



## Frequently Asked Questions on Proposal to Re-establish Tree Seedlings in Severely Burned Giant Sequoia Groves and Adjacent Fisher Habitat Corridor

In Spring of 2022, the National Park Service (NPS) solicited feedback on a proposed action to plant tree seedlings in Board Camp Grove, which burned at high severity during the 2020 Castle Fire in Sequoia National Park. A 30-day public comment period was held from February 22 to March 25, 2022. This public scoping effort resulted in the receipt of approximately 2,800 pieces of correspondence.

Since the previous public scoping effort, the NPS has had time to conduct surveys and field observations in many areas that burned at high severity under the 2020 Castle and 2021 KNP Complex Fires, including additional surveys in Board Camp Grove as well as other groves, and found that tree mortality was unprecedentedly high and natural regeneration was extremely low, relative to what the NPS has found following previous wildfires and prescribed fires. This information has resulted in the NPS expanding the scope of the initial proposal to include re-establishing tree seedlings in an additional five sequoia groves and in one endangered fisher habitat corridor that were severely impacted by recent wildfires in both Sequoia and Kings Canyon National Parks. These seven areas burned at such high and unprecedented severity and resulted in such extensive sequoia and mixed conifer mortality that these forests are unlikely to recover—and will instead remain vulnerable to fire-initiated long-term conversion from forest to shrub dominated communities—without intervention.

The NPS developed the FAQs below in response to public feedback received during the NPS' initial public scoping efforts for Board Camp. This feedback was reviewed by park staff and is being considered in the ongoing planning process.

### Frequently Asked Questions

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#### Q. What is the NPS proposing to do?

A. In order to prevent an unacceptable loss of the giant sequoia population in the limited number of groves where they naturally occur and restore proposed critical habitat for an endangered species, the NPS is proposing to promote post-fire recovery in up to six giant sequoia groves and a corridor of proposed fisher critical habitat impacted by high severity fire by replanting giant sequoia and other mixed conifer seedlings in areas where these forests are unlikely to recover without intervention. (See Public Scoping Information for additional information.)

The NPS is writing an environmental assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and is completing supporting analyses in accordance with the Wilderness Act and other resource protection laws to facilitate decision-making and to ensure proposed agency action conforms with these and other resource protection laws. Consultation with Native American tribes and state and federal agencies will also be completed prior to making a final decision.

#### Q. Why is action being considered?

A. Giant sequoia (*Sequoiadendron giganteum*) is a fundamental resource for which Sequoia and Kings Canyon National Parks (parks) were established and a primary attribute of the wilderness character of both the Sequoia and Kings Canyon Wilderness and the John Krebs Wilderness. Two recent wildfires—the Castle (2020) and KNP Complex (2021)—resulted in extensive sequoia and mixed conifer mortality across six sequoia groves within the parks. Given that giant sequoias

reproduce by seed, this mortality has greatly reduced the ability for natural regeneration in large areas of these groves, and in some locations, there are no live trees in close enough proximity to provide seed for seedling reestablishment. Post-fire surveys (which are ongoing) have documented that any seedling presence in at least some of these high mortality areas is highly patchy and far less in number and density than what would be needed to successfully re-establish sequoia presence in the damaged areas of these sequoia groves. Assessments are continuing and, under the proposed action, each grove area would be evaluated individually to see if planting is needed and if so, in what areas within the proposed planting area. Based on current assessments, if the NPS does not act, approximately 750 combined acres across six sequoia groves are vulnerable to fire-initiated long-term conversion from mixed conifer forest to shrub dominated communities and the subsequent, functional loss of giant sequoias from these areas.

In addition, the Southern Sierra Nevada distinct population segment (DPS) of fisher is a federally endangered forest-dependent species increasingly threatened by wildfire driven habitat loss. The severely burned area south of Redwood Mountain Grove, where planting is proposed, provides an important habitat linkage between two remaining green forested patches. Restoration of roughly 485 acres of tree cover in this habitat linkage is critical to speed up the time frame in which some level of connectivity can be recovered—which is important to allow for dispersal of young animals, safe travel between foraging patches, and genetic connectivity in an otherwise disjointed forest habitat for this endangered species.

**Q. Why does the NPS believe these forests will be lost? Won't these forests recover on their own?**

A. The proposed action integrates field surveys, analyses, and a decision tree that would lead the NPS toward inaction in an area should data indicate natural recovery is likely (see Public Scoping Information for additional information); however, initial analysis of remote imagery has indicated that significant portions of the six groves targeted for survey and evaluation and potential planting may have such high tree mortality and limited natural seedling recruitment that they are not expected to recover on their own. Subsequent field sampling, observation, and analysis in four of the six groves supports this concern (two of the proposed areas have not yet been surveyed). In large sections of these groves and fisher habitat corridor that have been surveyed by the NPS, the density of new seedlings are not sufficient to achieve mature forest conditions over time.

