

Basic Information Form

Park Name: Sequoia & Kings Canyon NP

PEPC Project ID: 117497

Related Project(s): 107200 and 119393

Project Status: Proposed

Compliance Status: In Process

Project Target Start: 10/11/2023

Project Title: Re-establish Tree Seedlings in Board Camp Grove

Project Description: 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 (EA), as amended, as it pertains to Board Camp Grove.

As described below and in alignment with the FONSI, conditions in Board Camp 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 Board Camp Grove was completed immediately following the KNP Complex 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 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): Field surveys in 2022 found 81.0% mortality of large sequoias within the entire area of Board Camp Grove following the 2020 Castle Fire and found a Bayesian estimated mean of 651 seedlings/acre, with no seedlings identified as second cohort ("strongly suggesting very little additional regeneration in the second year after the fire") (Soderberg et al. 2023, in review, p. 14). This natural regeneration has a <0.1% probability of being equivalent to the second-year seedling densities estimated by Stephenson et al. 2023, in preparation (Soderberg et al. 2023, in review). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the 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 16,011 median density of sequoia seedlings determined by Stephenson et al. 2023, in preparation. 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 the grove. See EA for additional information and context.

Climate Assessment (complete): Results of this analysis indicate that these two areas have 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, the NPS will move forward with planting in up to 38 acres in Board Camp 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 Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Board Camp Grove.

One crew, of up to 10 people, will implement the planting plan over the course of approximately 7 days in fall 2023. Note: an additional 2-5 people will complete monitoring at the same time as described below. This crew, along with monitors, will camp outside the grove but within close proximity to the planting area; this camp will also be used for helicopter sling-load deliveries. No tree felling is expected to be necessary to establish this administrative camp. All use of camp and work areas will follow wilderness minimum impact restrictions.

Both planting and monitoring crews will hike into the administrative camp location and then hike to planting sites or monitoring plots each day. Tree seedlings, tools, and equipment will be transported via two helicopter sling loads to the staging area at the administrative camp, and all gear will be flown off site at the end of the planting via one helicopter sling load. From staging sites, planting crews will transport seedlings to their planting locations on foot.

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. Described further in the attached SEGI Planting Monitoring Plan, this will include the establishment of 20 plots within the planting area 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 2024, once per year from 2025-2029, 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 (PEPC 117498) for more information/background.

Project Leader: Andrew Bishop
NEPA Specialist: Theresa Fiorino
NHPA Specialist: Juanita Bonnifield, Linn Gassaway

Project Type: Restoration

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

Location: Tulare County, CA

File List

- Restoration Plan for Board Camp Grove
- SEGI Planting Monitoring Plan

Last Updated Date: 10/09/2023

Last Updated By: eboerke

Planting Plan for Board Camp Grove

Purpose

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

Planting Prescriptions

Board Camp Grove totals 48 acres, with 38 acres burned at high severity, and is located in the John Krebs Wilderness on south-facing slopes in the South Fork drainage of the Kaweah River. Board Camp Grove will be replanted at a density of 75-200 trees per acre with different planting densities and species mixes for identified planting units. Please see attached map of SEKI Planting Units and Tables 1-3 for details on planting densities and compositions.

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, roughly 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 (final determination to be verified in the field). We will generally not plant within 50m of a living mature giant sequoia tree that is expected to provide ample seed rain within that range into the future. Again, see attached map of SEKI Planting Units for context of these locations.

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 (see Table 1). We will

generally 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 of 100 tree seedlings per acre (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. We will generally not plant further than 50m (distance of most seed distribution) from dead or dying giant sequoia trees (e.g., those trees that are not anticipated to continue to contribute seed rain into the future).

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).

Table 1. Planting Acreage, Density, Species Mixes and Proportions for Each Landscape Unit in Board Camp Grove

Landscape Unit	Planting Acreage	Planting Density (tpa)	Species Composition in Comparison to Table 2 Percentages
Canyon bottom/drainage and Northeast mid-slope <30 percent	35	200	More giant sequoia, white fir, and incense cedar
Northeast mid-slope >30 percent	0	150	More giant sequoia, white fir, and incense cedar
Southwest mid-slope <30 percent	0	100	Less white fir and incense cedar, more ponderosa pine
Southwest mid-slope >30 percent	2	75	Less white fir and incense cedar, more ponderosa pine
Ridge	1	75	Less giant sequoia, more ponderosa pine and sugar pine
Total	38		

Table 2. Approximate Species Mixes and Proportions for Different Vegetation Alliances

Vegetation Alliance	Giant Sequoia	Sugar Pine	Ponderosa Pine	Jeffrey Pine	White Fir	Incense Cedar
Giant Sequoia	70%	10%	5%	5%	5%	5%
White Fir – Sugar Pine	30%	25%	5%	5%	25%	10%

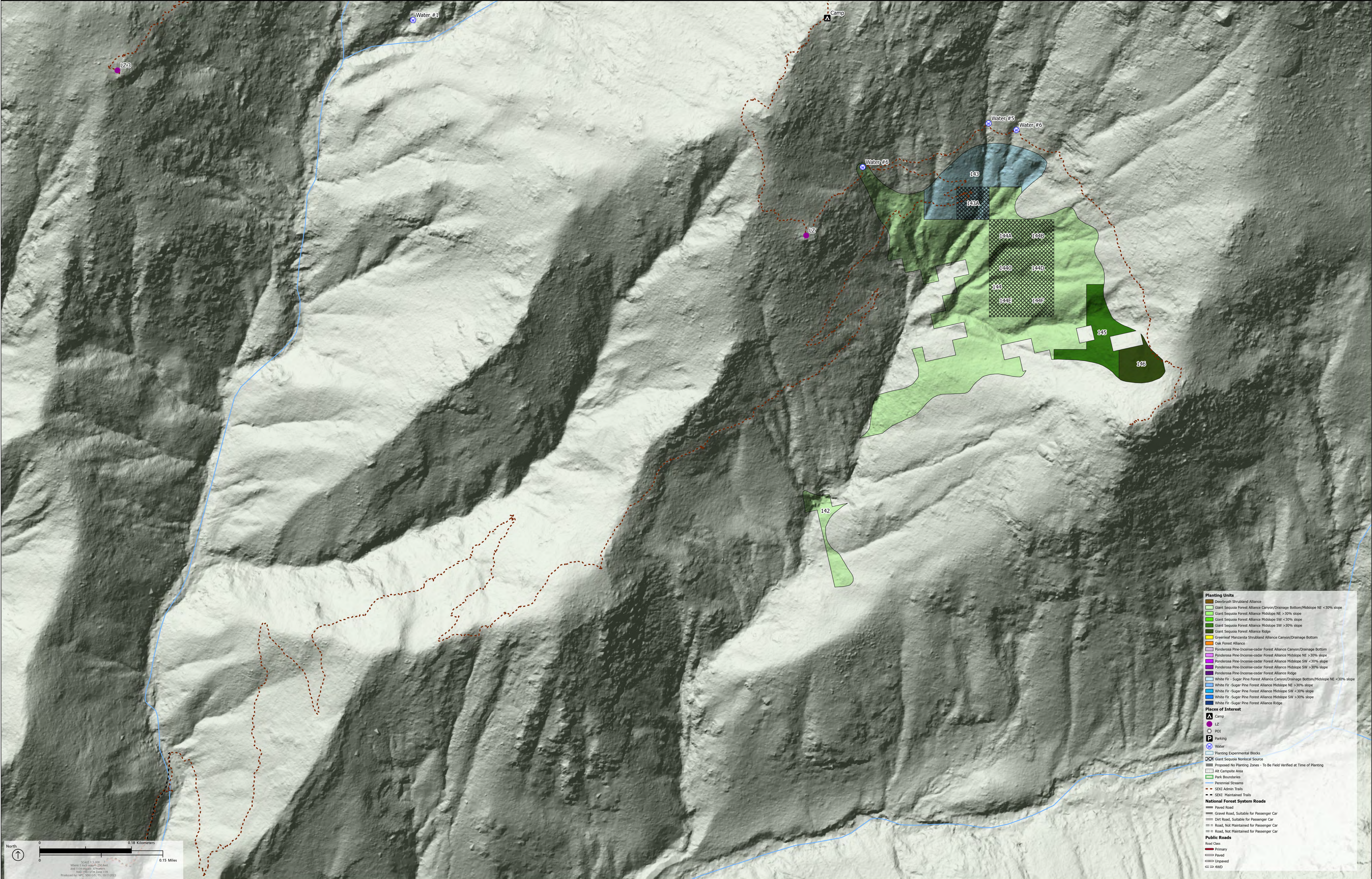
Table 3. Approximate Species Mix Proportions of Different Vegetation Alliances and Landscape Units for Board Camp Grove

