisfy a special provision in wilderness legislation (i.e., Section 4(d) of the Wilderness Act of 1964 or subsequent wilderness-enabling laws) that requires action? Cite law and section.

☐ YES ☒ NO

As the Hockett Area Recommended Wilderness has not been designated as wilderness by an act of Congress (see Section 3 of the Wilderness Act), no wilderness legislation applies to this area. Rather, the NPS, under policy, manages the Hockett Area Recommended Wilderness consistent with the provisions of the Wilderness Act. Though not necessary to conform with a special provision of the Act, Section 4(a) of the Wilderness Act establishes that the supplemental purposes of wilderness shall not lower the standards evolved for use and preservation of national park units established under the Organic Act: "Nothing in this Act shall modify the statutory authority under which units of the national park system are created. … Further, the designation… as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park, monument, or other unit of the national park system in accordance with section 100101(b)(1)…of Title 54, United States Code, [or] the statutory authority under which the area was created…" The proposed action serves to preserve Giant Sequoias; Sequoia National Park was designated by Congress (and these lands subsequently added to Sequoia National Park by Congress) in large part for the protection of this species.

D. Requirements of Other Federal Laws

*Not including special provisions found in wilderness-enabling laws, does another Federal law, by itself or as implemented or interpreted through EO, court order, etc., **require** action? Cite law and section.*

☒ YES ☐ NO

Yes. The persistence of mature giant sequoia is required to meet the park enabling legislation and other federal laws governing the National Park Service.

1890 Enabling Legislation of Sequoia National Park, 26 Statute 478

> "Whereas the rapid destruction of timber and ornamental trees in various parts of the United States, some of which trees are the wonders of the world on account of their size and the limited number growing, makes it a matter of importance that at least some of said forests should be preserved…". These lands are to be managed "for the preservation from injury of all timber, mineral deposits, natural curiosities or wonders . . . [and for] their retention in their natural condition."

Sequoia National Park was established, in a large part, to preserve trees that are "the wonders of the world on account of their size and the limited number growing." This passage is referring to Sequoias, recognizes their limited distribution, and directs that they should be preserved within the park. As the distribution of the species has been reduced, and current conditions are not the "natural condition" but instead will threaten recovery of these groves, the NPS is obligated to act to achieve one of the primary purposes for which these parks were established.

The NPS Organic Act of 1916 (54 USC 100101(a))

The Organic Act directs the NPS to "…conserve the scenery and natural and historic objects and the wildlife therein…by such means as will leave them unimpaired for the enjoyment of future generations".

The 1978 Amendment to the NPS Organic Act (54 USC 100101(b)(2))

This amendment clarified and enhanced the protective functions of the National Park Service and states:

"Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System, as defined in section 1c of this title, shall be consistent with and founded in the purpose established by section 1 of this title [the Organic Act provision quoted above], to the common benefit of all the people of the United States. The authorization of activities shall be construed, and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

The Organic Act and amendments direct the NPS to conserve "natural objects and wildlife therein" in an unimpaired manner. Sequoias are specifically referred to in the park's enabling legislation thus a resource that is necessary to fulfill identified park purposes. The species is key to the natural integrity of the park and holds special significance for park management and public enjoyment.

The threats to sequoias directly relate to a loss of occupied land area and associated total population decline which would remain diminished should affected areas convert in the long term to shrub communities. As current conditions threaten the natural distribution and survival of the species, the NPS is obligated to conserve the species in a manner consistent with the Act in order to prevent degradation through a long-term, if not permanent, loss of sequoias as a resource within the area.

2000 Addition of Dillonwood Grove to Sequoia National Park, 114 Stat. 3062

"The land referred to in subsection (a) is the land depicted on the map entitled "Dillonwood", numbered 102/80,044, and dated September 1999. "Upon acquisition of the land [depicted on the map entitled "Dillonwood", numbered 102/80,044, and dated September 1999] (1) the Secretary of the Interior shall— (A) modify the boundaries of Sequoia National Park to include the land within the park; and (B) administer the land as part of Sequoia National Park in accordance with all applicable laws…"

See the MRA in Appendix D of the Revised EA for a full list of laws, policies, plans, and other guidance concerning the issue described above.

Step 1: Determination – Is Administrative Action Necessary in Wilderness?

☒ YES **EXPLAIN BELOW AND COMPLETE STEP 2 OF THE MRAF**

☐ NO **STOP – EXPLAIN BELOW AND DO NOT TAKE ACTION**

The Upper Dillonwood Grove within Sequoia National Park is entirely within the Hockett Area Recommended Wilderness. The ecological, natural conditions in the Grove have been degraded, and acting entirely outside of this recommended wilderness would not address the lack of seedling regeneration in the Grove. Conservation and scientific understanding are public purposes of the Wilderness Act (16 U.S.C. § 1133(b)). Thus, actions taken to preserve, protect or conserve, natural resources, such as sequoia, and the scientific research of regeneration and restoration efforts further the purposes of the Act.

The Organic Act directs the NPS to "conserve the scenery, natural and historic objects, and wildlife" in units of the National Park System "…in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (54 U.S.C. § 100101(a)). The enabling legislation for the parks demonstrates that they were created in order to conserve their natural resources, in particular sequoia trees. The NPS determined that the persistence of mature giant sequoia is required to meet the parks' enabling legislation and other applicable laws. NPS Management Policies (which are the agency's official interpretation of its Organic Act and provide specific and detailed guidance regarding the NPS's preservation obligations under the Organic Act) also require the NPS to maintain natural population processes, strive to protect a full range of native plant and animal genotypes, and monitor wilderness to understand effects of management actions (see more information under Step 2). Consistent with these policies, the NPS may manipulate landscapes and plant or animal populations if necessary to correct excessive disturbance caused by past human actions and when such actions would not cause unacceptable impacts. Park management plans and the Parks' Foundation Document also provide for the conservation of giant sequoia (see more information under Step 2).