Due to a host of natural processes, most tree seedlings, especially giant sequoia, do not survive to maturity. To overcome low natural survival, sequoias and other fire adapted species typically regenerate at very high initial densities post fire—allowing for a small percentage to survive to maturity and perpetuate forested conditions. If a single fire did not result in a high enough density of seedlings to maintain forest cover, subsequent fires would again provide the opportunity for additional seedlings to regenerate and become established.

Unfortunately, in the case of areas being considered under this proposal, the mature trees that would have otherwise served as a seed source after subsequent fire were killed by unprecedented high severity fire during the 2020 Castle and 2021 KNP Complex Wildfires. If there are not sufficient seedlings in these areas now to ensure that some survive to adulthood (which is what the NPS is finding), these tree species—and associated forest—will be lost from these areas. Notably, this sort of mortality of adult sequoias and large conifers from recent wildfires did not occur in other groves and forests with a more recent history of fire (i.e., forests that did not have a long history of fire suppression and subsequent heavy fuel-loading or had introduced, prescribed fire); natural processes are therefore expected to be sufficient for these other areas to recover from recent wildfire impacts.

As described above, giant sequoias produce tens of thousands of seedlings after a fire, and only a handful of these survive to become the majestic monarchs that we see today. So, while the NPS has documented an average of 36,000 seedlings per acre in typical post-fire plots, seedling density in these six groves and adjacent fisher habitat is as low as 33 seedlings per acre—not even one percent of what would typically be expected post-fire. Studies suggest that further seedling germination sufficient to overcome such low seedling numbers is unlikely as most germination occurs within

the first, and sometimes second, year post fire. The NPS is working with the United States Geological Survey's Western Ecological Research Center (USGS) to analyze data from a previously logged grove that had lost giant sequoias over a large area in order to understand seedling densities necessary to reestablish sequoias once parent trees are lost. The NPS would use this analysis to inform what areas to actively replant, should the decision be made to move forward with action.

**Q. Why are these six groves important? Aren't there plenty of other sequoia groves?**

A. Giant sequoia (*Sequoiadendron giganteum*) is a fundamental resource for which Sequoia and Kings Canyon National Parks were established and a primary attribute of the wilderness character of both the Sequoia and Kings Canyon Wilderness and the John Krebs Wilderness. The giant sequoia is an iconic native tree which can grow over 20 feet in diameter and can live over 3,000 years. Individuals of the species are identified as the largest trees on earth. Giant sequoias are found only in a narrow band of the western slope of the Sierra Nevada in California—the entire global range of sequoias is only approximately 80 groves and grove complexes, covering approximately 25,000 acres. Close to half of these—37 groves covering 10,000 acres—occur within the boundaries of Sequoia and Kings Canyon National Parks (NPS analysis based on Hart 2021).

In 2020 and 2021, the Castle and KNP Complex (KNP) Fires together burned 27 NPS managed sequoia groves in these parks, six of which included contiguous areas of high severity fire where high mortality of monarch sequoias occurred (Stephenson and Brigham 2021). Assessments by NPS and partner agencies have determined that low seedling regeneration and lack of adequate seed source within these contiguous high severity patches leave these areas vulnerable to fire-initiated long-term conversion from forest to shrub dominated communities.

Should conversion of these areas occur, it would diminish the range wide distribution of an iconic species the NPS is obligated to protect (Coop et al. 2020; Guiterman et al. 2022). Though the monarch sequoias lost to the Castle and KNP, some of which had lived up to 3000 years, are irreplaceable in our lifetimes, the NPS has a fundamental responsibility to protect the species from population loss.

**Q. Why can't NPS consider planting only in non-wilderness groves?**

A. Of the six sequoia groves that burned at high severity during the Castle and KNP wildfires, four occur entirely within designated wilderness, one is partially located in designated wilderness (Redwood Mountain), and one is partially located in recommended wilderness (Dillonwood). No frontcountry sequoia groves were lost or partially lost to high severity fire. As well, the area of mixed conifer fisher habitat that burned at high severity during the KNP is entirely within designated wilderness. Therefore, planting in only non-wilderness groves would not achieve the purpose and need of promoting forest recovery in the areas affected.