Site	Vegetation Alliance	Landscape Unit	Giant Sequoia	Sugar Pine	Ponderosa Pine	Jeffrey Pine	White Fir	Incense Cedar
Board Camp	Giant Sequoia	Canyon/ NE < 30	66.67%	9.52%	4.76%	9.52%	4.76%	4.76%
Board Camp	Giant Sequoia	SW > 30	66.67%	9.52%	14.29%	9.52%	0.00%	0.00%
Board Camp	Giant Sequoia	Ridge	52.38%	9.52%	14.29%	14.29%	4.76%	4.76%
Board Camp	White Fir-Sugar Pine	Canyon/ NE < 30	30%	25%	5%	5%	25%	10%

SEKI Planting Map

Board Camp

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



- Planting Units**
- Deerbrush Shrubland Alliance
 - 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
 - Giant Sequoia Forest Alliance Ridge
 - Greenleaf Manzanita Shrubland Alliance Canyon/Drainage Bottom
 - Oak Forest Alliance
 - Ponderosa Pine-Incense-cedar Forest Alliance Canyon/Drainage Bottom
 - Ponderosa Pine-Incense-cedar Forest Alliance Midslope NE >30% slope
 - Ponderosa Pine-Incense-cedar Forest Alliance Midslope SW <30% slope
 - Ponderosa Pine-Incense-cedar Forest Alliance Midslope SW >30% slope
 - Ponderosa Pine-Incense-cedar Forest Alliance Ridge
 - White Fir - Sugar Pine Forest Alliance Canyon/Drainage Bottom/Midslope NE <30% slope
 - White Fir - Sugar Pine Forest Alliance Midslope NE >30% slope
 - White Fir - Sugar Pine Forest Alliance Midslope SW <30% slope
 - White Fir - Sugar Pine Forest Alliance Midslope SW >30% slope
 - White Fir - Sugar Pine Forest Alliance Ridge
- Places of Interest**
- Camp
 - LZ
 - POI
 - Parking
 - Water
 - Planting Experimental Blocks
 - Giant Sequoia Nonlocal Source
 - Proposed No Planting Zones - To Be Field Verified at Time of Planting
 - Alt Campsite Area
 - Park Boundaries
 - Perennial Streams
 - SEKI Admin Trails
 - SEKI Maintained Trails
- National Forest System Roads**
- Paved Road
 - Gravel Road, Suitable for Passenger Car
 - Dirt Road, Suitable for Passenger Car
 - Road, Not Maintained for Passenger Car
 - Road, Not Maintained for Passenger Car
- Public Roads**
- Road Class
- Primary
 - Paved
 - Unpaved
 - 4WD

SEGI PLANTING MONITORING PLAN FOR BOARD CAMP GROVE

Kristen Shive, UC Berkeley

Purpose

The purpose of this monitoring plan is to:

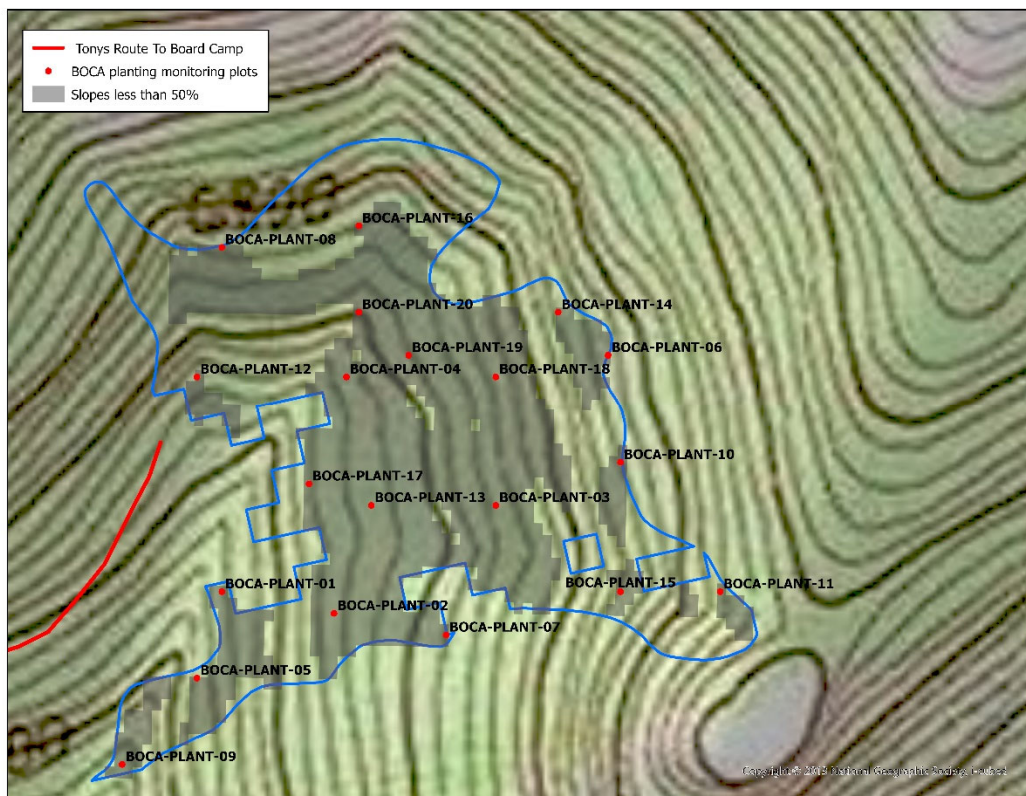
1. Evaluate success of planting based on criteria established in the EA; and
2. Based on #1 above, determine if additional planting is necessary (looking for at least 70% survivorship in year one and less than 10% mortality in years 2-4);

Sampling Scheme

We will establish 20 plots within the planting area and 20 control plots (using same plots that USGS has been monitoring; these plots will be no plant plots as controls), using GRTS to identify plot locations. As aspect only includes south and west facing slopes in Board Camp, there was little variation in heat load. Therefore, we drew the 20 GRTS plots from the entire large patch area. We will exclude areas >50% slope for safety reasons. See map below of proposed sampling plots.