Step 2: Determine the Minimum Activity

Other Direction

Is there "special provisions" language in legislation or other congressional direction that explicitly allows consideration of (but does not require) a prohibited use? (Step 1 has a similar question in Section C, but that question is specific to other legislation requiring action in wilderness; this question is specific to other legislation addressing consideration of prohibited uses). ***AND/OR*** *Has the issue been addressed or prescribed in agency policy, management plans, or legal directive (e.g., treaty, EO, court order, or other binding agreement with federal, state, or local agencies or authorities)?*

☒ YES **DESCRIBE OTHER DIRECTION**

☐ NO **SKIP TO "UNCONTROLLABLE TIMING REQUIREMENTS" BELOW**

NPS Management Policies 2006

NPS Management Policies (MP) require the NPS maintain natural population processes (MP 4.4.1.1) and strive to protect a full range of native plant and animal genotypes (MP 4.4.1.2) such as those that would be protected and preserved under this proposed action. These policies also require that the NPS meet its obligations under the Organic Act and Endangered Species Act to protect threatened or endangered species and their habitat (MP 4.4.2.3). Further, these policies permit the NPS to manipulate landscapes and plant or animal populations if necessary to correct excessive disturbance caused by past human actions (MP 4.4.2.4) and when such actions would not cause unacceptable impacts to the species in question or the ecosystem in question (MP 4.4.2). The parks' internal management guidance further directs the parks to re-establish the function of human disturbed natural systems (NPS 2007, Vegetation: desired conditions).

In accordance with these management policies, the NPS manages the natural resources of parks to maintain them in an unimpaired condition for present and future generations in accordance with NPS-specific statutes, including the NPS Organic Act and the National Parks Omnibus Management Act of 1998; general environmental laws such as the Clean Air Act, the Clean Water Act, the Endangered Species Act of 1973, the National Environmental Policy Act, and the Wilderness Act; executive orders; and applicable regulations.

1.4.5 What Constitutes Impairment of Park Resources and Values

> "An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:
>
> - necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
> - key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
> - identified in the park's general management plan or other relevant NPS planning documents as being of significance."

1.4.6 What Constitutes Park Resources and Values

- "the park's scenery, natural and historic objects, and wildlife, and the processes and condition that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; 11 water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structure, and objects; museum collections; and native plants and animals;

- appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;

- the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and

- any additional attributes encompassed by the specific values and purposes for which the park was established."

4.2 Studies and Collections

"The Service will encourage appropriately reviewed natural resource studies whenever such studies are consistent with applicable laws and policies. These studies support the NPS mission by providing the Service, the scientific community, and the public with an understanding of park resources, processes, values, and uses that will be cumulative and constantly refined. This approach will provide a scientific and scholarly basis for park planning, development, operations, management, education, and interpretive activities."

4.4.1.1 Plant and Animal Population Management Principles

"The Service *will* adopt park resource preservation… strategies that are intended to *maintain the natural population fluctuations and processes* that influence the dynamics of individual plant and animal populations, groups of plant and animal populations, and migratory animal populations in parks" (emphasis added).

4.4.1.2 Genetic Resource Management Principles

"The Service *will strive to* protect the full range of genetic types (genotypes) of native plant and animal populations in the parks by perpetuating natural evolutionary processes and minimizing human interference with evolving genetic diversity" (emphasis added).

"The need to maintain appropriate levels of genetic diversity *will guide decisions on what actions to take to manage isolated populations of species or to enhance the recovery of populations of rare, threatened, or endangered species*" (emphasis added).

4.4.2 Management of Native Plants and Animals

> "Whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species. The Service may intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the populations of the species or to other components and processes of the ecosystems that support them."

4.4.2.3 Management of Threatened or Endangered Plants and Animals

> "The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species."
>
> Further, the NPS will "manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species."

4.4.2.4 Management of Natural Landscapes

> "Natural landscapes disturbed by natural phenomena, such as… fires, will be allowed to recover naturally *unless manipulation is necessary to (1) mitigate for excessive disturbance caused by past human effects*…" (emphasis added).

6.3.6 Scientific Activities in Wilderness

> "Even those scientific activities (including inventory, monitoring, and research) that involve a potential impact to wilderness resources or values (including access, ground disturbance, use of equipment, and animal welfare) should be allowed when the benefits of what can be learned outweigh the impacts on wilderness resources or values... In every park containing wilderness, the conditions and long-term trends of wilderness resources will be monitored to identify the need for or effects of management actions."

<u>Sequoia and Kings Canyon National Parks General Management Plan (NPS 2007)</u>

Parks Mission: "protect forever the greater Sierran ecosystem – including the sequoia groves and high Sierra regions of the parks – and its natural evolution, and to provide appropriate opportunities to present and future generations to experience and understand park resources and values" (Page 1).

Management Prescription: "The giant sequoia groves — particularly Giant Forest — and the ecosystems they occupy are restored, maintained, and protected" (NPS 2007, Page 53).

Desired Conditions

- *Vegetation (including Sequoia Groves):*
  - "Intervention in natural biological or physical processes will be allowed only (1) when directed by Congress, (2) in some emergencies when human life and property are at stake, or (3) *to restore native ecosystem functioning that*

has been disrupted by past or ongoing human activities" (emphasis added) (NPS 2007, Page 13).
    - "The National Park Service *will* re-establish natural functions and processes in human-disturbed natural systems in the parks unless otherwise directed by Congress" (emphasis added) (NPS 2007, Page 14).
- *Wildlife:*
    - "Populations of native plant and animal species function in as natural a condition as possible except where special management considerations are warranted" (NPS 2007, Page 15).

Sequoia and Kings Canyon National Parks Wilderness Stewardship Plan (NPS 2015)

The Executive Summary of the parks' Wilderness Stewardship Plan (Page v.) outlines the following desired conditions:

> "The natural quality of wilderness would be preserved by mitigating the impacts of modern civilization on ecosystem structure, function, and processes. The NPS aspires to minimize or localize adverse impacts caused by visitor use and administrative activities. In the wilderness, natural processes would dominate:
>
> - *ecosystem structure and function* (emphasis added)
> - *native biodiversity* (emphasis added)
> - water quality and quantity
> - decomposition nutrient cycling, and soil forming processes
> - meadow and wetland productivity
> - *fire regimes* (emphasis added)
> - and soundscapes, dark skies, and viewsheds"

In addition: "Scientific investigations would continue to be conducted in wilderness to enable the NPS to meet its mission requirements and the ecological, geological, scientific, conservation, and historic purposes of the Wilderness Act."