**Q. Why is action needed now? Why doesn't the NPS wait a few years and see what happens over time, then plant later if the naturally regenerated seedlings don't grow?**

A. Research has shown that sequoia seedlings would need to be planted within the first 2-3 years to out compete rapidly re-sprouting shrubs. If action is not taken within the natural regenerative timeframe, these areas will be vulnerable to fire-initiated long-term conversion from forest to shrub dominated communities. Once these shrub community types are established, successful re-introduction of sequoia and pine seedlings within these previously forested areas would require more intensive intervention (herbicides, crushing), especially as these shrub communities alter the soil seedbank overtime.

**Q. How is the NPS determining what the replanting goal is and how many seedlings to replant?**

A. Based on the purpose and need for action, the goal of this proposed action is to have a sufficient number of sequoia and mixed conifer seedlings at sufficient densities to mimic natural regeneration of these species post wildfire and thereby direct the trajectory of these forests toward recovery. The NPS is looking at two different criteria for evaluating seedling densities against this goal.

1. First, seedlings that reestablish on their own after disturbance such as fire have one set of reference values because they have very high mortality in the first few years of growth. These reference values are being generated for giant sequoias by USGS based on published datasets and would be used in the decision tree process to decide whether replanting is necessary. Specifically, the NPS is working with the United States Geological Survey (USGS) to analyze data from a previously logged grove that had lost giant sequoias over a large area in order to understand seedling densities necessary to reestablish sequoias once parent trees are lost. Based on initial findings from this analysis, sequoia seedlings are typically at very high densities the first summer after disturbance (thousands to tens of thousands of seedlings per acre depending on what time of year and how many years post disturbance the measurements are taken) and rapidly declines over time post fire given high mortality of seedlings within the first few years. For mixed conifer species, densities would be based on a published model (Post-fire Spatial Conifer Regeneration Prediction Tool (POSCRPT)) of forest regeneration post-fire.
2. A different set of reference seedling densities is needed for planted seedlings for evaluating success in any areas where reforestation occurs. Planted seedlings have much higher survivorship because of their larger size having been grown in a greenhouse prior to planting. Site specific planting densities would be developed for each planting area based on stocking densities from the United States Forest Service (USFS), evaluation of site-specific climate, and use of other recommendations from published literature and USFS general technical reports. Based on previous sequoia planting work, the NPS is initially targeting between 200 to 600 planted sequoia seedlings per acre depending on site-specific conditions.

**Q. Why has the NPS already collected sequoia seed and what impact will this have on the burned sequoia groves?**

A. Given the time considerations identified in the previous response and the fact that there is variation in cone production from year to year (not all years produce adequate material), the NPS reviewed, analyzed (in accordance with resource protection laws), and initiated a project to collect cones from Board Camp and Redwood Mountain Groves in September 2022. While some of the collected seed was preserved in a seedbank to preserve sequoia genetic diversity and for research—as called for in the park’s Resource Stewardship Strategy—the NPS also collected and germinated a portion of the collected seed to allow the option of planting seedlings within the necessary timeframe should the NPS ultimately decide to act on this replanting proposal. Should the NPS decide to take no action on this replanting proposal, seedlings that have been germinated would be transferred to partner organizations or agencies for their use.

To ensure that the collection had no measurable impact on the seed availability in the source groves, the NPS collected a conservative quantity of cones following guidelines for seed collection developed by the Bureau of Land Management’s “Seeds of Success” Program, as well as the Center for Plant Conservation. For example, even in Board Camp Grove, where the NPS estimates that only around 40 living sequoias remain in the grove, the cone collection effort in 2022 equaled roughly 1.5% of the total cone crop potentially available in the grove that year.

Q. If there is not ample seed in the area to allow for grove regeneration without intervention, where is the NPS getting the seed from?

A. There is not ample seed within the dispersal distance for a sequoia seed to travel from its parent tree and successfully re-establish in some areas. In other words, the remaining seed within the groves is so far from the severely burned areas that little or none will reach the denuded areas without human intervention. Under the proposed action, sequoia seedlings would be grown from seed collected from a number of source groves, which may include a percentage of seed from natural sequoia groves that are outside the local seed zone. Pine seedlings would be grown from seed collected from within the local seed zone for these species.

Q. What tools is the NPS proposing to use to replant these areas?

A. NPS planting crews would use hand tools such as small spades or dibble bars to plant seedlings, and crews would hike to each site. The minimum necessary to transport tools and seedlings to each site would be evaluated under an individual Minimum Requirement Analysis (MRA) for each area in wilderness where action is determined to be necessary.