For each plot location, if at least five planted seedlings are not included in the plot, the plot will be moved successively in 10m increments across cardinal directions until at least five are captured. If a plot is otherwise not accessible for safety reasons, crews should follow the same protocol for moving the plot until it lands in a safe location.

Proposed Sampling Plots for Board Camp Grove

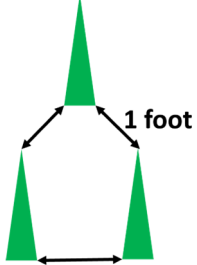
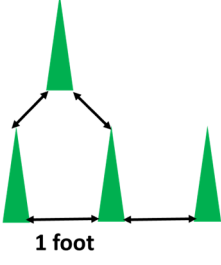
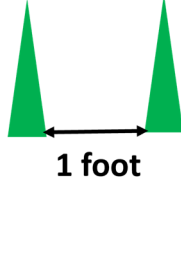
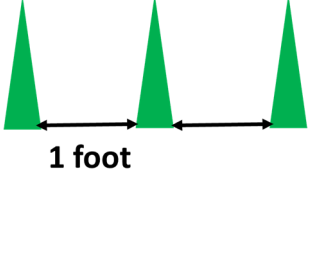


Plot Design

We will sample in a 1/10th acre plot (11.35m radius), defined by two transect tapes running N-S and E-W, with a rebar at plot center. All data on planted seedlings will be recorded by quadrant to help with future seedling relocation. Each planted seedling will be tagged at their base.

Data Collection

Crews will record species, live/dead status, seedling diameter at base and seedling height for all planted seedlings in the plot. They will identify seedling clumps in the plot by clump or gap, defining clumps as at least three seedlings that are separated by no more than one foot from at least two other seedlings (see examples below). If time permits in the future, we will map the seedlings so that we can better identify clumps using spatial analyses.

Clump	Clump	Not a clump	Not a clump
			

They will also estimate ground cover and cover of other vegetation in a 0.5m x 0.5m quadrat and a 2meter circle surrounding the focal seedling (note: we are using two scales here to accommodate microsite effects and broader effects, particularly since the smaller area will become less relevant as the seedlings age). We will also note whether the seedling occurs in a clump, and if so, how many seedlings are in the clump. They will also attempt to determine microsite conditions – for example, if the seedling was planted under a log or shrub, in a depression, etc.

We will also use a densiometer to record canopy openness at each seedling or clumps of seedlings. We assume most will be 0% at Board Camp but we will collect it for consistency with Redwood Mountain where there may be more variability.

Crews will take photos at each cardinal direction at transect ends, looking toward plot center.

Read Schedule

Funding permitting, we will revisit the plots in the spring and fall of 2024, to determine which seedlings survived the winter and be able to differentiate them from those that did not survive the summer drought. Thereafter we will re-visit the plots through year 3 (2026) and then every five years thereafter.

Field Gear Needed

- 1 rebar for each plot (40 total)
- Plant tags (approximately 27 per plot)
- 2 30m plot tapes
- 2 calipers
- 2 folding rulers
- 2 small DBH tapes
- Arrow GPS unit

iPad for data recording
2 quadrats
Densiometer

Disclaimer

Minor alterations of this study design may occur in the field.



ENVIRONMENTAL SCREENING FORM (ESF)

Updated Sept 2015 per NPS NEPA Handbook

A. PROJECT INFORMATION

Project Title: Re-establish Tree Seedlings in Board Camp Grove
PEPC Project Number: 117497
Project Type: Restoration
Project Location:
County, State: Tulare, California
Project Leader: Andrew Bishop

B. PROJECT DESCRIPTION

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 (EA), as amended, as it pertains to Board Camp Grove.

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

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One crew, of up to 10 people, will implement the planting plan over the course of approximately 7 days in fall 2023. Note: an additional 2-5 people will complete monitoring at the same time as described below. This crew, along with monitors, will camp outside the grove but within close proximity to the planting area; this camp will also be used for helicopter sling-load deliveries. No tree felling is expected to be necessary to establish this administrative camp. All use of camp and work areas will follow wilderness minimum impact restrictions.

Both planting and monitoring crews will hike into the administrative camp location and then hike to planting sites or monitoring plots each day. Tree seedlings, tools, and equipment will be transported via two helicopter sling loads to the staging area at the administrative camp, and all gear will be flown off site at the end of the planting via one helicopter sling load. From staging sites, planting crews will transport seedlings to their planting locations on foot.

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. Described further in the attached SEGI Planting Monitoring Plan, this will include the establishment of 20 plots within the planting area 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 2024, once per year from 2025-2029, 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 (PEPC 117498) for more information/background.

C. RESOURCE IMPACTS TO CONSIDER:

Resource	Potential for Impact	Potential Issues & Impacts
Air Air Quality	None	
Biological Migratory birds	Potential	See impacts to wildlife, below.
Biological Nonnative or Exotic Species <i>Invasive Species and Soil Pathogens</i>	Potential	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 only to Board Camp Grove). Mitigations will be implemented to minimize the potential for any impacts.
Biological Sequoias	Potential	Issue: Planting of sequoia grove

<i>Sequoia Recovery and Resilience</i>		Impact: Beneficial effects are expected to be as described in the Revised EA (pages 54-56; as applicable only to Board Camp Grove).
Biological Species of Special Concern or Their Habitat <i>Fisher</i>	Potential	Issue: Disturbance and removal of trees. Impact: Minor potential negative effects are expected to be as described on pages 12-15 of the revised EA (as applicable only to board camp grove) with the exception that no snag felling will occur. The U.S. Fish and Wildlife Service was consulted. See OCC.
Biological Vegetation <i>Understory Vegetation—Including Special Status Plants or Shrub Communities</i>	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 applicable only to Board Camp Grove). Mitigations will be implemented to avoid or minimize, impacts.
Biological Wildlife and/or Wildlife Habitat including terrestrial and aquatic species <i>Wildlife Disturbance and General Wildlife Habitat</i>	Potential	Issue: Presence of work Crews. Helicopter flights and landings. Impact: Potential for minor negative impacts as described on pages 12-15 of the revised EA (as applicable only to Board Camp Grove) with the exception that impacts will be reduced as chainsaw use and tree felling will not occur.
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 <i>Soils and Soil Erosion</i>	Potential	Issue: Foot traffic and planting. Impact: Minor negative and beneficial impacts are anticipated, consistent with those described on pages 11-12 of the EA (as applicable only to Board Camp Grove), as amended. Mitigations will be implemented to minimize, if not avoid, these potential impacts.
Geological Geologic Processes	None	
Lightscapes Lightscapes	None	

