National Park Service
U.S. Department of the Interior

Sequoia and Kings Canyon National Parks
Region 10

KNP Complex Wildfire Tree Hazard Mitigation

Environmental Assessment

February 2023

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NOTE TO REVIEWERS

There are several ways to comment on this document:

BY MAIL – You may mail comments to:

Superintendent
Sequoia and Kings Canyon National Parks
Attn: KNP Tree Hazards
47050 Generals Highway
Three Rivers, CA 93271

ONLINE – You may also comment on this project at http://parkplanning.nps.gov. Access https://parkplanning.nps.gov/KNPTreeHazards to provide comments electronically.

Before including your address, phone number, e-mail address, or other personally identifiable information in your comment, be aware that your entire comment – including your personally identifiable information – may be made publicly available at any time. You can request to have your personally identifiable information withheld from public review, but such requests cannot be guaranteed.

ON THE COVER

Conifer trees killed during the KNP Complex Wildfire located along the Generals Highway in Sequoia National Park.

[National Park Service Photo]

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Chapter 1: Purpose and Need

Introduction

The National Park Service (NPS) is proposing to mitigate roughly 12,000-15,000 roadside tree hazards[1] within the burn perimeter of the 2021 KNP Complex Wildfire (KNP) in Sequoia and Kings Canyon National Parks (parks). Areas subject to tree hazard mitigation include the Generals Highway, Mineral King Road, Crystal Cave Road, Crescent Meadow Road, and Redwood Mountain Road. Action may also be taken in other developed areas within the KNP burn perimeter as necessary to meet desired conditions, safety, and resource protection goals. In addition, the NPS is proposing to treat woody debris that poses a safety and wildfire risk in these same areas.

The NPS is preparing this environmental assessment (EA) to facilitate National Environmental Policy Act (NEPA) review and agency decision making.

Purpose and Need

Given NPS' obligations to promote public use and the increased risk to public and employee safety and infrastructure posed by the volume of tree hazards along park road corridors and within developed areas, the purpose and need of the proposed action is to minimize the threat to public safety and NPS infrastructure from tree hazards resulting from, or further weakened by, the KNP Complex Wildfire while maintaining, if not restoring, public access to frontcountry areas of the parks where it is currently threatened by the presence of these hazard trees.

The KNP Complex Wildfire (KNP) burned over 88,000 acres of Sequoia and Kings Canyon National Parks and adjacent lands during the fall of 2021, resulting in high levels of tree-mortality across the landscape and adding to the already extensive levels of conifer mortality previously documented within the parks and throughout the Sierra Nevada (Fettig et al. 2019). Where dead or otherwise defective trees overlap with developed areas, some are considered tree hazards[2] – meaning they pose a direct risk to human safety and property due to the likelihood of their failure and potential to hit a human or man-made target[3].

While the parks have documented an increasing number of tree hazards from ongoing drought and beetle kill over the past 10 years, the KNP added substantially to the tree hazard backlog. Park roadways, including the Generals Highway—a high use scenic driving corridor which serves as the primary route connecting the two parks and the parks' most visited areas—have been severely affected. The Mineral King Road, which provides access to park campgrounds and trailheads as well as access to a large seasonal inholding community, has likewise been affected. Other areas, such as Crystal Cave and Redwood Mountain roads, were also heavily impacted by the KNP and remain closed to public access due in part to the continued threat of tree hazards. As well, tree hazards currently threaten Clover Creek wastewater infrastructure. See Figure 1 (page 2).

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[1] See Appendix D - Definitions
[2] See Appendix D - Definitions
[3] See Appendix D - Definitions

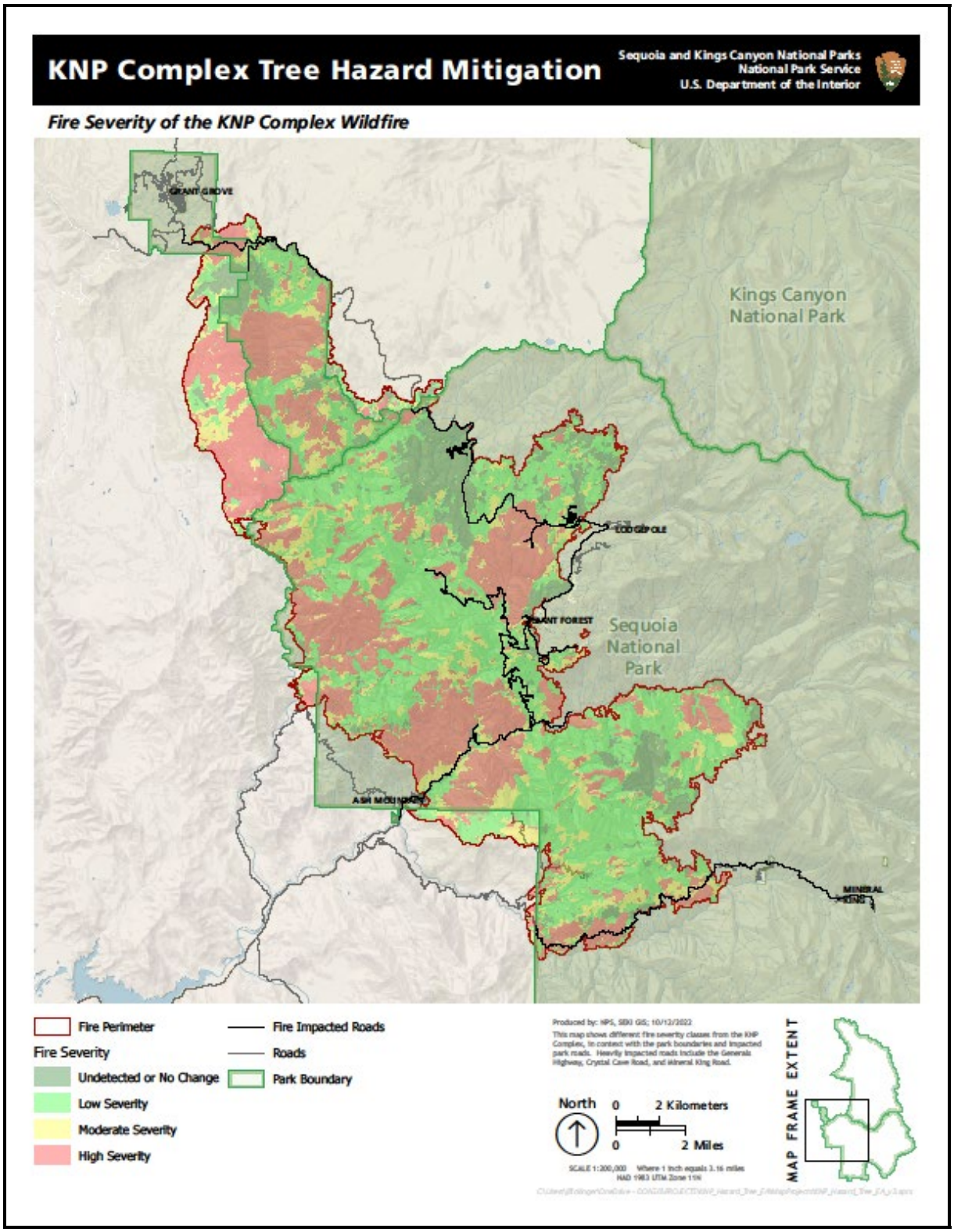

FIGURE 1: OVERVIEW OF THE ACTION AREA FOR KNP COMPLEX WILDFIRE TREE HAZARD MITIGATION IN SEQUOIA AND KINGS CANYON NATIONAL PARKS

Figure Source: (NPS, 2022)

Issues

Issues Selected for Detailed Analysis

The following issues are carried forward for further analysis in Chapter 3.