Q. How long does the NPS plan to continue planting? What does the NPS consider success?

A. The desired outcome of the proposed action is to establish a sufficient number of sequoia and mixed conifer seedlings at sufficient densities to mimic natural regeneration of these species post wildfire and thereby direct the trajectory of these forests toward forest recovery as would have occurred naturally had high fuel loading not led to the severe fire effects these areas experienced. As mentioned previously, based on evaluation of site-specific climate, use of other recommendations from published literature, and general technical reports from the USFS, the NPS is proposing to plant 200 to 600 seedlings per acre in areas where intervention is determined to be necessary. The NPS anticipates that most initial planting in these potential seven areas would occur over the next two years, fall 2023-fall 2025, but additional, supplemental, plantings could occur per area through fall 2028 if survivorship of seedlings is such that seedling density targets are not achieved following the initial plantings. The NPS anticipates high survivorship of seedlings based on similar planting efforts elsewhere, but consideration of planting over this longer time period would improve probability of planting events aligning with years of above-average precipitation; a critical component of seedling success in the southern Sierra Nevada (Shive et al. 2022; York et al. 2009).

Q. What other actions is the NPS considering to promote forest recovery and protect sequoias?

A. In addition to replanting severely burned areas, the NPS has a long history of using prescribed fire to reduce fuel accumulations in sequoia groves, though limited capacity and funding has previously required that such treatments focus primarily in high-use, frontcountry areas. In recognition that more groves with high fuel loading could be lost to high severity fire when the next fire occurs, the NPS recently approved an action to conduct emergency fuels reduction in eleven sequoia groves and surrounding forests, and implementation is underway. As well, the NPS is currently in the process of updating the parks' fire and fuels management plan which will evaluate alternatives for improving sequoia grove resiliency into the future.

Q. How does this proposal conform with the Wilderness Act?

As stewards of wilderness, the NPS must carefully consider each proposed action through the lens of wilderness preservation, as directed by the Wilderness Act. The Wilderness Act requires that the four federal land management agencies that administer wilderness preserve wilderness character, but wilderness character is not defined in the Act. Rather, the agencies worked together on a common framework to define, quantify, and monitor wilderness character to meet this statutory requirement. This interagency framework defines wilderness character as a holistic concept, comprised of five tangible "qualities" found in the language of the Act: untrammeled, natural, undeveloped,

opportunities for solitude or primitive and unconfined recreation, and other features of value. Within this framework, each quality is an equally important tangible component of wilderness character.

Notably, section 4(a) of the Wilderness Act also states that:

“The purposes of this Act are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge systems are established and administered and...Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system 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 the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of Congress which might pertain to or affect such area...”

In this section, the Wilderness Act clarifies that other laws, such as the National Park Service Organic Act (that defined the mission of the NPS) and the enabling legislations that established Sequoia and Kings Canyon National Parks are not “modified by”, nor the standards of these laws “lowered” by, the lands’ designation as Wilderness. As such, National Park Service policy provides more specific and detailed guidance to navigate the Wilderness Act, the Organic Act, and other applicable laws. For example, Director’s Order 41 (DO-41) requires parks to complete a minimum requirement analysis (MRA) “in order to document the determination of whether a proposed action (project), which involves a prohibited use, is necessary to meet the minimum requirement for the administration of the area for the purpose of wilderness”, and NPS Management Policies 2006 “provide that a MRA must also be applied to all other administrative actions (projects) within wilderness that could potentially affect wilderness character” (DO-41 6.4). The Reference Manual associated with DO-41, RM-41, also includes *Guidelines for Evaluating Ecological Intervention Proposals in National Park Service Wilderness* which provides a framework to inform decisions when there is a conflict between intervention (the untrammelled quality) and degradation of natural resources (the natural quality).

The parks have applied the minimum requirement concept and the RM-41 ecological interventions framework to the groves most severely affected by the Castle and KNP Complex Wildfires to evaluate whether action is necessary to meet the requirement to preserve wilderness character, prevent a long-term loss of natural resources, and meet the requirements of other laws (this is often referred to as Step 1 of a MRA). By initiating this “Step 1” of an MRA, the NPS has conceptually determined that, pending further data-driven analyses, planting (which would be a trammel) may be necessary to meet the legal requirements of the Organic Act, enabling legislation of the parks, and the Endangered Species Act, and is consistent with the preservation of wilderness character under the Wilderness Act. Through these evaluation tools, and through NEPA, the NPS continues to analyze the minimum requirement in wilderness to meet all of the NPS’ legal obligations and conform with other agency guidance.

Step two of the MRA (i.e., NPS’ final determinations on whether and where to plant within a specific area and what the minimum requirement would be to transport tools and materials) would not be made through the Environmental Assessment. Rather, if the NPS ultimately adopts one of the action alternatives, the NPS would develop individual planting plans—informed by site-specific evaluations and minimum requirement analyses—to determine the minimum requirement for administrative action in wilderness.