Other Human Health and Safety	Potential	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.
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	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	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 Wilderness <i>Natural Quality</i>	Potential	Issue: Planting tree seedlings across 38 acres of wilderness. Impact: Long term beneficial impacts are anticipated to be consistent with those described on pages 68-69 of the revised EA (as applicable only to Board Camp Grove) and in the site specific MRA. The cumulative effects to wilderness character within the John Krebs Wilderness are consistent with the EA.
Wilderness Wilderness <i>Opportunities for Solitude or Primitive and Unconfined Recreation</i>	Potential	Issue: Sights and sounds of ongoing project work. Impact: Temporary negative impacts are anticipated to be consistent with those described on page 70 of the revised EA (as applicable only to Board Camp), as amended, and as further refined in the site specific MRA-Alternative 2 except that chainsaws would not be used, thereby reducing the impacts estimated in the EA as it

		pertains to this project area. Cumulative impacts within the John Krebs Wilderness are likewise generally consistent with the EA also with the exception that motorized tool use will not cumulatively contribute to negative impacts to solitude as they would not occur.
Wilderness Wilderness <i>Undeveloped Quality</i>	Potential	<p>Issue: Mechanized transport, tree wells, and monitoring.</p> <p>Impact: Temporary negative impacts are anticipated to be consistent with those described on pages 69-70 of the revised EA (as applicable only to Board Camp Grove), as amended, and as further refined in the site specific MRA- Alternative 2. However, impacts to the undeveloped quality from helicopter use as described in the EA will not occur. Cumulative impacts within the Sequoia-Kings Canyon wilderness are generally consistent with the EA, as amended.</p>
Wilderness Wilderness <i>Untrammeled Quality</i>	Potential	<p>Issue: Planting tree seedlings across 38 acres of wilderness.</p> <p>Impact: Temporary negative impacts are anticipated to be consistent with those described on page 68 of the revised EA (as applicable only to Board Camp Grove) and as further refined in the site specific MRA-Alternative 2. Cumulative impacts would be as described in the EA.</p>



Memo To File

A. Project Information

Park Name: Sequoia and Kings Canyon National Parks
PEPC Project Number: 117497
Project Title: Re-establish Tree Seedlings in Board Camp Grove
Project Location:
County, State: Tulare, California

Project Leader: Andrew Bishop

B. Description of the Current Action (Project Description)

In alignment with the decision tree outlined in the selected alternative within the FONSI associated with Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised EA, the NPS will move forward with planting in up to 38 acres in Board Camp 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 Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Board Camp Grove.

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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. Described further in the attached SEGI Planting Monitoring Plan, this will include the establishment of 20 plots within the planting area 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 2024, once per year from 2025-2029, 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.

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: 117498 (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 (EA), as amended, as it pertains to Board Camp Grove.

As described below and in alignment with the FONSI, conditions in Board Camp 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 Board Camp Grove was completed immediately following the KNP Complex 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 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): Field surveys in 2022 found 81.0% mortality of large sequoias within the entire area of Board Camp Grove following the 2020 Castle Fire and found a Bayesian estimated mean of 651 seedlings/acre, with no seedlings identified as second cohort ("strongly suggesting very little additional regeneration in the second year after the fire") (Soderberg et al. 2023, in review, p. 14). This natural regeneration has a <0.1% probability of being equivalent to the second-year seedling densities estimated by Stephenson et al. 2023, in preparation (Soderberg et al. 2023, in review). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the 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 16,011 median density of sequoia seedlings determined by Stephenson et al. 2023, in preparation. 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 the grove. See EA for additional information and context.

Climate Assessment (complete): Results of this analysis indicate that these two areas have 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 Board Camp Grove) as described in the existing NEPA documents and associated decision documents but for reduced impacts from reduced removal of snags and associated impacts that were otherwise anticipated in the NEPA documentation.

Superintendent: **CLAYTON JORDAN** Digitally signed by CLAYTON JORDAN
Date: 2023.10.12 16:48:17 -07'00'

Clayton F. Jordan



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 Board Camp Grove

Prepared by: Linn Gassaway **Date Prepared:** **Telephone:**

PEPC Project Number: 117497

Locations:

County, State: Tulare, CA

Describe project:

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 (EA), as amended, as it pertains to Board Camp Grove.

As described below and in alignment with the FONSI, conditions in Board Camp 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 Board Camp Grove was completed immediately following the KNP Complex 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 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): Field surveys in 2022 found 81.0% mortality of large sequoias within the entire area of Board Camp Grove following the 2020 Castle Fire and found a Bayesian estimated mean of 651 seedlings/acre, with no seedlings identified as second cohort ("strongly suggesting very little additional regeneration in the second year after the fire") (Soderberg et al. 2023, in review, p. 14). This natural regeneration has a <0.1% probability of being equivalent to the second-year seedling densities estimated by Stephenson et al. 2023, in preparation (Soderberg et al. 2023, in review). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the 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 16,011 median density of sequoia seedlings determined by Stephenson et al. 2023, in preparation. 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 the grove. See EA for additional information and context.

Climate Assessment (complete): Results of this analysis indicate that these two areas have 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, the NPS will move forward with planting in up to 38 acres in Board Camp 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 Environmental Assessment by reference) and as refined under the attached Site Planting Plan for Board Camp Grove.

One crew, of up to 10 people, will implement the planting plan over the course of approximately 7 days in fall 2023. Note: an additional 2-5 people will complete monitoring at the same time as described below. This crew, along with monitors, will camp outside the grove but within close proximity to the planting area; this camp will also be used for helicopter sling-load deliveries. No tree felling is expected to be necessary to establish this administrative camp. All use of camp and work areas will follow wilderness minimum impact restrictions.

Both planting and monitoring crews will hike into the administrative camp location and then hike to planting sites or monitoring plots each day. Tree seedlings, tools, and equipment will be transported via two helicopter sling loads to the staging area at the administrative camp, and all gear will be flown off site at the end of the planting via one helicopter sling load. From staging sites, planting crews will transport seedlings to their planting locations on foot.

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. Described further in the attached SEGI Planting Monitoring Plan, this will include the establishment of 20 plots within the planting area 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 2024, once per year from 2025-2029, 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 (PEPC 117498) for more information/background.

Area of potential effects (as defined in 36 CFR 800.16[d])

Area of Potential Effect (APE) for the proposed Undertaking was determined to be the 38 acres of the high severity burn area in Board Camp Grove. Vertical APE is 12 inches below surface.

3. Has the area of potential effects been surveyed to identify historic properties? No.

4. Potentially Affected Resource(s):

Archeological Resources Present: No

Historical Structures/Resources Present: No

Cultural Landscapes Present: No

Ethnographic Resources Present: No

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

Y/N	Scope of Action
-----	-----------------

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)

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: 08/15/2023

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: 09/29/2023

Comments: Based on topography, slope and distance from water, the Board Camp APE has a very low potential for pre-contact Historic Properties. The APE is above snow line at an elevation between 5,800 and 7,000 ft. and is extremely steep with average slope of 29 degrees and over 50% being over 30 degrees slope. The nearest permanent water source is the South Fork Kaweah River which is between 2,000 and 1,000 feet down slope and over 0.5- 1 miles from the APE.

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: NPS-SEKI proposes to mitigate any potential effect to any unidentified Historic Properties by having an archaeological monitor accompany the first planting crew. The archaeological monitor will provide: • A training on identification and protection of historic properties • Spot survey ahead of planting crew. • Record the integrity of the 1909 trail. • Flag any potential historic properties and communicate the avoidance locations.

Doc Method: Standard 4-Step Process

[X] Historical Architect

Name: Elle Farias

Date: 09/29/2023

Comments: No historic buildings within the APE of the undertaking.