Sequoia and Kings Canyon National Parks Resource Stewardship Strategy (NPS 2017)

The parks' Resource Stewardship Strategy (RSS) outlines the following goals associated with sequoia protection:

1. Maximize persistence of large, living giant sequoias.
2. Maximize persistence of structurally and compositionally complex giant sequoia groves that are sustainable, resilient (to drought, fire, insects, etc.), and support native biodiversity.
3. Manage for ecological functions essential to giant sequoia groves (fire, hydrology).
4. Prepare for potential shifts in giant sequoia distribution to enable its persistence in the broader Sierra Nevada landscape.
5. Prioritize persistence of giant sequoia in areas of highest social value" (NPS 2017, Page 41).

At the time of its writing, the RSS stated that only 20% of sequoia groves in the Parks were within desired fire return interval and that small trees were overly dense in most groves. Both of these stressors were identified as moderate concern just five years ago (NPS 2017, Page 41).

Finally, the Parks' RSS identified such direct management priorities to "…include continuing and expanding the use of fire and fuels treatments, reducing other stressors like invasive plants,

establishing seed banks, and research with new or expanded treatments that may increase resistance and resilience to climate change, drought, insects, disease, and uncharacteristically severe fires" (NPS 2017, Page 84).

The RSS also listed monitoring, protecting, and restoring (when feasible) terrestrial wildlife as a high priority for the NPS. "Contribute to/review species recovery plans and evaluate opportunities to facilitate recovery of T&E and candidate species and other species of concern (Sierra Nevada bighorn sheep, California spotted owl, California condor, Pacific fisher)" (NPS 2017, Page 94).

NPS Climate Change Response Strategy (NPS 2010)

Under the Climate Change Response Strategy, the NPS will analyze potential climate change impacts and adaptively apply the information to improve planning, resource conservation, and visitor experience.

- Goal 2: Collaborate with partners to develop, test, and appropriately apply climate change models to NPS activities (NPS 2010, Page 12).
    - Objective 2.3: Facilitate development of models that can be used by managers to plan for and adapt to climate change impacts (NPS 2010, Page 14).
- Goal 6: Implement adaptation strategies that promote ecosystem resilience and enhance restoration, conservation, and preservation of park resources (NPS 2010, Page 15).
    - Objective 6.1: Collaborate with federal, state, and local partners and programs to acquire, evaluate, and develop tools, such as vulnerability assessments and scenario planning, to inform the development of adaptation plans at appropriate scales (NPS 2010, Page 14).
    - Objective 6.3: Collaborate to develop cross jurisdictional conservation plans to protect and restore connectivity and other landscape scale components of resilience (NPS 2010, Page 14).

NPS Guidelines for Ecological Intervention in Wilderness Reference Manual 41 (RM41 2022) (Included as Appendix C: Evaluating Ecological Intervention Proposal in Wilderness of the Revised EA)

As of 2022, Reference Manual (RM) 41 includes an analytical tool, *Guidelines for Evaluating Ecological Intervention Proposals in National Park Service Wilderness*, developed to assist NPS unit managers in applying the provisions of NPS management policy and other guidance when determining whether or not intervention is or is not favored in wilderness. The parks' analysis of the eight factors outlined within this guidance document found that six factors in this analysis favor intervention while the other two neither strongly favored nor dis-favored intervention. These factors are more fully explained in Appendix C and are summarized in Appendix B of the Revised EA.

Uncontrollable Timing Requirements

What, if any, are the considerations that would dictate timing of the action?

Acting now, when Upper Dillonwood Grove is as close as feasible to post-fire conditions, enables planted seedlings to compete with surrounding shrubs as they regenerate within the Grove and more closely mimics what re-establishment would have occurred naturally. As well, acting sooner would allow more time for seedlings to grow to a size where they will be resilient to fire prior to the next fire interval. Finally, conversion to fire-initiated shrub communities, if not halted by timely

intervention, is likely to exacerbate a high severity fire cycle and increase the likelihood of degradation that could occur should high severity fire spread from these new shrub communities to other areas, including remnant portions of the Grove. Once shrub communities become dominant, this degradation would likely be self-perpetuating and irreversible without substantial intervention (e.g., mastication, herbicide).

It is also essential to establish monitoring plots immediately after planting so that the initial condition can be assessed and compared to future conditions. After initial plots are established, it would be important to monitor frequently in the first few years to understand regeneration as close to the fire as possible and survivorship of planted seedlings as the first few years of growth are when seedlings are the most vulnerable. After the initial years, it would be important to monitor in consistent intervals that are less frequent given the reduced concerns about survivorship but not too long to miss key changes, trends, or conditions.

Workflow Components

What are the distinct components or phases of the action?

Component 1	*Transportation of personnel to the project site for planting and monitoring*
Component 2	*Transportation of seedlings and tools and monitoring equipment to the project site*
Component 3	*Administrative Camping*
Component 4	*Seedling planting*
Component 5	*Establish Monitoring Plots*
Component 6	*Identify Planted Seedlings within Plots*
Component 7	*Frequency of Monitoring*

Step 2: Alternatives

Alternative 1: No Planting; Monitor Only

Component Methods

Component	Workflow Components	Component Methods for this Alternative
1	*Transportation of personnel to the project site for planting and monitoring*	Access by foot for monitoring.
2	*Transportation of seedlings and tools to the project site*	Transportation of tools for monitoring by foot.
3	*Administrative Camping*	No group camping needed.
4	*Seedling planting*	No action.
5	*Establish Monitoring Plots*	Maintain existing 20 monitoring plots with rebar; no additional plots.
6	*Identify Planted Seedlings within Plots*	No action.
7	*Frequency of Monitoring*	Monitor once every five years.

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken? Provide a complete narrative description of the Component Methods identified above.

The decision tree outlined in the Selected Alternative within the FONSI, as supported by the MRA in Appendix D of the Revised EA, points the NPS toward planting; this no action/monitor only alternative is not consistent with the FONSI and MRA nor the conservation purposes of wilderness; rather it is outlined for the purposes of comparison for the analysis. Under Alternative 1, the NPS would take no action to restore Upper Dillonwood Grove. Rather, the NPS would continue to monitor post-fire conditions within the former sequoia grove, consistent with the post-fire monitoring completed to date, which includes 20 survey plots in the Grove that are marked with rebar in the center of each plot, which could remain on site for up to 40 years but would be removed if/when high resolution GPS achieves a high enough level of accuracy so as to make rebar unnecessary. These plots would continue to be surveyed approximately every five years with a small crew that would access the site by foot and would carry all supplies in and out by foot.