- Visitor and Employee Safety
- Rare Threatened or Endangered Species – Fisher
- Fuel Loading and Future Fire Effects
- Wilderness
- Visitor Use and Experience

Issues Considered but Dismissed

The following issues were considered but dismissed from further analysis.

Air Quality – Including Equipment Emissions and Pile Burning

Sequoia and Kings Canyon National Parks are designated as a Class I Airshed under the Clean Air Act, as amended, and are therefore subject to the most stringent requirements for allowable increases in air pollution. The proposed project falls within the San Joaquin Valley Air Pollution Control District (SJVAPCD), which is susceptible to air pollution given its climate, topography, and human activities and is currently designated a severe nonattainment area for ozone (1-hour), PM 2.5, and PM-10 under California Ambient Air Quality Standards (SJVAPCD, 2022). Area (nonpoint) sources continue to be the major contributor of air pollutants in the district; ozone, acidic and nitrogen deposition, pesticide drift, and regional haze are the most serious threats. Air pollution influences in the action area primarily originate outside park boundaries.

EQUIPMENT EMISSIONS AND FUGITIVE DUST

Under the preferred alternative, use of chainsaws and heavy equipment for tree-felling, bucking, and to chip and haul debris would increase hydrocarbon, nitrogen oxide, and sulfur dioxide vehicle emissions resulting in localized air quality effects for a total of 6-8 months (duration of project) along the 62-mile linear action area. During this time, air emissions would be transient in nature, lasting 10 hours per day for roughly 1-7 days along individual road segments depending on intensity of the action in each area. It is anticipated that emissions would generally dissipate at the end of each project workday and would entirely cease upon project completion. In addition, dust control measures would be implemented as necessary to control fugitive dust. Because of the transient nature of these impacts, and mitigations to further reduce anticipated impacts, this issue was dismissed from further analysis.

PILE BURNING

Under the preferred alternative, felled trees and limbs would be piled and burned after adequate moisture has been received in October and prior to May 1. Smoke production may occur over the course of 5-10 days total, though the quantity of smoke produced during pile burning would be dependent on factors including the total number of piles (which cannot be quantified until piles are constructed) and conditions on the day pile burning is conducted. Despite these unknowns, smoke generation from pile burning is generally not an issue due to cleaner burning slash fuels and the limited duration of active fire. However, based on recent prescribed fire projects and pile-burning plans, there is potential for short-term increased PM 2.5 during firing and burn-down for areas adjacent to the project sites including sensitive receptors in Wilsonia, Grant Grove, Wuksachi, Lodgepole, Silver City, and Mineral King (NPS 2021). Though smoke may drift across adjacent

roadways such as the Generals Highway or Highway 180 during ignition, closures for public health and safety have been rarely necessary in the past, and there are no indications of needing to do so in response to this proposed action. To ensure the project does not contribute to local exceedance of air quality standards, the NPS would prepare and submit to SJVAPCD a smoke management plan, including a smoke trajectory map, for approval a minimum of seven days prior to any planned pile burning. The NPS would then monitor conditions throughout the winter to ensure pile burning falls within the park burn plan and SJVAPCD guidelines and would then monitor local air quality throughout the duration of the project to ensure emissions do not exceed those authorized in the plan (per NPS 2021a and local Interagency Unified Guidelines and Procedures for Smoke Management).

Due to limited and short-term nature of smoke production anticipated, as well as the implementation of state control measures and onsite monitoring to further reduce the potential impacts to sensitive receptors, this issue was dismissed from further analysis.

Aquatic Resources – Including Water Quality and Wetlands

Section 303(d) of the Clean Water Act requires that states, territories, and authorized tribes identify waterbodies that do not meet water quality standards and to develop, with EPA approval, Total Maximum Daily Loads for waters identified as impaired to meet established water quality criteria and associated beneficial uses.

Several wetlands and forks and tributary creeks of the Kaweah River occur within the proposed action area; however, none are classified as impaired under section 303(d) (State Water Resources Control Board, 2022). Aquatic resources can be affected by erosion of sediment when project actions disturb soils or sensitive vegetation in sensitive areas. However, the NPS would implement mitigations to avoid direct and indirect project related disturbance to aquatic resources and soils such that the project would not result in direct effects on aquatic resources (see Appendix B). Because effects to aquatic resources are not anticipated, this issue was dismissed from further analysis under the EA.

Climate Change—Including Forest Adaptation and Resilience

One respondent to the initial public scoping phase of this project requested that the project discuss actions to improve forest adaptation to changing conditions, including selecting resilient native species for replanting, and asked the NPS to identify reasonably foreseeable effects that climate change may have on the project and what impacts the project may have on climate change.

There are no reasonably foreseeable effects of climate change on the project. While some restoration planting is proposed under the 2021 KNP Burned Area Emergency Response (BAER) Plan, such actions lie outside the purpose and need of this proposal and the issue of resilient planting is therefore not evaluated further in this EA.

Activities associated with implementation of the preferred alternative (i.e., use of heavy machinery and trucking) would contribute to an increase in greenhouse gas (GHG) emissions for the 6–8-month project duration. However, given the scale and intensity of proposed action in the context of regional and global economic activity, any effects of project related GHG emissions on climate change would not be discernible at a regional scale; nor is it possible to link the GHG emissions from individual project actions meaningfully and quantitatively to regional or global climatic patterns.

As to any impacts to climate change from the mitigation and potential removal of tree hazards from site, this project occurs within an 88,000-acre wildfire footprint where most measurable carbon would have been released during the fire itself, and the project does not convert forest to some other use. As the forest continues to recover, which is anticipated, carbon would continue to be sequestered into the future.

Because it is not feasible to tie individual actions to global climate change, and consideration of climate change is not necessary to make a reasoned choice between alternatives, climate change was dismissed from further analysis in this EA.

Cultural Resources

Thirty-eight archeological sites have been documented within the proposed action area. Of these, two are listed on the National Register of Historic Places, eight have been evaluated as eligible for listing on the National Register of Historic Places, twelve have been determined as ineligible, and the rest have not been evaluated. Three Historic Districts—the Crystal Cave Historic District, the Generals Highway Historic District, and the Mineral King Road Historic District—are also within the proposed action area. Given the types of disturbance that could potentially arise from implementation of the preferred alternative and a number of mitigations identified and incorporated to protect identified and unidentified cultural resources from disturbance, the NPS has determined, as of the release of this EA, that implementation of the preferred alternative would not result in an adverse effect to historic properties and is seeking concurrence on this determination with the State Historic Preservation Officer (SHPO). This issue was therefore dismissed from further analysis in the EA.

Economics—Local Communities

Several respondents during public scoping expressed interest in how the project would affect local economies, many of which rely on tourism dollars closely associated with visitation to Sequoia and Kings Canyon National Parks. While extended park closures may reduce economic productivity for gateway communities, temporary construction closures—such as those proposed in the preferred alternative—are routine in these parks and have had no measurable effect on park visitation that the NPS is aware of. Rather, annual visitation has remained relatively stable over the last 10 years outside of park closures associated with the Covid-19 pandemic, wildfires, and major winter storm events (NPS 2022a). Further, the NPS anticipates that the proposed action alternatives would restore access to currently closed areas while reducing the potential for new areas to be closed; thus, ensuring surrounding communities continue to benefit from park visitation.

Because the NPS does not anticipate any of the alternatives to impact visitation levels to an extent that would be measurable and directly correlated to the action, economic activity related to the project was dismissed from further analysis in the EA.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs on minorities and low-income populations or communities.

Communities bordering the parks include those of low income, communities where Spanish is primarily spoken and English-speaking skills are limited, those where a high number of residents have less than a high school degree, and those where access to internet services may be limited (EPA 2022). These communities may be disadvantaged in their potential to be exposed to environmental contaminants and their ability to access resources or obtain information that may affect their health.