Check if project does not involve ground disturbance []

Assessment of Effect: ☐ No Potential to Cause Effect ☐ No Historic Properties Affected ☒ No Adverse Effect ☐ Adverse Effect ☐ Streamlined Review

Recommendations for conditions or stipulations:

Doc Method: Standard 4-Step Process

C. PARK SECTION 106 COORDINATOR'S REVIEW AND RECOMMENDATIONS

1. Assessment of Effect:

Y/N	Assessment of Effect
	No Potential to Cause Effects
	No Historic Properties Affected
Yes	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: Aug 15, 2023

SHPO Received: Sep 26, 2023

THPO Required: No

THPO Sent:

THPO Received:

SHPO/THPO Notes: Therefore, NPS proposes a Finding of No Adverse Effect. After reviewing the information submitted, the SHPO offers the following comments. • This project constitutes an undertaking with the potential to affect historic properties. • The APE is sufficient to take direct and indirect effects of the undertaking on historic properties into account. • Identification and evaluation efforts are sufficient. • Based upon the information submitted, the SHPO has no objection to the proposed Finding of No Adverse Effect for this undertaking. • Please be advised that under certain circumstances, such as unanticipated discovery or a change in project description, NPS may have additional future responsibilities for this undertaking under 36 CFR Part 800.

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.

5. Mitigations/Treatment Measures: For the proposed project actions to be within compliance requirements during construction and/or project implementation, the following mitigations must be adhered to:

- 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.
- See Appendix A of EA for additional mitigations.

6. Assessment of Effect Notes:

D. RECOMMENDED BY PARK SECTION 106 COORDINATOR

Compliance Specialist:

NHPA Specialist

Juanita Bonnifield

JUANITA BONNIFIELD

Digitally signed by JUANITA

BONNIFIELD

Date: 2023.10.11 08:28:21 -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 JORDAN

Digitally signed by CLAYTON JORDAN

Date: 2023.10.12 16:49:19 -07'00'

Clayton F. Jordan



Other Compliance/Consultations Form

Park Name: Sequoia and Kings Canyon National Parks
PEPC Project Number: 117497
Project Title: Re-establish Tree Seedlings in Board Camp Grove
Project Type: Restoration
Project Location:
County, State: Tulare, CA
Project Leader: Andrew Bishop

ESA

Any Federal Species in the project Area? Yes
If species in area: Not Likely to Adversely Affect
Was Biological Assessment prepared? Yes
Sent to FWS: Jul 7, 2023
FWS Response: Aug 21, 2023
If Biological Assessment prepared, concurred? Yes

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 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 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, the limited operating period for felling of trees with den features will further ensure no adverse impacts to denning fishers occur (no felling of snags will occur under this component of the overall selected alternative); and 4) restoration of habitat connectivity and fire-resilient forest conditions is expected to provide an overall benefit to fisher (FWS-2023-0111204-S7-001). Though the NPS consulted on impacts with the expectation of tree felling, no further tree felling will occur in the action area.

Data Entered By: Theresa Fiorino

Date: October 10, 2023

ESA Mitigations

See Appendix A of 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: October 10, 2023

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,	Yes		

structure, or installation? (If Yes, Minimum Requirements Analysis required)			
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.			
Other Information: See Attached.			

Data Entered By: Theresa Fiorino

Date: October 10, 2023

Other Permits/Laws

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

Data Entered By: Theresa Fiorino

Date: October 10, 2023



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

Plant Tree Seedlings in Board Camp Grove (2024-MRA-01)

Step 1: Determine If Administrative Action May Be Necessary

Issue Statement

Board Camp Grove, totaling 48 acres, is located in the John Krebs Wilderness on south-facing slopes in the South Fork drainage of the Kaweah River. The Grove offers a remote, extremely steep, wilderness experience for those with a desire to explore off trail. Prior to the 2020 Castle Fire, STI data from Board Camp showed 270 total living sequoias, with 99 (4 of them are double stemmed trees) sequoias at least 4' dbh, 83 (3 double stem) at least 5' dbh, and 29 (2 double stem) at least 10' dbh. However, 38 acres (79%) of Board Camp burned at high severity during the Castle Fire and sequoia mortality in high severity areas was 91.4% following the fire. Measured sequoia seedling densities within Board Camp Grove during year two post-fire had a mean of 651 seedlings per acre with no seedlings identified as second cohort—"strongly suggesting very little additional regeneration in the second year after the fire" (Soderberg et al. 2023, in review, p. 14). See Figure 5 of EA for fire severity map of the Board Camp Grove. See pages 61-64 and Appendix C: Evaluating Ecological Intervention Proposals in Wilderness in the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (EA) for further information and background.

In applying the Decision Tree outlined in selected alternative in the Finding of No Significant Impact (FONSI) decision for the EA (see page 20 and Figure 7 of the 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 Board Camp Grove was completed immediately following the KNP Complex 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 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):* Field surveys in 2022 found 81.0% mortality of large sequoias within the entire area of Board Camp Grove following the 2020 Castle Fire and found a Bayesian estimated mean of 651 seedlings/acre, with no seedlings identified as second cohort ("strongly suggesting very little additional regeneration in the second year after the fire") (Soderberg et al. 2023, in review, p. 14). This natural regeneration has a <0.1% probability of being equivalent to the second-year seedling

densities estimated by Stephenson et al. 2023, in preparation (Soderberg et al. 2023, in review). The NPS has therefore found that (1) mortality within the proposed action area (as outlined in the 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 16,011 median density of sequoia seedlings determined by Stephenson et al. 2023, in preparation. Based on these field surveys and findings, the NPS has determined that regeneration is insufficient to restore a self-sustaining population of sequoia throughout the grove. See EA for additional information and context.

- *Climate Assessment (complete)*: Results of this analysis indicate that Board Camp 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 Board Camp Grove meet the decision tree criteria for taking action in these areas in alignment with the Minimum Requirement Analysis (MRA) (see Appendix D of EA) and FONSI to Establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Critical Habitat in Sequoia and Kings Canyon National Parks. See these documents, along with the EA, for more information/background.

This MRA refines and further considers the minimum requirement for replanting sequoia and other mixed conifer seedlings in Board Camp Grove as a supplement to the MRA that was prepared to evaluate the larger planting proposal (see Appendix D of EA).

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 38 acres of the Board Camp Grove that burned at high severity, the entire area occurs within wilderness. Therefore, taking action outside of wilderness would not address the low seedling regeneration in the Board Camp Grove.

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 John Krebs Wilderness. High severity fire has contributed to the death of 79 large (> 4 feet in diameter) sequoia trees and reduced the intact acreage of Board Camp Grove by roughly 80%; 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 Board Camp 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.

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

Though not necessary to conform with a special provision, 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; both Sequoia and Kings Canyon National Parks were designated 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.

Omnibus Public Land Management Act of 2009 – Public Law 111-11 (March 30, 2009)

The Omnibus Public Land Management Act of 2009 (PL 111-11) designated the John Krebs Wilderness where Board Camp Grove is located.

See the MRA in Appendix D of the 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 Board Camp Grove is entirely within wilderness. The ecological, natural conditions in the grove have been degraded and acting entirely outside of wilderness would not address the lack of seedling regeneration in the grove. Conservation is a public purpose of the Wilderness Act (16

U.S.C. § 1133(b)). Thus, actions taken to preserve, protect or conserve, natural resources, such as sequoia, further this purpose 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 and strive to protect a full range of native plant and animal genotypes. 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.

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.”

4.4.1.1 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).

Sequoia and Kings Canyon National Parks General Management Plan (NPS 2007)

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”

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 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 EA.