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0, Not Evaluated = NE *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
	No Action					
1	Access by foot for monitoring.	0	0	0	0	0
2	Transportation of tools for monitoring by foot.	0	0	0	0	0
3	No action.	0	0	0	0	0
4	No action.	0	0	N	0	0
5	Maintain existing 20 monitoring plots; no additional plots.	0	N	P	0	0
6	No action.	0	0	0	0	0

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0, Not Evaluated = NE *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
7	Monitor once every five years.	0	0	0	N	0

What is the effect of each Component Method on the qualities of wilderness character? What mitigation measures will be taken? Include cumulative impacts in the explanation.

See Appendix A of the Revised EA for a full list of all mitigation measures that would be implemented associated with all monitoring. In addition: Monitoring installations would be removed as soon as possible: all monitoring plot markers would be moved if high resolution GPS improves to such an extent that physical markers are no longer required for precisely identifying plot boundaries.

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

No impacts identified.

UNDEVELOPED: Explain the effects to this quality in terms of how "the imprint of man's work [would] remain substantially unnoticeable," and how wilderness will continue to be in contrast with other areas of "growing mechanization":

20 plot markers would continue to negatively affect the undeveloped quality for up to 40 years or until high precision GPS can reliably define precise boundaries for all plots. All impacts to undeveloped quality would cease after a period of 40 years (or less if high precision GPS proves effective) such that wilderness quality would be preserved in the long term.

NATURAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

Sequoia mixed conifer and mixed conifer seedlings are expected to remain either absent or at densities below that needed to support forest recovery in the area. Based on current assessments, 39.6 acres of the Upper Dillonwood Grove would remain highly vulnerable to conversion from giant sequoia/mixed conifer forest to disturbance related/maintained shrub community. Should sequoia and mixed conifer remain either absent or at densities below that needed to support recovery of Upper Dillonwood Grove, as would be the most likely to occur under this alternative than any action alternative (see Chapter 3 of the Revised EA), the total acreage of Upper

Dillonwood Grove would remain diminished by as much at 39.6 acres. Due to type conversion and high severity fire feedback loops, this timeframe would be expected to be indefinite. Likewise, the total number of sequoias within the Hockett Area Recommended Wilderness, including the total number of potential future large sequoias, may also be reduced in the long term—again, expected to be indefinite.

Because giant sequoia is a primary attribute of wilderness character in the Hockett Area Recommended Wilderness, the diminished grove footprint would adversely affect the natural quality of wilderness and continue to contribute to the overall trajectory toward less natural. As well, the natural quality could further deteriorate if cycles of high severity fire resulting from the conversion to shrub-dominated systems spread to other nearby areas—including remnant sequoia grove.

Monitoring of existing post-fire plots would have positive impacts on the natural quality of wilderness to the extent that it provides actionable information to managers on changes to these areas over time.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE OR PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe solitude, primitive recreation, and unconfined recreation separately:

Solitude would be negatively affected from a small crew of researchers (up to five individuals) visiting this site every five years for up to 40 years. Each monitoring trip would last roughly one to two weeks. Outstanding opportunities for solitude would remain in the surrounding wilderness during monitoring activities and would remain consistent with pre-project levels between monitoring intervals.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

Monitoring in this area would contribute to beneficial effects on the scientific value of the Hockett Area Recommended Wilderness. These benefits would continue to be realized in the long term.

Alternative 2: Replant Seedlings Using Seed Propagated from Seed Collected from both the Local Genetic Community and Other Source Populations; Transport Seedlings with Helicopter Support; Crews Hike In and Stage in Wilderness.

Component Methods

How will each of the components of the action be performed under this alternative?

Component	Workflow Components	Component Methods for this Alternative
1	*Transportation of personnel to the project site for planting and monitoring*	Workers walk to camp and work sites. Workers would also hike out along with all materials they can carry at the end of implementation.
2	*Transportation of seedlings and tools to the project site*	Seedlings and tools would be transported and backhauled via helicopter. In the first year, 2 sling load deliveries and 1 sling load backhaul would be needed. In subsequent years of replanting, up to 1 sling load delivery and 1 sling load backhaul would be needed each year planting is indeed needed. Some equipment would be carried by workers.
3	*Administrative Camping*	19 snags (4 of which are smaller than 12" dbh) would be felled via chainsaw.
4	*Seedling planting*	Seedlings, including 20% grown from seed outside the local genetic community, would be planted by hand using hand tools.
5	*Establish Monitoring Plots*	20 additional monitoring plots would be installed in planting areas with rebar.
6	*Identify Planted Seedlings within Plots*	Tags seedlings within plots.
7	*Frequency of Monitoring*	Monitor two times in first year and one per year for at least three years post-planting (if completed); monitor once every five years thereafter.

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken? Provide a complete narrative description of the Component Methods identified above.

Given the results summarized in the issue statement, and in alignment with the decision tree outlined in the selected alternative in the FONSI for the Revised EA, the NPS would move forward with planting in 39.6 acres in Upper Dillonwood Grove. Sequoia and mixed conifer seedlings grown from seed collected both within and outside the local genetic community would be planted at roughly 75-200 seedlings/acre using hand tools according to methods outlined under the selected alternative in the FONSI (which incorporates Alternative 2 in the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Environmental Assessment by reference) and as refined under the Site Planting Plan for Upper Dillonwood Grove.

One crew, of up to 15 people, would implement the first year planting plan over up to 2 weeks in fall 2024 or alternately spring 2025 depending on precipitation levels. An additional crew of 2-5 people will complete monitoring at the same time or shortly thereafter as described below.

All crews will hike to and camp within close proximity of the project area, accessing all areas by foot. Tree seedlings (which would be stored within coolers in order to keep them cool prior to planting and thereby reduce mortality), tools, and equipment will be transported to project area via two helicopter sling loads, and all gear will be flown off site at the end of the planting via one helicopter sling load. From the sling load delivery location, planting crews will transport seedlings to their planting locations on foot.