None of the proposed alternatives would result in an increase in toxins in these areas, modify existing environmental conditions, or limit access to resources in these communities.

While pile-burning may result in smoke reaching identified sensitive receptors, the communities that would be affected are those within park boundaries and are not disadvantaged in terms of their potential exposure to environmental contaminants (see air quality section). These communities, and all visitors to the parks, would be notified of potential for smoke impacts prior pile burning activities if impacts are anticipated. The NPS would provide these notifications in English and Spanish on the parks' mobile compatible website and on visitor bulletin boards such that speakers of these languages would have equal access to this information.

Because none of the project alternatives would have direct or indirect effects outside park boundaries, affected communities would be notified as necessary to ensure they are aware of potential impacts, and disadvantaged populations would not otherwise be disproportionately affected, environmental justice was dismissed from further analysis in the EA.

Indian Trust Resources and Sacred Sites

Executive Order 13175 requires early consultation with tribes if a proposal is to have substantial direct effect on Indian Trust Resources. Through consultation with tribal communities, no Indian Trust Resources have been identified within the project area, and the NPS has no record of such resources within the project area. The NPS therefore cannot presume or identify any effects to these resources. This issue was therefore dismissed from further analysis. See Chapter 4 for information on Tribal Consultation.

Invasive Species

Soil disturbance can provide an opportunity for invasive species to be introduced to the parks or become established and spread. Invasive plant seeds and propagules can also be introduced to the parks and transferred between project areas on project equipment, tools, and clothing.

This project would not import fill, and invasive plants are uncommon at elevations where most of the proposed action would occur; reducing the potential for both introduction and spread of invasives through those means. The application of mitigation measures – including keeping equipment on road surfaces, inspecting vehicles for seed and propagules prior to work, and limiting ground disturbance during debris removal – would minimize the potential for invasive species introduction or persistence.

Because the project would not increase the potential for invasive species to be introduced to the project areas, this issue was dismissed from further analysis.

Species of Special Concern – California Spotted Owl

California spotted owl (*Strix occidentalis occidentalis*) is a California Department of Fish and Wildlife Species of Special Concern that relies on medium to large diameter trees for nesting and rearing and can be disturbed by high decibel sounds such as those that are expected to result from the project. Up to 17 spotted owl territories have some overlap with the action area. Nesting history indicates that within the last 30 years, up to 14 of these territories had nests documented within 0.25 miles of the action area.

Despite project overlap with known owl territories, the NPS does not anticipate any of the proposed alternatives would directly affect individual owl nests, or influence survival, overall availability of owl nesting habitat, or prey availability in active territories. Since high decibel sounds are known to

disturb nesting owls, the NPS would conduct pre-project surveys in any areas that work is proposed during the Owl Limited Operating Period (LOP) (March 1 – August 15). Project work would not occur within 0.25 miles of detected active owl nests.

Because the proposed action would not result in decreased survival or modify the availability or suitability of owl habitat beyond current conditions, and because the NPS would implement mitigations to avoid nesting disturbance, the action is not expected to result in significant impacts to California Spotted Owl. For these reasons, this issue was dismissed from further analysis in the EA.

Vegetation – Including Special Status Species

While this project would remove standing trees most are either dead or dying trees of common forest species. Live, and dead, non-hazardous trees would remain throughout the proposed action area. Though understory vegetation may be crushed through tree felling and removal of downed material, vegetation in the action area is generally common and resilient to such disturbance. In areas that burned at moderate and high severity and where action would be the most intense, little vegetation currently remains. Even as vegetation recovers, alternatives considered in this EA would not change the species type, density, or distribution of trees or understory vegetation within the project area.

Special status plants have been documented to occur within or near the project area. Tree felling, pile placement, and pile burning could directly crush plants and reduce or destroy seedbanks. The proposed action would not result in an increase in the number of fallen trees compared to no action (fire-killed trees would fall without intervention) and known locations of special status plants would be flagged for avoidance from disturbance related to project activities. Surveys would also be conducted in advance of project work in areas where piles would be placed to minimize potential impacts to special status plants. Should special status plants be found in areas where pile burning is proposed, they would be flagged and avoided.

Because the NPS does not anticipate significant impacts to vegetation and has developed mitigations to avoid impacts to special status species, this issue was dismissed from detailed analysis.

Wildlife – Including Migratory Birds and Mammals

Several commentors raised questions over how the proposed action would affect wildlife and how the NPS would prevent wildlife impacts.

Impacts to wildlife can occur when habitat on which they rely is lost; especially when that habitat is rare. Wildlife can also suffer direct harm or mortality during project related actions that disturb habitat they occupy. A variety of snag reliant migratory and resident bird species and mammals occur in the action area. Due to the current conditions of the affected environment, snag availability would not be limited by tree hazard mitigation actions. As well, the NPS considered wildlife in the development of this proposal and integrated measures to mitigate or eliminate impacts to wildlife into the scope of the preferred alternative.

This project would comply with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act by implementing FWS nationwide conservation measures to avoid direct impacts. These measures include either working outside the migratory bird nesting period or conducting pre-clearance bird nesting surveys so impacts to any active nest (including owls or eagle) can be avoided, retaining roadside cover for small mammals, and completing the project in an expedient manner to avoid continued disturbance as the forest recovers and birds and mammals return (see Appendix B).

Because the project would avoid impacts to birds or mammals, and because effects on the endangered fisher are considered elsewhere, this issue was dismissed from further analysis as a standalone topic.

Wildland Urban Interface and Community Wildfire Resilience

At least one respondent during public scoping questioned whether the EA would address wildland-urban interface (WUI) and fire resilience issues within local communities.

Notably, the project area does not extend beyond park boundaries. However, there are several private inholdings within Wilsonia in Kings Canyon National Park and within and near Silver City within Sequoia National Park. Although the proposed action does not address defensible space provisions on or around these inholdings, the EA does consider the health and human safety effects of maintaining firebreaks which would protect ingress and egress to properties in the event of a wildfire. Beyond this potential, addressing defensible space is outside the purpose and need for action and scope of the proposal and was therefore dismissed from further analysis.

Soundscapes

Use of high decibel mechanized equipment (ranging from 80-110 dB) for tree hazard mitigation and debris cleanup would result in a degradation of soundscapes between ¼ and two miles from project activities depending on the dB level of equipment being used, terrain, and forest cover. These impacts would be spread out over the 62-mile linear project area such that individual road segments would be subject to high dB sound levels for up to 10 hours per day for roughly 1-7 days depending on degree of action taken in each area. Sound levels would return to pre-activity levels at the end of each workday and would fully recover along each segment as work is completed. Due to the short duration of project activities in each section of the project area, the conditions of the affected environment of the project (i.e., along highway corridors and in developed areas), and the relative abundance of natural soundscapes parks wide, project related noise would not result in substantial impacts to the parks' soundscapes.

Furthermore, project related noise will be analyzed under other resource topics including endangered species, wilderness, and visitor experience. Because of the short duration of impacts to soundscapes, the existing conditions in the project area, and that noise impacts are considered under other resource topics, this issue is dismissed from further analysis as a standalone topic in the EA.

Chapter 2: Alternatives

Three alternatives, a no action alternative and two action alternatives, are carried forward for evaluation in this EA. This chapter describes the alternatives carried forward, as well as a brief description of alternatives that were considered but dismissed from further analysis.