Uncontrollable Timing Requirements

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

Acting now, when Board Camp 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). Although conifers are most often planted in spring, with hotter, drier summers becoming more frequent (see Stephenson et al. 2023 in preparation), fall may be a more effective planting time since it avoids the summer drought. For this reason, planting in fall is preferred in this area.

Workflow Components

What are the distinct components or phases of the action?

Component 1	<i>Transportation of personnel to the project site</i>
Component 2	<i>Transportation of seedlings and tools to the project site</i>
Component 3	<i>Seedling planting</i>
Component 4	<i>Monitoring</i>

Step 2: Alternatives

Alternative 1: No Planting; Monitor Only

Component Methods

Component	Workflow Components	Component Methods for this Alternative
1	<i>Transportation of personnel to the project site</i>	No site access beyond monitoring (which is not evaluated here)
2	<i>Transportation of seedlings and tools to the project site</i>	No equipment needed beyond that which is associated with monitoring (which is not evaluated here)
3	<i>Seedling planting</i>	No planting would occur
4	<i>Monitoring</i>	Monitoring Installations (not evaluated here as common to all at this level of understanding)

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 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 Board Camp Grove. The NPS would continue to monitor post-fire conditions within the former sequoia grove. Notably: a monitoring design has not been finalized and would be considered under a separate MRA. Because monitoring (in general) would be common to all alternatives but more information/details are needed to thoughtfully review and determine the minimum requirement for monitoring and identify the more specific impacts associated with that tool (e.g., such as beyond assuming no more than the roughly 600 installations outlined in the EA), it is not further analyzed here.

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 <i>Describe in detail the impacts to each of the five qualities in the narrative section below</i>	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
	<i>No Action</i>					
1	No site access beyond monitoring (which is not evaluated here)	0	0	0	0	0
2	No equipment needed beyond that which is associated with monitoring (which is not evaluated here)	0	0	0	0	0
3	No planting would occur	0	0	N	0	0
4	Monitoring Installations (not evaluated here as common to all at this level of understanding)	NE	NE	NE	NE	NE

*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 EA for a full list of all mitigation measures that would be implemented.

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”:

No impacts identified beyond those associated with any monitoring.

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, 38 acres of the Board Camp 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 Board Camp Grove, as would be the most likely to occur under this alternative than any action alternative (see Chapter 3 of EA), the total acreage of Board Camp Grove would remain diminished by as much as 38 acres in the long term (close to 80% of the Grove). 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 John Krebs 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 John Krebs 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.

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:

No impacts identified beyond those associated with any monitoring.
--

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:

No impacts identified.

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. [Click or tap here to enter text.](#)

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	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	Transport of seedlings, tools, and equipment, to project site.	Seedlings and tools would be transported via helicopter (2 sling load deliveries) and would be backhauled via helicopter (1 sling load). Some equipment would be carried by workers.
3	Plant seedlings	Seedlings, including 20% grown from seed outside the local genetic community would be planted by hand using hand tools. A small well would be created to capture incidental moisture.
4	Monitoring	Monitoring Installations (not evaluated here as common to all at this level of understanding)

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, the NPS would move forward with planting in up to 38 acres in Board Camp 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 Board Camp Grove.

One crew, of up to 10 people, would implement the planting plan over the course of approximately 7 days in fall 2023. This crew would camp outside the grove but within close proximity to the planting area; this camp would also be used for helicopter sling-load deliveries (described below). No tree felling would be completed to establish this administrative camp. All use of camp and work areas would follow wilderness minimum impact restrictions.

Both planting and monitoring crews would hike into the administrative camp location and then hike to planting sites each day. Tree seedlings, tools, and equipment would be transported via two helicopter sling loads to the staging area at the administrative camp, and all gear would be flown off site at the end of the planting via one helicopter sling load. From staging sites, planting crews would transport seedlings to their planting locations on 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 <i>Describe in detail the impacts to each of the five qualities in the narrative section below</i>	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
	<i>Example: Workers walk to work site.</i>	0	0	0	0	0
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 via helicopter (2 sling load deliveries) and would be backhauled via helicopter (1 sling load). Some equipment would be carried by workers.	0	N	0	N	0
3	Seedlings, including 20% grown from seed outside the local genetic community would be planted by hand using hand tools. A small well would be created to capture incidental moisture.	N	N	P	0	0
4	Monitoring Installations (not evaluated here as common to all at this level of understanding)	NE	NE	NE	NE	NE

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 EA for mitigation measures.

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

Untrammelled quality would be negatively affected by planting tree seedlings across just under 38 acres in wilderness. 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 (roughly seven days) while actions are actively being implemented. The untrammelled quality would return to pre-project levels immediately post implementation such that the untrammelled 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”:

Up to a total of three sling load landings (two drops and one pickup 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).

The small tree wells created around each planted seedling (100-400 per acre across 38 acres) would likewise have a minor negative effect on undeveloped quality until the wells are no longer evident on the landscape—a period of one to two years post planting.

Despite these temporary impacts, the undeveloped 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 Board Camp Grove would have a greater likelihood than Alternative 1 of restoring sequoia and mixed conifer seedlings on just under 38 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.

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 Board Camp) for a total of roughly 1-2 total hours over the course of a week. The presence of work crews (roughly 10-15 individuals), and an administrative camp would further negatively affect the opportunities for solitude for a total of roughly 7-10 days during project implementation.

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:

No impacts identified.

Additional Alternatives

Step 2: Alternatives Considered but Dismissed

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

Explain:

The NPS considered but dismissed a number of alternatives in the 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 EA for a discussed on why these alternatives are dismissed:

1. Plant Only Outside 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 EA as Appendix D (see this MRA for additional discussion):

8. *Transport seedlings and tools on stock and foot*

Board Camp Grove is not accessible via trail, much less trail that is accessible for stock. Further, the distance that would need to be traversed from the nearest maintained trail ranges from 2.7 miles and would require stock or foot traffic to traverse steep elevational gradients. While abandoned trail alignments do exist to Board Camp Grove, they are not passable to stock and are either obliterated or not feasible for human 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) therefore 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. *Allow cross-country travel of stock to re-planting sites to transport seedlings and tools*

Under this alternative, stock would travel from existing access routes cross-country in trail-less areas to deliver seedlings and tools. This alternative was dismissed outright as trail-less areas where planting would occur in Board Camp are too steep and rugged to allow for safe stock travel.

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

Under this alternative, the NPS would utilize hand tools—including chainsaws, crosscuts, or pulaskis—to restore 2.7 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.

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 2.7 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—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 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.

Finally, the NPS considered the following alternative as part of the EA and MRA that accompanied the EA.

11. 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 Board Camp 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 EA and was not considered again in this MRA as the 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 EA (see Chapter 3: Affected Environment and Environmental Consequences).

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.