To prepare a safe administrative camp and sling load landing area, roughly 6 snags (i.e., dead trees) 35-60 inches dbh (those that may range from 150-200 feet tall), 9 snags 16-32 inches dbh, and roughly 4 snags less than12 inches dbh that pose a safety hazard to administrative campers or sling load landing would be felled. Blasting has not been determined the safest tool to remove any of the identified tree hazards. Therefore, chainsaws would be used to fell tree hazards greater than 12" dbh. Handtools will be used to fell 12" or lower dbh trees so long as the tree feller determines it is safe to do so using the Severity, Probability, Exposure (SPE) model described in the Revised EA and in the alternatives considered but dismissed section of this MRA. The NPS estimates that tree felling this number of trees with chainsaws will require roughly 2-3 hours of chainsaw run time. All use of camp and work areas would follow wilderness minimum impact restrictions.

If mortality after the first planting season is high (i.e., survival is less than 70%), subsequent replanting may occur for up to 2 years. During any successive planting years, it is anticipated that this total will decline in direct relation to the number of seedlings being replaced (e.g., if seedlings suffer 50% mortality or less, the annual planting time would be for roughly one week the first year and several days the next). The number of sling load deliveries would be 1 instead of 2 each successive year of planting though would be reevaluated depending on the number of seedlings being delivered. Tree hazards would not require felling in subsequent years as sites would be reused.

The NPS would also establish and implement a long-term monitoring protocol to track survivorship of planted seedlings and continue to understand regeneration within this area consistent with the selected alternative, as amended. The existing 20 plots as described in Alternative 1 would remain the same in this alternative and an additional 20 plots would be established and marked using one rebar stake to mark the center of each plot. Each planted seedling within the 20 plots associated with planting efforts (i.e., not control plots) would be tagged using a metal plant tag. The NPS estimates that roughly 27 plant tags would be needed within each of the 20 planting (not control) plots, for a total of approximately 540 plant tags within the planting area. Plant tags would remain until either the marked seedling/tree suffers mortality or is no longer necessary. While the NPS assumes many plant tags would be removed within 20 years, plot markers could remain in

wilderness for up to 40 years. However, researchers would test high resolution GPS to determine if a high enough level of accuracy can be achieved so as to make rebar unnecessary; in which case rebar could be removed before the end of the monitoring (~40 years).

All monitoring equipment would be carried to the project area at the time of planting activities either via foot or via a helicopter if no additional flights beyond that described above would be required. These monitoring plots would be monitored by crews of up to 5 people twice in 2024, once per year from 2025-2029, and, like in Alternative 1, once every five years thereafter. These crews would access the locations by foot.

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0, Not Evaluated = NE *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
1	Workers walk to camp and work sites. Workers would also hike out along with all materials they can carry at the end of implementation.	0	0	0	N	0
2	Seedlings and tools would be transported and backhauled via helicopter. In the first year, 2 sling load deliveries and 1 sling load backhaul would be needed. In subsequent years of replanting, up to 1 sling load delivery and 1 sling load backhaul would be needed each year planting is indeed needed. Some equipment would be carried by workers.	0	N	0	N	0
3	19 snags (4 of which are smaller than 12" dbh) would be felled via chainsaw.	N	N	0	N	0
4	Seedlings, including 20% grown from seed outside the local genetic community would be planted by hand using hand tools.	N	0	P	0	0
5	20 additional monitoring plots would be installed in planting areas with rebar.	0	N	P	0	0
6	Tags seedlings within plots.	0	N	0	0	0
7	Monitor two times in first year and one per year for at least three years post-planting (if completed); monitor once every five years thereafter.	0	0	0	N	0

What is the effect of each Component Method on the qualities of wilderness character? What mitigation measures will be taken? Include cumulative impacts in the explanation.

See Appendix A of the Revised EA for mitigation measures. In addition: Monitoring installations would be removed as soon as possible: all monitoring plot markers would be moved if high resolution GPS improves to such an extent that physical markers are no longer required for precisely identifying plot boundaries, and plant tags would be removed as seedlings/trees die, grow to a size such that a plant tag is no longer needed to identify precise individual, or if high resolution GPS improves to such an extent that physical markers are no longer required for precisely identifying the individual seedling/tree that is monitored.

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

Untrammeled quality would be negatively affected by planting tree seedlings across 39.6 acres in recommended wilderness and by the felling of 19 snags (i.e., dead trees) in the location of the administrative camp/sling load delivery location where these pose a safety hazards to crews working in the area. The degree of trammeling actions would also be further negatively influenced by the introduction of up to 20% non-local genetic material which would result in a different genetic makeup than was present prior to the fire. These trammeling actions would occur for the duration of the project (up to two weeks the first year and up to one week for two subsequent years if planting is still needed) while actions are actively being implemented. The untrammeled quality would return to pre-project levels immediately post implementation such that the untrammeled quality would be preserved in the long term.

UNDEVELOPED: Explain the effects to this quality in terms of how "the imprint of man's work [would] remain substantially unnoticeable," and how wilderness will continue to be in contrast to other areas of "growing mechanization":

The undeveloped quality would be negatively affected by chainsaw use, evidence of cut stumps, use of helicopter sling loads, and monitoring markers and tree tags as follows:

Chainsaw use at the administrative camp and helicopter landing zone would negatively affect the undeveloped quality for roughly 2-3 hours as hazard trees are removed to establish these areas during the first year of planting only. Stumps of 19 snags would be flush cut with the ground and otherwise camouflaged to minimize visual impacts. However, evidence of cut stumps would still result in additional, though minimal, negative effects on undeveloped quality until stumps deteriorate naturally—a period of 10-20 years, depending on stump diameter and tree species.

Up to a total of three sling load landings in the first year (two drops and a pickup (across two "landings") when materials are delivered, and one during demobilization) would negatively affect the undeveloped quality for a total of less than five minutes (each sling load takes seconds to drop and pick up) in the first year. This impact (though only two, not three, sling loads) would also occur in up to two subsequent plantings/years should high mortality occur. The degree of impact in subsequent years may decrease if fewer seedlings are planted in subsequent years.

Despite these temporary impacts, the undeveloped quality would be preserved in the long term.