Alternative 1: No Action—Continue Current Management Direction

Under Alternative 1, the NPS would not take immediate action to mitigate all roadside tree hazards or treat resulting woody debris within the KNP burn perimeter. Rather, the NPS would continue to identify, prioritize, and annually mitigate tree hazards under its existing tree hazard program. For the purposes of analysis, the NPS assumes it would address a small portion of the existing tree hazards within the KNP burn perimeter every year, potentially up to 500 trees annually, though likely fewer. Tree hazards currently standing within the KNP burn scar are expected to naturally fail or otherwise be mitigated over an estimated 10–15-year timeframe depending on weather conditions such as large windstorms and the NPS' capacity to mitigate trees. Although the NPS would clean up and remove any debris that falls on parking lots, roadways, or other infrastructure, woody debris outside the road prism, whether from natural failure or resulting from mitigation actions, would primarily be left on site. That said, this debris could be removed from site on a case-by-case basis as necessary to address specific operational or safety issues or otherwise to meet desired conditions.

Because tree hazards within the action area would be mitigated slowly over time, and natural failure is likely, short-term (e.g., hours long) closures to either abate risk to human health and safety or to enable cleanup of failed trees would be anticipated under this alternative. Similarly, areas currently closed to public use, Crystal Cave Road and Redwood Mountain Road, would remain closed until all high priority hazards could be identified and mitigated. These closures would likely extend several years into the future. Safety risk and necessity of closures would be based on existing criteria for tree hazard surveillance, tree hazard density, and professional judgement.

Tree hazard identification and mitigation would continue to be guided by the 2015 Regional Directive on Hazard Tree Management (PW-062) and the parks' Vegetation Management Plan.

Elements Common to Alternatives 2 and 3

Under Alternatives 2 and 3, roadside tree hazards remaining within the KNP fire perimeter, estimated at 12,000 – 15,000 trees, would be mitigated over the shortest feasible timeframe (6-8 months, starting in 2023) but could extend for two to four years (becoming increasingly intermittent over time) as some trees experience delayed mortality from the fire and become hazardous in the months and years ahead. While fire severity does not precisely correlate with the number of tree hazards present, the NPS expects that the relative number of tree hazards, and thus intensity with which trees would be mitigated, would be greatest within high severity burn areas and vice versa. See Figures 2-4 (pages 10 – 12) for detailed action area maps and Tables 1 and 2 (pages 13 and 14) for tree hazard estimates. Please note the number of tree hazards is expected to increase over time due to delayed mortality.

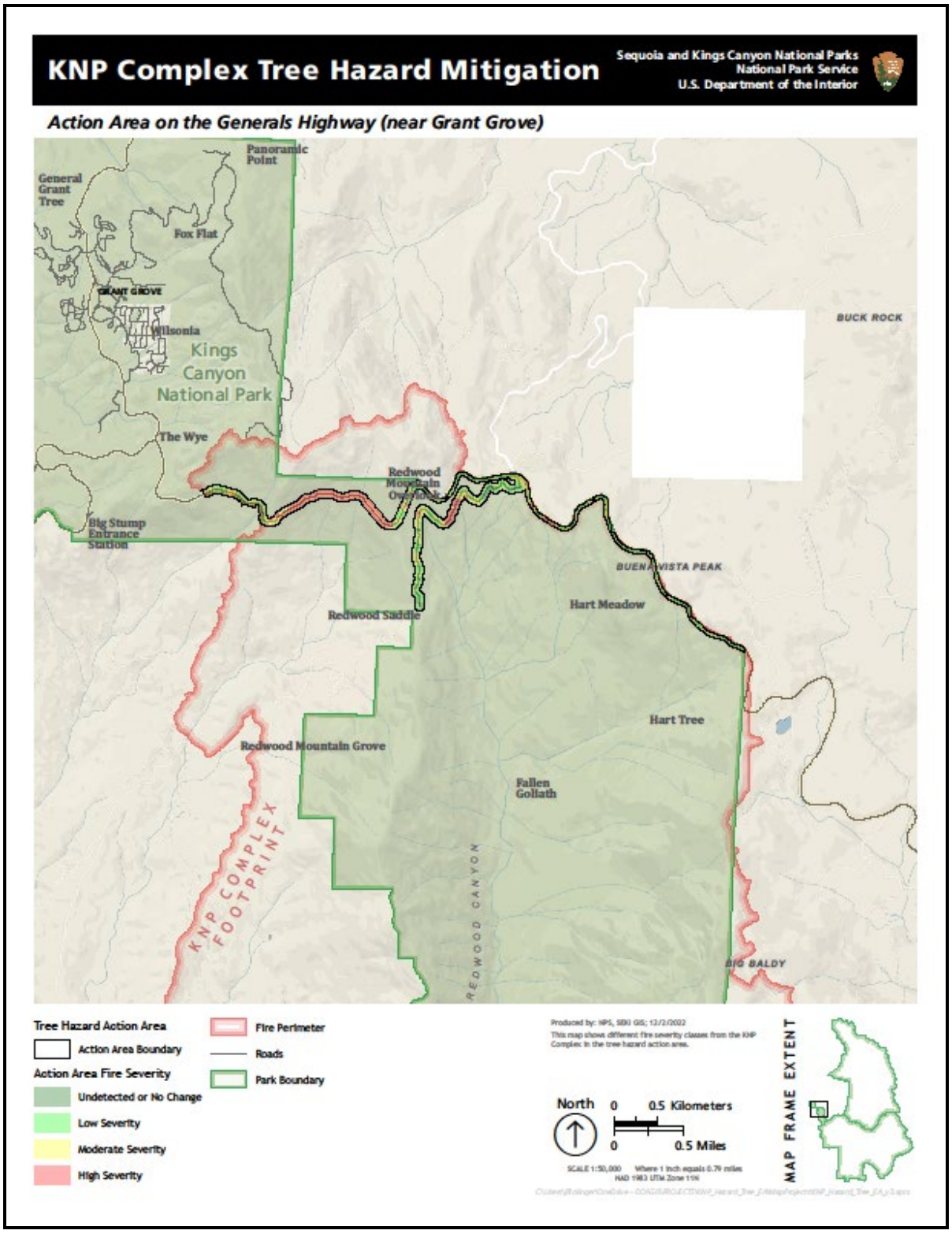

FIGURE 2:KNP TREE HAZARD MITIGATION ACTION AREA NEAR GRANT GROVE AND REDWOOD SADDLE ROAD IN KINGS CANYON NATIONAL PARK

Figure Source: (NPS, 2022)