Explain rationale for selection, including a comparison of the selected alternative with other alternatives:

Under Alternative 1, “No Planting; Monitor Only”, impacts to untrammelled, undeveloped, and opportunities for solitude or primitive and unconfined recreation would not occur. 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 conservation purposes of wilderness, the Organic Act, or NPS legislation. In contrast, while Alternative 2 will result in temporary impacts to the untrammelled, undeveloped, and opportunities for solitude or primitive and unconfined recreation, in the short term (a period ranging from 2 hours and up to a total of less than two weeks) this alternative is anticipated to limit potential for further degradation of natural quality typically caused by high severity fire cycles. In the long term, Alternative 2 is also anticipated to result in long-term (again centuries) 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, sequoias, and endangered species in the long term as forests recover. For more information, including cumulative effects, see Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat EA and FONSI.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
<input checked="" type="checkbox"/>	Mechanical Transport:	Three round trip flights (2 for mobilization and 1 for demobilization) lasting a duration of 40 total minutes over the course of roughly one week.
<input type="checkbox"/>	Motorized Equipment:	N/A
<input type="checkbox"/>	Motor Vehicles:	N/A
<input type="checkbox"/>	Motorboats:	N/A
<input checked="" type="checkbox"/>	Landing of Aircraft:	Two sling load deliveries and one sling load demobilization (three landings total).
<input type="checkbox"/>	Temporary Roads:	N/A
<input type="checkbox"/>	Structures:	N/A

Approved? Prohibited Use

☒

Installations:

Quantity, Timing, Frequency, or Duration

Roughly 100-400 per acre raised earthen (i.e., native soil) tree wells (3 inches in height) on the downhill slope of each seedling. Anticipated to no longer be visible/functional after 1-2 years.

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

Follow up reporting form on total duration of chainsaw use to be submitted upon project completion. See Appendix A of Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat for mitigation list.

Approvals

Project Title (from page 2):

Plant Tree Seedlings in Board Camp Grove

Refer to agency policies for the following signature authorities:

Prepared by:

Name: Theresa Fiorino :Environmental Protection Specialist

Reviewed by:

Name: Christy Brigham :Chief of Resource Management and Science

CHRISTY BRIGHAM Digitally signed by CHRISTY BRIGHAM
Date: 2023.10.11 06:13:10 -07'00'

Approved by:

Name Clayton F. Jordan: Superintendent

CLAYTON JORDAN Digitally signed by CLAYTON
JORDAN

Signature _____ Date: 2023.10.12 16:55:03 -07'00'



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

Monitor Post-Fire Regeneration and Planted Seedlings in Board Camp Grove (2024-MRA-02)

Step 1: Determine If Administrative Action May Be Necessary

Issue Statement

Board Camp Grove, totaling 48 acres, is located in the John Krebs Wilderness on south-facing slopes in the South Fork drainage of the Kaweah River. The Grove offers a remote, extremely steep, wilderness experience for those with a desire to explore off trail. Following the 2020 Castle Fire, the NPS found 81.0% mortality of large sequoias within the entire area of Board Camp Grove (91.4% mortality in the majority of the grove that burned at high severity fire) and measured sequoia seedling densities within Board Camp Grove during year two post-fire had a mean of 651 seedlings per acre with no seedlings identified as second cohort—"strongly suggesting very little additional regeneration in the second year after the fire" (Soderberg et al. 2023, in review, p. 14). After applying the Decision Tree outlined in selected alternative in the Finding of No Significant Impact (FONSI) decision for the Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Revised Environmental Assessment (EA) (see page 20 and Figure 7 of the EA), the NPS has determined that regeneration is likely insufficient to restore a self-sustaining population of sequoia throughout the grove, and has decided to move forward with planting, consistent with the FONSI, EA, and two other minimum requirements analyses—one associated with a broader proposal to consider planting six groves and an adjacent fisher habitat corridor (scope of EA) that is found in Appendix D of the EA and one related to planting seedlings specific to Board Camp Grove following the implementation of the decision tree.

Now that the NPS is moving forward with planting, there is a scientific need to (1) Evaluate success of planting based on criteria established in the EA; (2) Based on the above, 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 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.

This MRA is intended to therefore analyze the minimum tool associated with monitoring regeneration, survival, and growth of the replanting efforts in the high severity areas of Board Camp Grove.

See the EA and Appendix D: Minimum Requirement Analysis for more background detail as well as the accompanying documentation (including MRA) associated with planting within this area.

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

Planting of Board Camp Grove will occur entirely within wilderness. Therefore, monitoring the impact of these fires or the success of planting outside of 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. Intentionally not monitoring is also contrary to the scientific and conservation purposes of wilderness, particularly in these novel post-fire environments (section 4(b) of the Act).

Criteria for Determining Necessity

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 for the John Krebs Wilderness. High severity fire during the Castle wildfire contributed to the death of roughly 80 individual large (> 4 feet in diameter) sequoia trees and reduced the intact acreage of the Grove; resulting in diminished natural quality of wilderness character. Monitoring the affected areas is

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

Monitoring is not necessary to protect outstanding opportunities for solitude or primitive and unconfined recreation.

OTHER FEATURES OF VALUE

☒ YES ☐ NO

Monitoring in this area under unprecedented conditions resulting from recent wildfire provides a novel scientific opportunity to study both natural and planted seedling survival as well as provide managers with data necessary to gauge success of management actions and provide a basis for future management decisions.

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

This action is not necessary to satisfy a special provision.

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

Monitoring planting results and regeneration will inform whether the planting action effectively supports the persistence of mature giant sequoia and preservation of forest habitat in the area and will ensure the NPS makes future decisions about these conservation goals that are informed by the best available science—required to meet the park enabling legislation and other federal laws governing the National Park Service as follows.

The Organic Act of the National Park Service:

The Organic Act directs us "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

The 1978 Amendment (a.k.a. Redwoods Act) strengthened the protective functions of the NPS and influenced recent decisions regarding resource impairment. "...the protection, management, and administration of these areas shall be conducted in the light of the high public value and integrity of the NPS and shall not be exercised in derogation of the values and purposes for which these various areas have been established..."

The research is necessary to inform management of degraded forest ecosystems and alterations of community functioning. Without this information managers do not have the tools "to conserve the scenery and the natural and historic objects and the wildlife therein..."

The National Park Service Omnibus Management Act of 1998:

The National Park Service Omnibus Management Act of 1998 directs the Secretary of the Interior "to assure that management of units of the National Park System is enhanced by the availability and utilization of a broad program of the highest quality science and information."

It established the framework for fully integrating natural resource monitoring into the management process of the NPS. Section 5934 of the Act requires the Secretary of the Interior to develop a program of "inventory and monitoring of NPS resources to establish baseline information and to provide information on the long-term trends in the condition of the National Park System resources." The message of the Parks Omnibus Management Act of 1998 was reinforced by Congress in the FY 2000 Appropriations bill.

The data collected through these studies will serve as the foundation for informing changes through time and providing critical data for assessing the long-term effects of unprecedented fire and the results of NPS' ecological intervention. This research also provides scientific information that can be used in managing resources in SEKI and other national parks.

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

Board Camp occurs in wilderness. The ecological, natural conditions in this Grove has been degraded, and monitoring is necessary to ensure the planting actions meet the conservation and scientific purpose of wilderness, the purposes of NPS under the Organic Act, the purposes of

Sequoia and Kings Canyon National Parks under park enabling legislation, and the NPS Organic Act (consistent with section 4(a) of the Wilderness 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 and preservation of fisher habitat connectivity is required to meet the parks’ enabling legislation and other applicable laws, including the Endangered Species Act (16 U.S.C. § 1536(c)). 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 and strive to protect a full range of native plant and animal genotypes. They 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.

Without rigorous monitoring of the regeneration and restoration efforts, the NPS cannot adequately fulfill its legal mandates as explained above.

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: 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.”