Small (measures in cm/inches) plant tags would also negatively affect the undeveloped quality until either the marked seedling/tree suffers mortality or for a period of up to roughly 40 years. Plot markers would also continue to negatively affect the undeveloped quality for up to 40 years or until high precision GPS can reliably define precise boundaries for all plots. All impacts to undeveloped quality would cease after a period of 40 years (or less if high precision GPS proves effective) such that wilderness quality would be preserved in the long term.

NATURAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

Replanting the Upper Dillonwood Grove would have a greater likelihood than Alternative 1 of restoring sequoia and mixed conifer seedlings on 39.6 acres of wilderness. Were the restoration to be successful, this alternative would be expected to direct the trajectory of the severely burned area toward forest recovery to their pre-fire conditions, beneficially affecting sequoia grove recovery and thus the natural quality of wilderness character. The NPS anticipates that once seedlings were established, natural and dynamic post-fire recovery processes would continue, and the seedlings would mature over a period of centuries, such that large sequoias would be the dominant feature within most, if not the entire, grove footprint.

While speculative in terms of benefit to natural quality of wilderness character specifically, seedlings propagated from a variety of sources may demonstrate increased survival capacity, increasing the likelihood of success and long-term resilience to climate change. Should seedlings grown from other sources prove key to successful replanting of these areas, this would beneficially affect natural quality of wilderness character; though the genetic characteristics of the population would be different from what would otherwise be present.

Monitoring the planting efforts and post fire recovery would also have primarily positive impacts on the natural quality of wilderness by providing the most scientifically valid and actionable information to managers on how to best manage the ecological changes caused by past and future wildfires within the parks and throughout the Sierra Nevada. In addition to describing current conditions, the study would be able to accurately describe how these conditions change over time. Specifically, in physically marking plots, the NPS is able to more precisely replicate a plot boundaries and reduce "noise" associated with any slight change in seedling numbers from imprecise boundary identification. In addition, by marking individual seedlings, the NPS can track survivorship and growth of planted seedlings which can be used to inform whether or not a supplemental planting may be appropriate (which has implications on the natural quality). This data is otherwise not obtainable.

OUTSTANDING OPPORTUNITIES for SOLITUDE or PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe outstanding opportunities for solitude or primitive and unconfined recreation separately:

Project components would not affect opportunities for primitive and unconfined recreation. However, the sights and sounds of helicopter flights to and from the Grove would negatively affect opportunities for solitude in this region of the wilderness (primarily along flight path from Ash Mountain to Upper Dillonwood) for a total of roughly 1-2 total hours over the course of up to 2 weeks and in over the course of one week in up to two subsequent years if planting is needed again. The sound of 15-40 total minutes of helicopter flights and roughly 2-3 hours of chainsaw

use would negatively affect solitude over the course of one to two days during removal of snags during camp establishment (year one only). In subsequent years, should planting be needed, up to 27 minutes of overflights may be heard over the John Krebs and Hockett Area Recommended Wilderness in up to two years likely during the fall or spring seasons when planting activities would occur.

The presence of work crews (up to15 individuals during planting activities and up to 5 crew members during monitoring activities), and an administrative camp would further negatively affect the opportunities for solitude for a total of roughly up to 2 weeks during project implementation in the first year. During any successive planting years, it is anticipated that this total will decline in direct relation to the number of seedlings being replaced (e.g. if seedlings suffer 50% mortality or less, this quality would be impacted for roughly one week). In addition, this quality of wilderness character would be negatively affected from researchers visiting these sites up to two times annually for the first year, once for the five years following, and every five years thereafter for up to 40 years. Each monitoring trip would last roughly one to two weeks.

Outstanding opportunities for solitude would remain throughout the surrounding wilderness to a similar degree as typical within these wilderness areas. Post project, opportunities for solitude or primitive and unconfined recreation would return to pre-project levels, and opportunities for solitude would be preserved in the long term. As opportunities for primitive and unconfined recreation would not be affected by this project, this quality as a whole would likewise be preserved in the long term.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

Monitoring in this area would contribute to beneficial effects on the scientific value of the Hockett Area Recommended Wilderness. These benefits would continue to be realized in the long term to a slightly greater extent than in Alternative 1 given the additional information gained from monitoring planting activities.

Step 2: Alternatives Considered but Dismissed

What alternatives were considered but dismissed? Why were they dismissed?

The NPS considered but dismissed a number of alternatives in the Revised EA that are dismissed for similar reasons within this MRA, specifically as they do not align with the conservation purposes of taking action to address the Issue Statement and/or clearly entail more impacts to wilderness character. These include the following. Please see the Revised EA for a discuss**ion** on why these alternatives are dismissed:

1. Plant Only Outside Wilderness (and areas managed as wilderness)
2. Plant Only Sequoia Seedlings in Sequoia Groves
3. Sow Seed to Re-establish Seedlings
4. Remove Existing Fuels either via Manual Thinning or Prescribed Burning Prior to Planting
5. Complete Site Preparation Including Herbicide and Crushing of Vegetation
6. Plant Understory Vegetation in Addition to Sequoia Mixed-Conifer Seedlings
7. Monitor Regeneration and Take Action at a Later Time if Necessary

The NPS also dismissed the following alternatives and alternative components within the MRA that accompanies the Revised EA as Appendix D (see this MRA for additional discussion):

8. *Transport seedlings and tools on stock and foot or allow cross-country travel of stock to re-planting sites*

   Upper Dillonwood Grove is not accessible via trail, much less a stock accessible trail. Under this alternative, the NPS considered how stock would travel cross-country from existing access routes in trail-less areas to deliver seedlings and tools. The NPS determined that the distance that would need to be traversed from the nearest maintained trail is roughly 2 miles and would require stock or foot traffic to traverse steep elevational gradients. While the NPS found that up two miles of abandoned trail alignments do exist near Upper Dillonwood Grove, at least one mile of trail has been abandoned for a length of time that they do not appear in NPS records and are either obliterated or not feasible for human or stock use due to their condition—including downed trees and lack of tread surfaces. The steep terrain, lack of maintained trails, distance to the site and weight of plant materials, tools, food, and gear (roughly 1,750 pounds) make this alternative infeasible to achieve the conservation purposes of taking action and would present an unacceptable safety risk to tree planting crews and stock traveling to and from work sites. This alternative was therefore dismissed due to safety considerations and infeasibility.