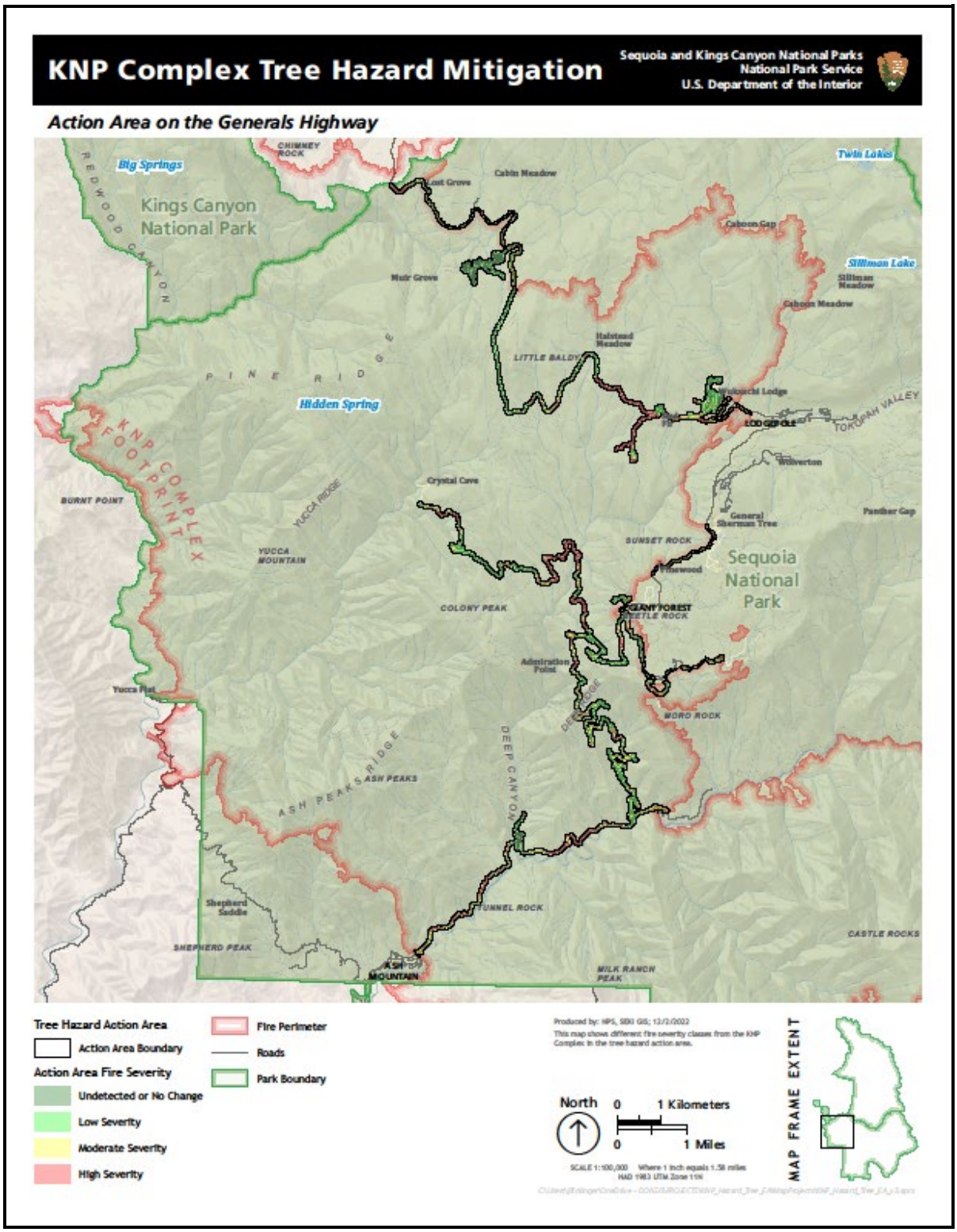

FIGURE 3: KNP TREE HAZARD MITIGATION ACTION AREA ALONG THE GENERALS HIGHWAY, CRESCENT MEADOW ROAD, CRYSTAL CAVE ROAD, AND ADMINISTRATIVE ROADS IN SEQUOIA NATIONAL PARK

Figure Source: (NPS, 2022)

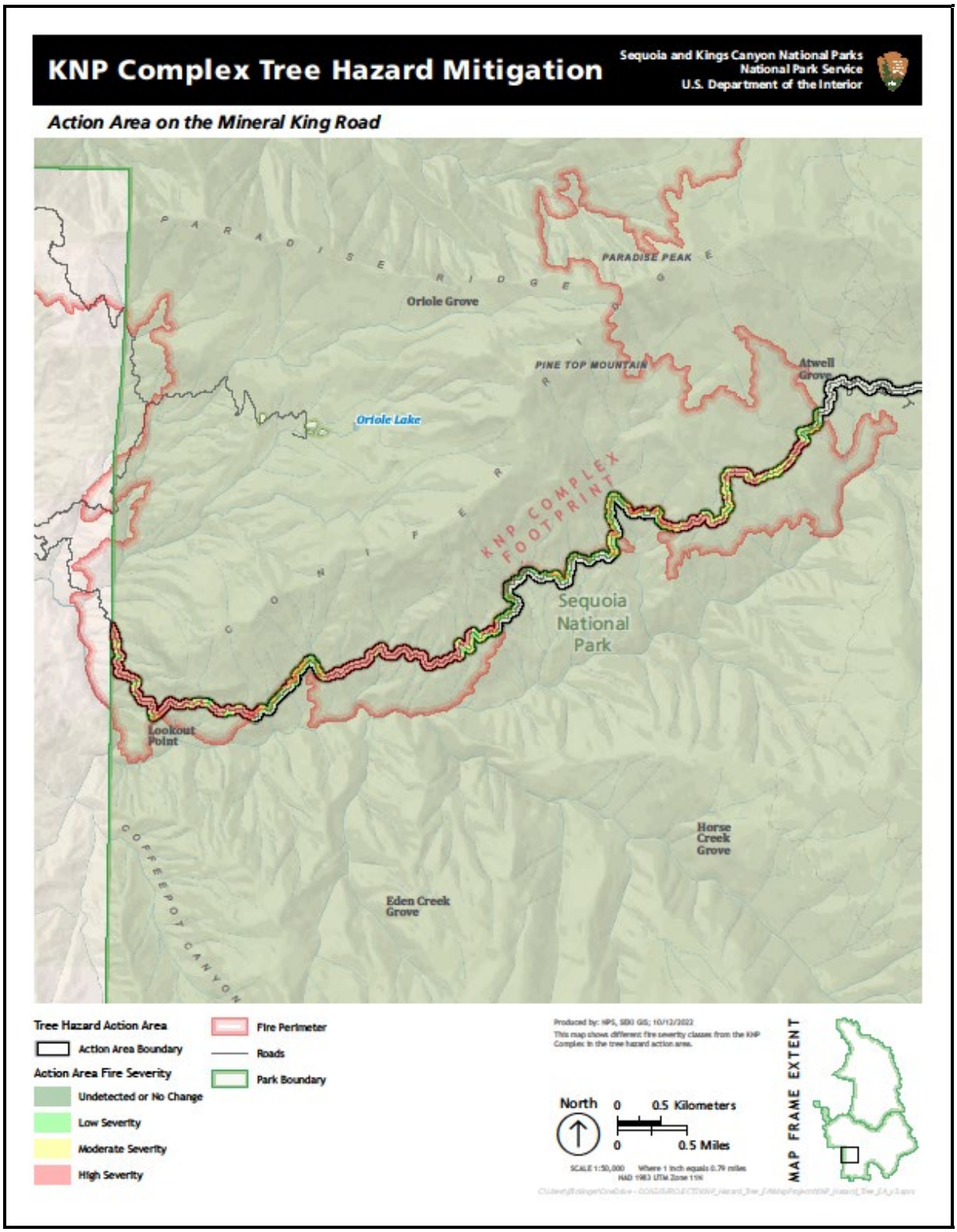

FIGURE 4:TREE HAZARD MITIGATION ACTION AREA ALONG THE MINERAL KING ROAD IN SEQUOIA NATIONAL PARK

Figure Source: (NPS, 2022)

Tree Hazard Determination and Mitigation

Prior to mitigating trees, survey crews would identify and mark tree hazards using the guidance of the 7-Point Rating System (see Appendix A). Trees meeting the threshold for mitigation would include any dead or dying trees or those with identified defects[4] having a reasonable probability of striking the road or other infrastructure should they fail. The striking distance would be measured at 1 – 1.5 times the height of the tree; therefore, the distance from the road where trees would be marked as hazards would vary depending on tree height and slope. Calculations for this EA assume a maximum distance of 150 feet—which was the maximum distance measured—however this distance may be up to 200 feet or more for taller trees. Prior to felling, some trees marked for mitigation and having desirable characteristics for wildlife, such as cavities, may also be identified for retention as downed debris during site cleanup (applicable to Alternative 2 only).

All marked trees would be felled by NPS staff or contractors. After trees are felled, stumps would be flush cut and treated with borax to prevent spread of annosus root disease. Trees slated to remain onsite under either Alternatives 2 or 3 would be directionally felled perpendicular away from roads to the maximum extent feasible to prevent logs from rolling downhill, limit roadside fuels, and break up fuel continuity.