NPS Management Policies 2006: 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.”

2015 Wilderness Stewardship Plan for Sequoia and Kings Canyon National Parks

“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.”

Uncontrollable Timing Requirements

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

Planting is proposed to begin the fall of 2023. It is 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	<i>Transportation of personnel and gear to and from monitoring plots</i>
Component 2	<i>Establish Monitoring Plots</i>
Component 3	<i>Identify Planted Seedlings within Plots</i>
Component 4	<i>Frequency of Monitoring</i>

Step 2: Alternatives

Alternative 1: Establish Plots via GPS Only. Monitor Plots via Foot.

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	<i>Transportation of personnel and gear to and from monitoring plots</i>	Transportation of personnel and gear to and from monitoring plots via foot
2	<i>Establish Monitoring Plots</i>	Establish Monitoring Plots with GPS Points Only
3	<i>Identify Planted Seedlings within Plots</i>	No Identification of Planted Seedlings.
4	<i>Frequency of Monitoring</i>	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.

Described further in the attached SEGI Planting Monitoring Plan, the NPS and partners would establish and implement a long-term monitoring protocol to track survivorship of planted seedlings and continue to understand regeneration within this area. This would include the establishment of 20, roughly 25-meter diameter, plots within the planting area and 20, roughly 25-meter diameter, Monitor Post-Fire Regeneration and Planted Seedlings in Board Camp Grove
MRAF - Step 2: Determination

control plots (using same plots that USGS has been monitoring; these plots would be no plant plots as controls). Plot centers would be established using high resolution GPS. Monitoring crews of up to five people would monitor these plots twice in 2024, once per year from 2025-2029, and once every five years thereafter. These crews would access the locations by foot and would be on site for no more than two weeks during each monitoring period. The NPS anticipates that this monitoring would be completed by outside researchers who would be issued a research permit.

Described further in the attached SEGI Planting Monitoring Plan, this alternative would include the

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 <i>Describe in detail the impacts to each of the five qualities in the narrative section below</i>	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
1	Transportation of personnel and gear to and from monitoring plots via foot	0	0	0	N	0
2	Establish Monitoring Plots with GPS Points Only	0	0	P	0	P
3	No Identification of Planted Seedlings or Installation of Monitoring Equipment.	0	0	0	0	0
4	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	P	N	P

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.

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

No impacts anticipated.

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”:

No impacts anticipated.

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

Monitoring 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. This said, even high-resolution GPS is not precise enough at this time to identify precise/consistent boundaries of plots which can result in slight changes in seedling numbers within a plot; small changes in numbers of seedlings in a plot result in large changes in seedling density per acre and survivorship, thereby creating more “noise” in the resulting data sets.

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 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 in the surrounding wilderness during monitoring activities. After the annual monitoring action, opportunities for solitude would return to pre-project levels.

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 John Krebs Wilderness. These benefits would continue to be realized in the long term.

Alternative 2: Establish Plots Using Rebar and Tags. Monitor Plots via Foot.

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	<i>Transportation of personnel and gear to and from monitoring plots</i>	Transportation of personnel and gear to and from monitoring plots via Foot; transport of plot markers would occur via helicopter that is already visiting site for planting (no additional helicopter use)
2	<i>Establish Monitoring Plots</i>	Establish Monitoring Plots with Rebar
3	<i>Identify Planted Seedlings within Plots</i>	Tag Seedlings within Plots
4	<i>Frequency of Monitoring</i>	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.

This alternative would be the same as Alternative 1 except plots would be marked using one rebar stake to mark the center of each plot, and each planted seedling within the plot 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 (specific to monitoring plots).

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 in fall 2023 either via foot or via a helicopter which is transporting all equipment and seedlings associated with the planting effort. No additional helicopters, beyond those considered in the MRA associated with planting would be necessary. Like Alternative 1, these monitoring plots would be monitored by crews of up to 5 people twice in 2024, once per year from 2025-2029, and once every five years thereafter. These crews would access the locations by foot. The NPS anticipates that this monitoring would be completed by outside researchers who would be issued a research permit.

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 <i>Describe in detail the impacts to each of the five qualities in the narrative section below</i>	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
1	Transportation of personnel and gear to and from monitoring plots via Foot; transport of plot markers would occur via helicopter that is already visiting site for planting (no additional helicopter use)	0	0	0	N	0
2	Establish Monitoring Plots with Rebar	0	N	P	0	P
3	Tag Seedlings within Plots	0	N	P	0	P
4	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	P	N	P

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. 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:

There will be no effect on the untrammeled quality.

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”:

Small (measures in cm/inches) plant tags would 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:

The action would 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:

Negative effects would be as described under Alternative 1.

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:

Beneficial effects would be as described under Alternative 1 but would provide a significant increase in scientific rigor and reliability with the addition of tree tags and physical plot markers. As well, marking the plots with rebar will ensure that plots can be accurately tracked over time, improving the robustness of the scientific data collected. See additional detail under “natural” above.

Step 2: Determination – What is the Minimum Activity?

Selected Alternative

Alternative 2: Establish Plots Using Rebar and Tags. Monitor Plots via Foot.

Alternative #1 (Establish Plots via GPS Only. Monitor Plots via Foot.) 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 Alternative #2 because GPS has not shown to be precise enough to ensure consistent boundaries of plots which can result in slight changes in seedling numbers; 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, Alternative #1—which does not enable this understanding—would only partially achieve the scientific purpose of wilderness.

Alternative #2 (Establish Plots Using Rebar and Tags. Monitor Plots via Foot.) meets the goals of Step 1 and, though it involves an increased number of small (measured in inches) installations, it will best assist managers in tracking results of ecological intervention, specifically by tracking a plot-based (rebar) sample of planted seedlings (seedling tags) 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. If high accuracy GPS units can achieve necessary level of accuracy, rebar would be removed. The installations and negative impacts to the undeveloped quality of wilderness character are therefore the minimum required (in number and duration) necessary to preserve the natural quality of wilderness character and meet the scientific and conservation purposes of wilderness.

As outlined in the EA and as supported by Appendix D in the EA and the MRA associated with planting in Board Camp specifically, wilderness character would be preserved in the long term.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
<input checked="" type="checkbox"/>	Mechanical Transport:	Although rebar would be transported via helicopter; no additional flights would be required to transport this material above that which is required for the planting effort.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
<input type="checkbox"/>	Motorized Equipment:	N/A
<input type="checkbox"/>	Motor Vehicles:	N/A
<input type="checkbox"/>	Motorboats:	N/A
<input type="checkbox"/>	Landing of Aircraft:	N/A
<input type="checkbox"/>	Temporary Roads:	N/A
<input type="checkbox"/>	Structures:	N/A
<input checked="" type="checkbox"/>	Installations:	40 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 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.

Approvals

Project Title

Monitor Post-Fire Regeneration and Planted Seedlings in Board Camp Grove

Prepared by:

Name: Theresa Fiorino :Environmental Protection Specialist

Recommended by:

Name: Christy Brigham :Chief of Resource Management and Science

CHRISTY BRIGHAM

Digitally signed by CHRISTY BRIGHAM
Date: 2023.10.11 06:14:11 -07'00'

Approved by:

Name Clayton F. Jordan: Superintendent

CLAYTON JORDAN

Digitally signed by CLAYTON
JORDAN

Signature _____

Date: 2023.10.12 16:56:39 -07'00'