9. *Construct stock trails in currently trail-less areas to transport tools and seedlings*

   Under this alternative, the NPS considered the implications of utilizing hand tools—including chainsaws, crosscuts, or pulaskis—to restore 2 miles of administrative trails to support mobilization of seedlings, tools and equipment. Administrative trails would be restored to pre-project conditions at the conclusion of project as no new trails have been determined necessary in this area under the 2015 WSP.

   Constructing and/or re-opening and then commissioning one mile of trail in forested terrain in the middle of a high severity burn scar is estimated to require one full month for a 6–8-member trail crew. Work required would include tread work (scraping of a tread surface with digging tools), log clearing (using chainsaws), and ultimately recontouring and

revegetation of duffing. An additional one month per trail mile would be required if cross-cut saws and pulaskis were used to clear trail rather than chainsaws. While an abandoned trail alignment of 2 miles connects to an existing trail system, these trails have been abandoned for decades in part due to poor alignment and have been restored to prevent continued damage resulting from erosion.

Restoring abandoned trails, particularly to make them stock accessible, would lead to extensive soil, vegetation, and sound disturbance (from crew presence and tool use). As well, during construction and re-closure of any trail located through a burn scar, crews would be continually exposed to snags that are numerous in all of the planting areas. Exposure would be much greater than that to which planting crews would be exposed—up to four months vs. 1-2 weeks—increasing the risk for a tree failure to occur when crew members are present than tree planting alone (see Appendix D of Revised EA for more information on safety components routinely considered by NPS). For additional information on abandoned trails and how trail construction or the presence of trails impacts wilderness character please see Appendix K of the parks' 2015 Wilderness Stewardship Plan.

Due to reasons outlined above, an alternative that involves construction and then de-commissioning of a stock trail through currently trailless areas was dismissed from further consideration for both safety purposes and because constructing such trails would have greater impact to wilderness character— including the opportunity for solitude or primitive and unconfined recreation, undeveloped, and natural qualities—than other alternatives considered and would therefore not be the minimum requirement to achieve project objectives. Therefore, the NPS determined that it was not necessary to document a full wilderness character analysis in this MRA.

10. Use helicopter sling load drop zones outside of Recommended Wilderness

Two helicopter sling load drop zones were identified outside of recommended wilderness but are not feasible for planters to carry seedlings and gear due to steep terrain and long travel. Seedlings would need to be carried 1.5 mi on a road (that is not drivable) and another 1 mile off trail on steep terrain to camp and the planting site. The steep terrain, lack of maintained trails, distance to the site and weight of plant materials, tools, food, and gear (roughly 1,750 pounds) therefore make this alternative infeasible to achieve the conservation purposes of taking action and would present an unacceptable safety risk to tree planting crews traveling to and from work sites. This alternative was therefore dismissed due to safety considerations and infeasibility.

11. *Use Only Non-Motorized Tools (i.e., Hand Saw, Crosscut Saw, or Axe) or Explosives to Clear Snags from Administrative Camps or* Sling Load Drop Zones

Tree felling is consistently one of the top five most dangerous jobs in America (BLS 2020); when requiring crews to complete this type of work, safety must be of utmost concern. NPS often uses the Severity, Probability, Exposure (SPE) model of risk as described further below:

- **Severity:** Tree falling mishaps are easily fatal; there's only so much risk personal protective equipment (PPE) can mitigate. The choice of tool does not change *severity*.
- **Probability:** Method of mitigation affects skill needed, with greater *probability* of mishap when the required skill level is high. Felling trees with non-motorized tools

or explosives is a highly technical skill, and though skill can be partially mitigated through training and crew selection firefighters available to complete the work, most staff do not have the skills to safely fall trees with these tools. Complexity of the surrounding environment further increases the *probability* of mishap. As action areas are located within high severity burn scars, there are other numerous dead/dying trees and some may be over 100 feet in height and/or would have a high dbh, complexity, and therefore *probability*, of mishap is likely to be high in locations where trees would require felling depending on the density of trees.

- **Exposure:** *Exposure* is the factor most influenced by the choice of tool or methods. Given that felling a tree that may exceed 100 feet in height with a crosscut saw would take roughly 2-4 hours to complete and would require additional staff to complete the cuts, the risk/exposure to crews of falling objects (i.e., "widow-makers") during this extended period of stationary work would be considerable. In comparison, cutting a single tree with a chainsaw would take an estimated 5-10 minutes or 17% of the time needed to use a crosscut saw. Felling the tree with explosives would require 30 minutes to an hour to set up the blast.

Due to the conditions in the action area, we cannot assume that all snags within administrative camping areas could be safely felled with hand tools alone and will not impose this requirement on staff when the work could be completed more safely (via substantially less exposure to surrounding hazards) with a chainsaw. The exclusive use of hand tools to fell snags was therefore dismissed from further consideration as it may not always be safe to do so.

Conducting blasting in a forest where numerous snags exist would be technically challenging, and in some cases would present a high level of safety and operational risk—as experienced by NPS staff in previous situations within the parks, though explosives may be the safer tool in some cases where snags are extremely decayed and rigging cannot be employed, it is not always recommended as a reasonable and safe alternative for all situations (Ned Aldrich personal communication September 2022). Furthermore, trees felled with explosives can easily catch fire in the process, increasing risk for additional wildfire within the project areas. Given these safety concerns, explosives are not often recommended as the safest tool for felling snags particularly in light of the high density of snags and other dead/dying trees in the project areas and the susceptibility of the project areas to future high severity fire. Given these considerations, an alternative to only use explosives was also dismissed from further consideration as it may not always recommended as a reasonable alternative from a safety standpoint.

The NPS also considered the following alternative as part of the Revised EA and MRA that accompanied the Revised EA.