TABLE 1. ESTIMATED ACREAGE AND LINEAR ROAD MILES AFFECTED BY PROPOSED TREE HAZARD MITIGATION AND DEBRIS TREATMENT[5]

Burn Severity	Acres Subject to Tree Hazard Mitigation[6]	Acres Subject to Debris Treatment Under Alternative 2 [7]	Linear Road Miles Affected
Unburned/Low	1,316	478	42
Moderate	422	241	11
High	382	203	8
Total	**2,120**	**922**	**61**

[4] See Appendix B

[5] Acreage was rounded to nearest whole number for clarity.

[6] Acreage was calculated using the maximum measured distance from the road where trees were marked within the burn perimeter; roughly 150 feet from the road edge. The maximum distance overestimates actual acreage affected because most trees are less than 100 feet tall.

[7] Acreage was calculated using the 80-foot maximum distance from the road edge where action may occur to capture full extent of the action. The distance beyond the road edge may be less in some areas due to variations in road width and quantity of debris resulting from mitigation actions therefore, the total acreage affected will be lower than that calculated.

TABLE 2. TREE HAZARDS ESTIMATED PER ROAD SECTION/AREA WITHIN KNP BURN PERIMETER IN SEQUOIA AND KINGS CANYON NATIONAL PARKS AS OF WINTER 2022

Road Section	Road Section Distance in Miles	Tree Hazard Estimate*
Generals Hwy. (NPS)	42	7,309
Crescent Meadow/Moro Rock Rd.	3	422
Mineral King Rd.	8	588
Crystal Cave Rd.	6	3,364
Redwood Saddle Rd.	2	413
Clover Creek Wastewater Treatment Plant (Admin Only)	1	1,270
Totals	**61**	**13,366**

* This EA provides an estimated range for the number of tree hazards that would be mitigated under one of the action alternatives due to constantly changing conditions, including the failure of identified tree hazards failing prior to implementation and delayed mortality of trees that become hazardous before or during implementation. The total of tree hazards represented in this table is simply capturing a moment in time that provides context for the number of total tree hazards that could be mitigated under one of the action alternatives. The NPS estimates that the final number of tree hazards that could be mitigated under this plan could be as many as 15,000 given delayed mortality.

Closures

Under both action alternatives, the NPS would maintain existing closures along the Crystal Cave and Redwood Mountain Roads until high priority hazards could be identified and mitigated (i.e., assumed to be within several months, if not sooner). Once high priority hazards were addressed, the NPS may restore weekend access to these areas for the duration of the visitor use season (barring any other safety considerations) but would continue to implement up to days long, midweek closures along these roads to ensure safe and efficient felling and cleanup operations during implementation. During the summer season (Memorial Day through Labor Day), these full closures would be limited to Monday-Friday, but could be weeks long during the off season.

Similarly, 5 day long, weekday closures could be utilized along the following additional sections of road during the summer season in order to ensure safe and efficient felling and cleanup operations: 1) Crescent Meadow, 2) the section of the Generals Highway (Generals) between Wuksachi and the north boundary of Sequoia National Park, and 3) Clover Creek Wastewater Treatment Facility. During the fall, winter, and spring, 7 days long weekly closures could also be implemented in these areas to complete the work as quickly as possible and reduce conflicts with visitor use to the greatest extent practicable.

Access along the Generals between the Foothills Entrance Station and Wuksachi would also be subject to weekday delays lasting between one and three hours and up to six hours along Mineral King Road in the summer season. The location and timing of these delays along the Generals and Mineral King Road would be staggered such that visitors should not experience multiple delays during a single day, and the road would be temporarily opened after each closure for single lane passthrough prior to the next closure.

Over the course of the fall, winter, and spring access along the Generals could also be delayed for up to seven hours on two days of every workweek, and Mineral King Road could be closed to public access for multiple day-long closures once the area is typically gated and inaccessible to vehicular traffic (starting in late October each year).

These delays and closures would be carefully scheduled to maximize visitor access and increase predictability for visitors and staff alike, and the NPS would share these fixed schedules with the public through a variety of media tools well in advance of closures being implemented.

Once tree hazard felling and debris treatment was completed along a given road or road section, the road in question would no longer be subject to further closures but for any additional trees that experience delayed mortality post initial implementation. Any following closures in these areas would be of short (anticipated to be less than an hour) duration.

Equipment

Equipment used for mitigation and debris treatment may include chainsaws, hydraulic tree jacks, boom trucks, pick-up trucks, come-alongs, and rigging. Heavy equipment would remain on road surfaces.

Alternative 2: Mitigate Tree Hazards and Treat Woody Debris Within the KNP Burn Perimeter (Preferred Alternative)

Under Alternative 2, all elements of tree hazard mitigation described under Elements Common to Alternatives 2 and 3 (pages 9 – 15) would be implemented, and the NPS would treat woody debris resulting from mitigation actions as described below. In addition, mitigations identified in Appendix A would be followed.

Debris Treatment

Consistent with NPS policy, the NPS would retain and recycle biomass resulting from tree hazard mitigation through the ecosystem whenever practical (NPS Management Policies 2006, § 8.8). Given the amount and density of tree hazards that would be mitigated under the preferred alternative, the NPS would treat (i.e., remove) excess fuels within the developed footprint of other infrastructure to avoid fuels accumulation, break up fuel continuity, and otherwise ensure the NPS can maintain a fire break along roadways during future fires. For this reason, logs and debris resulting from failure or felling of KNP tree hazards landing within up to 80 feet of the road's edge and not meeting the retention standards outlined below would be treated as necessary to achieve site specific goals and project objectives. Authorized methods of treatment include piling and burning, lopping and scattering, chipping the material and spreading it on site to a depth of generally no greater than two inches, chipping and hauling the material from the parks, or hauling the material from the parks whole (see Appendix C). Some logs may also be made available for public use via permit.

Retention Standards of Felled Tree Hazards and Logs in the KNP Burn Perimeter:

- To the extent feasible, retain a minimum of three, and no more than roughly five logs, ideally 12 inches in diameter or greater, along each 100-foot section of road. In cases where number of logs onsite already meets or exceeds this standard, all additional felled trees would be removed.

- To the maximum extent feasible, distribute downed logs roughly 20-30 feet apart within each 100-foot section to break up fuel continuity and avoid creation of jackpot[8] fuels within the project area.
    - As feasible, trees would be felled directionally, rather than moved post felling, to achieve appropriate spacing.
    - Felled logs may be stacked up to two logs high if they lie roughly perpendicular to one another and the spacing of roughly 20-30 feet on average is otherwise attained.
- Retain the largest logs available over 12 inches in diameter along each treated section unless smaller logs are marked for retention by wildlife biologists.
- Preferentially retain logs furthest from the roadway along each roadway section.

To the maximum extent feasible, given safety and infrastructure considerations, the NPS would directionally fall trees slated for debris removal perpendicular toward roads to facilitate treatment. Logs would be removed from the felling location in a manner that reduces the number of visible cut ends, prevents ground disturbance, and produces a gradual transition between treated and untreated areas. To the maximum extent feasible, trees that the NPS identified for retention would be directionally felled perpendicular away from roads, to prevent logs from rolling downhill, maximize distance of debris from the roadway, and to break up fuel continuity.

While the NPS would generally apply the above standards to all project areas, a greater or lesser number of trees or logs may be present post treatment along some road segments depending upon resource considerations, tree hazard density, tree diameter, existing site conditions, and equipment access limitations. Again, treatment of woody debris would only occur within 80 feet of the road's edge; all other felled trees would remain on site.

Slash (branches, limbs, or trees under eight inches in diameter) within 80 feet of the road's edge would primarily be piled and burned on site under the guidance of the parkwide burn plan; this work would primarily be accomplished by hand labor. The NPS would initiate pile burning in the fall/winter of 2023/2024. Remaining piles, if any, would be burned in the fall/winter of 2024/2025. If pile burning is not feasible due to site conditions or quantity (e.g., too little slash in an area or slopes too steep to pile burn safely or efficiently), slash would be lopped to generally no greater than 24 inches in length and distributed to break up fuel continuity and so as not to generally accumulate to a depth of greater than 12 inches. As needed to break up fuel continuity, remaining slash could be chipped and spread on site (again, to no greater than generally two inches in depth) or chipped and removed from the parks.

The NPS estimates that roughly 40-50 tons per acre (t/a) (40,000-50,000 total tons) of woody debris > 12" in diameter would be removed while roughly 10-15 t/a (10,000-15,000 total tons) of debris > 12" in diameter would remain on site in the 922-acre (80' from each road edge) debris treatment area. Though the NPS does not have an estimate of debris quantities under 12" in diameter that would be removed, these materials would make up a small fraction of the overall woody debris expected to result from mitigation efforts. Figure 5 (below) shows a rough representation of anticipated pre and post debris treatment site conditions. Note the high quantity of roadside debris

[8] See Appendix D - Definitions

anticipated immediately post tree hazard-felling—especially in high severity areas—as compared to post debris treatment.

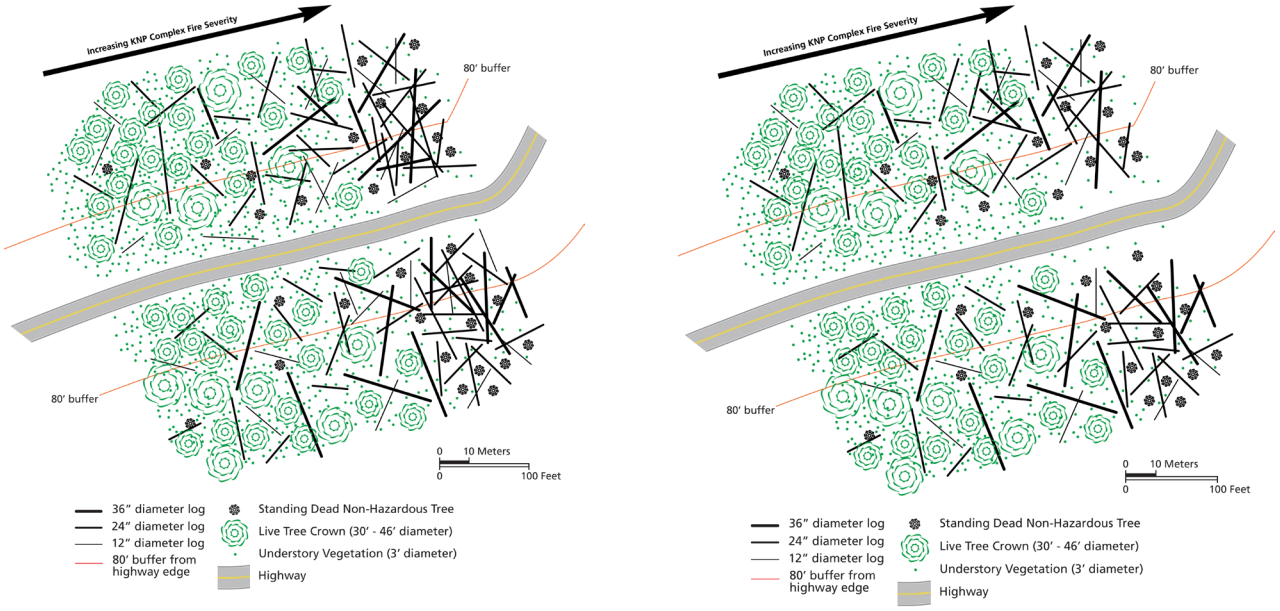

FIGURE 5: REPRESENTATION OF SITE CONDITIONS POST TREE HAZARD FELLING (LEFT) AND POST DEBRIS TREATMENT (RIGHT) ALONG A 400 FOOT ROAD SEGMENT

Figure Source: (NPS, 2022)

Timing

The NPS would begin mitigation of high priority tree hazards under this EA as early as April 2023, or as soon as weather and snow conditions allow, in order to safely re-open closed areas or prevent additional closures. The NPS estimates that roughly 200-300 trees would require mitigation in Spring 2023 to maintain a reasonable level of safety in some areas. Most of this spring mitigation effort would be expected to occur along Crystal Cave Road but could occur intermittently throughout the project area.

Mitigation of the remaining identified tree hazards – regardless of priority – in action areas that burned at high severity, would begin as early as June 2023, and full project implementation throughout the action area would be targeted to begin in July 2023. The NPS would continue tree hazard mitigation actions and debris removal activities until all currently identified tree hazards within the action area had been mitigated – an estimated 6-8 months total. While the goal would be to mitigate known tree hazards as soon as possible, seasonal access limitations, delayed mortality, or other unforeseen circumstances may require additional intensive work in 2024 and intermittent work through roughly 2026.

Equipment

In addition to the equipment identified in Actions Common to Alternatives 2 and 3, long reach excavators, dump trucks, front-end loaders, stump-grinders, and chippers may be used during project implementation to facilitate debris treatment. This additional equipment would also remain on road surfaces.

Alternative 3: Mitigate Tree Hazards Only

Like Alternative 2, Alternative 3 would implement all elements of tree hazard mitigation described under Elements Common to Alternatives 2 and 3 (pages 9 – 15); however Alternative 3 would not apply woody debris treatments described in Alternative 2. In addition, mitigations identified in Appendix B would be followed, as applicable. The NPS would clean up and remove any debris that falls on parking lots, roadways, or other infrastructure or otherwise conflicts with operational needs, but woody debris outside the road prism, whether from natural failure or resulting from mitigation actions, would largely be left on site.

Timing would be similar to that described under Alternative 2 with the exception that the project may be completed more quickly due to lack of debris treatment; roughly 5-7 months total.

Alternatives Considered but Dismissed

Do not Remove Tree Hazards – Instead Mitigate Hazards Through Facility Closures

Several commentors during public scoping suggested taking no action to fell tree hazards and, in some cases, suggested closing and/or ultimately removing facilities from the parks.

Alternatives to entirely discontinue tree hazard removal in favor of park or facility closures was not considered in detail as it does not meet the stated purpose and need for action. As well, such an action is contrary to NPS management policies which deem it unacceptable to "diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values," instead, requiring that parks provide "appropriate, high-quality opportunities for visitors to enjoy the parks", and "maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of American society" (NPS 2006, p. 99 and 100). These policies are generally consistent with the enabling legislation establishing the parks and with legislation defining the mission of the National Park Service.

Do Not Mitigate Tree Hazards in Wilderness

Due to the height of trees along park roadways, there are a number of identified tree hazards that are located more than 100 feet from the centerline of the parks' roads—the location of the wilderness boundary through much of the parks. For this reason, the NPS conducted a Minimum Requirement Analysis (MRA) to determine the necessity of taking administrative action to mitigate tree hazards in Wilderness. Through the MRA process, the NPS determined that the presence of roadside tree hazards, regardless of their location in relation to the roads in question, threatened the NPS' ability to meet legal obligations, policy, and management guidance to promote the use and enjoyment of national parks while providing a reasonable level of safety to the visiting public, and to provide for safe working conditions for park staff. Therefore, an alternative to not mitigate roadside tree hazards located within the wilderness boundary was dismissed from further analysis.

Remove Tree Hazards Only in High or Moderately Burned Areas

The parks initially considered limiting the scope to areas that burned at only moderate to high severity, as opposed to all tree hazards within the KNP burn perimeter. While this alternative would address many areas where high numbers of tree hazards exist, the presence or absence of tree

hazards is not fully predicted by burn severity. Because limiting the scope of the action would not fully achieve the purpose and need, a reduced scope was dismissed from further analysis.