12. *Replant Seedlings Grown from Seed Collected from the Local Genetic Community of Each Replanted Area.*

    Under this Alternative all methods would be as described in Alternative 2 with the exception that the NPS would not add genetic diversity to Upper Dillonwood Grove by sourcing cones/seed from arid groves and from groves with known higher levels of genetic diversity within the seed zone. Instead, all seed would be collected only from within the local genetic community (or neighborhood.) This alternative was already considered in the previous MRA and in the associated Revised EA and was not considered again in this MRA

as the Revised EA and previous MRA documented the short-term negative effects to the untrammelled quality and potentially long-term positive effects to the natural quality of wilderness character should these seedlings increase the likelihood that the intervention would be successful and enough giant sequoia would grow to full maturity and become monarchs over centuries as described further in the impacts from Alternative 2 in the Revised EA (see Chapter 3: Affected Environment and Environmental Consequences).

Finally, the NPS considered the following alternative in 2022 when evaluating the minimum requirement for monitoring post-planting, and dismisses it from further consideration in this action given the following.

13. Establish Monitoring Plots via GPS Only

This alternative would only partially meet the scientific and conservation purposes of monitoring outlined in Step 1. While it avoids installing physical plot markers or tree tags that could be onsite for up to 40 years, the value of the data would be comparatively and substantially less than using physical markers this time because GPS has not shown to be precise enough to ensure consistent boundaries of plots which can result in slight changes in seedling numbers and small changes in numbers of seedlings in a plot result in large changes in seedling density per acre and survivorship. What may seem like minute inaccuracies can have substantive effects on the quality of the data collected. Plot monitoring without identifying specific seedlings would also prevent the NPS from understanding seedling survivorship and growth, which is critical to (1) Evaluating success of planting based on criteria established in the EA; (2) Determining if additional planting is necessary (looking for at least 70% survivorship in year one and less than 10% mortality in years 2-4). Data collection without marking plot center with rebar and tagging seedlings would therefore result in subpar data quality that would not meet the rigors of peer-review and would therefore be less able to inform future management decisions. As understanding seedling survivorship and growth in relation to these altered postfire conditions is necessary for the long-term conservation and preservation of the natural quality of wilderness character, this alternative—which does not enable this understanding—would only partially achieve the scientific purpose of wilderness and was dismissed from a more thorough analysis.

Step 2: Determination – What is the Minimum Activity?

Selected Alternative

Alternative 2: Replant Seedlings Using Seed Propagated from Seed Collected from both the Local Genetic Community and Other Source Populations; Transport Seedlings with Helicopter Support; Crews Hike In and Stage in Wilderness.

Under Alternative 1, "No Planting; Monitor Only", short term impacts to untrammeled, undeveloped, and opportunities for solitude or primitive and unconfined recreation would not occur beyond those which are associated with monitoring the 20 post-fire recovery plots. However, this Alternative would be expected to result in continued diminished natural quality in the long-term (a period of centuries) and is not consistent with the NPS' obligation to preserve wilderness character as a whole, the conservation purposes of wilderness, the Organic Act, or NPS legislation.

In contrast, while Alternative 2 will result in temporary impacts (a period ranging from 2 hours and up to a total of less than two weeks in year one and up to one week in two subsequent years) to the untrammeled, undeveloped, and opportunities for solitude or primitive and unconfined recreation associated with planting activities, this alternative is anticipated to limit potential for further degradation of natural quality typically caused by high severity fire cycles. Though it also involves an increased number of small installations (20 pieces of additional rebar and plant tags (measured in inches)) for monitoring, it will best assist managers in tracking results of ecological intervention, specifically by tracking a plot-based sample of planted seedlings as well as natural regeneration of sequoias. Without randomly installed plots where planted seedlings are individually tracked, researchers will be unable to provide a robust assessment of seedling survival, growth, and their relation to on-site conditions. In the long term, again centuries, Alternative 2 is also anticipated to result in the restoration of natural quality currently diminished by high severity fire effects and in the short term is anticipated to limit potential for further degradation of natural quality that is typically caused by high severity fire cycles within shrub-dominated communities. Thus Alternative 2 aligns with the conservation purposes of wilderness and better meets the NPS' obligations to preserve wilderness character as a whole, to preserve sequoias, and to protect forest dwelling species (including endangered species) in the long term as forests recover. This alternative is therefore the minimum requirement necessary to preserve the natural quality of wilderness character and meet the scientific and conservation purposes of wilderness.

For more information, including cumulative effects, see Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA and FONSI.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
☒	Mechanical Transport:	Three round trip flights in the first year (2 for mobilization and 1 for demobilization) lasting a duration of 15-40 total minutes hover time over the course of up to 2 weeks. Up to two round trip flights for a duration of 10-27 minutes over the course of up to one week in up to two additional, subsequent years should planting be needed.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
☒	Motorized Equipment:	Chainsaw for roughly two to three hours over the course of 1-2 days in the first year only.
☐	Motor Vehicles:	N/A
☐	Motorboats:	N/A
☒	Landing of Aircraft:	Two sling load deliveries and one sling load demobilization (three landings total) in the first year. One sling load delivery and demobilization each successive year planting is determined necessary.
☐	Temporary Roads:	N/A
☐	Structures:	N/A
☒	Installations:	20 additional rebar stakes; up to roughly 540 tree tags.

Describe mitigation measures as well as monitoring and reporting requirements, if appropriate:

See Appendix A of Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA for mitigation list. In addition: Monitoring installations would be removed as soon as possible: all monitoring plot markers would be moved if high resolution GPS improves to such an extent that physical markers are no longer required for precisely identifying plot boundaries, and plant tags would be removed as seedlings/trees die, grow to a size such that a plant tag is no longer needed to identify precise individual, or if high resolution GPS improves to such an extent that physical markers are no longer required for precisely identifying the individual seedling/tree that is monitored. Also, submit monitoring reports to research and monitoring program. Follow up reporting form on total duration of chainsaw use to be submitted upon project completion.

Approvals

Project Title (from page 2)**:**

Re-Establish and Monitor Tree Seedlings in Upper Dillonwood Grove (2024-MRA-15)

Prepared by:

Name: Theresa Fiorino: Environmental Protection Specialist

Reviewed/Recommended by:

Name: Christy Brigham: Chief of Resource Management and Science

CHRISTY BRIGHAM Digitally signed by CHRISTY BRIGHAM Date: 2024.09.20 16:45:09 -07'00'

Signature _____

Approved by:

Name Clayton F. Jordan: Superintendent

Clayton F. Jordan Digitally signed by CLAYTON JORDAN Date: 2024.09.23 19:01:10 -07'00'

Signature _____

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