Remove All Dead Trees – Conduct Salvage Logging

At least one respondent to public scoping proposed expanding the scope of the project to include removal and salvage of all dead trees in the KNP perimeter. The NPS dismissed this expanded scope of tree removal, including salvage of all timber within the KNP burn perimeter, from further consideration because most trees do not threaten developed areas; removing them would therefore exceed the stated purpose and need of the proposed action.

While the NPS could authorize the removal of some identified roadside tree hazards as timber, salvage of all trees within the perimeter as timber was furthermore dismissed from further consideration for several reasons. Firstly, NPS policy requires consideration be given to recycling felled tree hazards into the ecosystem unless it creates an unacceptable fuel load or cannot otherwise be reasonably recycled in place (NPS 2006). In this case, the NPS determined that the largest logs—those with greatest likely economic value as timber—are also the most ecologically important. Therefore, maintaining these logs on site to the extent feasible better aligns with NPS policy. In addition to the desire to realize ecological benefit, the majority of tree hazards that might be removed as excess debris are not expected to be viable for use as timber. For these reasons expanding the scope of tree removal to specifically include timber salvage was dismissed from further analysis.

Remove Additional Downed Trees

One respondent to public scoping proposed expanding the scope of debris treatment beyond the 80-foot treatment area. The NPS determined that broadscale debris treatment was not deemed necessary to achieve the purpose and need of the project, which is to address safety and access concerns sufficiently addressed by the 80-foot treatment zone. In addition, increased treatment distance would require roads or skid trails to reach the debris, which would be more environmentally impactful, could be cost prohibitive, and would likely be infeasible in many locations due to the steepness of terrain. For these reasons, this alternative was dismissed from further analysis.

TABLE 3. SUMMARY OF ALTERNATIVES CONSIDERED TO MITIGATE THE THREAT TO PUBLIC SAFETY AND NPS INFRASTRUCTURE FROM TREE HAZARDS KILLED OR OTHERWISE DAMAGED BY THE KNP COMPLEX WILDFIRE

Project Component	Alternative 1: No Action Continue Current Management Direction	Alternative 2: Mitigate Roadside Tree Hazards and Treat Resultant Woody Debris (Preferred Alternative)	Alternative 3: Mitigate Roadside Tree Hazards and Do Not Treat Roadside Debris
Tree Hazard Mitigation	The NPS would mitigate roughly 500 tree hazards annually along park roadways until all identified hazards are mitigated. Many tree hazards within the KNP burn perimeter would likely fail naturally over that timeframe (i.e., 10-15 years).	The NPS would mitigate roughly 12,000-15,000 tree hazards along park roadways within the KNP burn perimeter over a short timeframe (intensively over 6-8 months and then intermittently over the course of up to 4 years).	Same as Alternative 2
Debris Treatment	The NPS would clear debris falling naturally on roadways during routine maintenance. The NPS would largely leave debris resulting from tree hazard mitigation and falling outside the routine maintenance prism in place though some would be treated on a case-by-case basis as necessary to address specific operational or safety issues or otherwise to meet desired conditions.	The NPS would retain and recycle biomass resulting from tree hazard mitigation through the ecosystem where practical. Slash within 80 feet of the roadway would be either piled and burned, lopped and scattered, chipped and scattered, or chipped and hauled off site depending on quantity and site conditions. NPS-felled logs occurring within 80 feet of the roads edge and not meeting the retention standards would either be chipped and spread on site to a depth of generally no greater than two inches or hauled from the parks. Some logs could also be removed from the parks whole or made available to the public through a wood-cutting permit.	Same as Alternative 1

Anticipated Closures	The NPS would maintain existing full closures along the Crystal Cave and Redwood Mountain Road until high priority hazards could be identified and mitigated (assumed to be completed during spring/summer 2023). Periodic future closures would be anticipated due to remaining tree hazards along this narrow road. The NPS would continue to close areas where tree hazards pose unacceptable level of risk and would implement temporary closures of roughly 20-30 minutes for mitigation of individual roadside tree hazards as needed. The number of closures would be expected to increase over time.	Under both action alternatives, the NPS would maintain existing closures along the Crystal Cave and Redwood Mountain Roads until high priority hazards could be identified and mitigated (i.e., assumed to be within several months, if not sooner). Once high priority hazards were addressed, the NPS may restore weekend access to these areas for the duration of the visitor use season (barring any other safety considerations) but would continue to implement up to days long, weekday closures along these roads to ensure safe and efficient felling and cleanup operations during implementation. During the summer season (Memorial Day through Labor Day), these full closures would be limited to Monday-Friday but could be weeks long during the off season. Similarly, 5 day long, weekday closures could be utilized along the following additional sections of road during the summer season in order to ensure safe and efficient felling and cleanup operations: 1) Crescent Meadow, 2) the section of the Generals Highway (Generals) between Wuksachi and the north boundary of Sequoia National Park, and 3) Clover Creek Wastewater Treatment Facility. During the fall, winter, and spring, 7 days long closures could also be implemented in these areas to complete the work as quickly as possible and reduce conflicts with visitor use to the greatest extent practicable. Access along the Mineral King Road and the section of the Generals between the Foothills Entrance Station and Wuksachi would also be subject to weekday delays lasting between one and three hours along the Generals and six hours along Mineral King Road in the summer season. The location and timing of these delays along the Generals and Mineral King Road would be staggered such that visitors should not experience multiple delays during a single day, and the road would be temporarily opened after each closure for single lane passthrough prior to the next closure. Over the course of the fall, winter, and spring access along the Generals could also be delayed for up to seven hours on two days of every workweek, and Mineral King Road could be closed to public access for multiple day-long closures once the area is	Same as Alternative 2

Project Component	Alternative 1: No Action Continue Current Management Direction	Alternative 2: Mitigate Roadside Tree Hazards and Treat Resultant Woody Debris (Preferred Alternative)	Alternative 3: Mitigate Roadside Tree Hazards and Do Not Treat Roadside Debris
		typically gated and inaccessible to vehicular traffic (starting in late October each year). These delays and closures would be carefully scheduled to maximize visitor access and increase predictability for visitors and staff alike, and the NPS would share these fixed schedules with the public through a variety of media tools well in advance of closures being implemented. Once tree hazard felling and debris treatment was completed along a given road or road section, the road in question would no longer be subject to further closures but for any additional trees that experience delayed mortality post initial implementation. Any following closures in these areas would be of short (anticipated to be less than an hour) duration.	
Project Timing	10-15 years. Mitigation of high priority trees may occur any time of year.	Anticipated 6-8 months total for hazard tree felling and debris treatment, though intermittent work could occur for up to four years due to delayed mortality. The NPS would begin mitigation of imminent trees along Crystal Cave Road and elsewhere as early as April 2023; mitigation in high severity areas could start as early as June 2023; mitigation of all trees would begin as early as July 2023. Tree hazard mitigation project work would resume in June 2024 if necessary. Pile burning would occur in winter 2023/2024 and/or 2024/2025.	Same as Alternative 2 with the exception that project completion would be anticipated within 5-7 months total due to the lack of debris treatment under this alternative.
Equipment	chainsaws, hydraulic tree jacks, boom trucks, pick-up trucks, come-alongs, and rigging	chainsaws, hydraulic tree jacks, boom trucks, pick-up trucks, come-alongs, and rigging, long reach excavators, dump trucks, front-end loaders, stump-grinders, and chippers	chainsaws, hydraulic tree jacks, boom trucks, pick-up trucks, come-alongs, and rigging

Chapter 3: Affected Environment & Environmental Consequences

Visitor and Employee Safety

Affected Environment

Since 2012, there has been an increase in tree mortality throughout the Sierra Nevada. Aerial surveys from 2015-2017 estimated 5.8 million dead trees in the parks (Moore et al. 2018). In line with increasing mortality, the NPS has documented a steady increase in tree hazards throughout all developed areas in the parks. The KNP contributed to the already high number of tree hazards within the burn footprint by killing or further weakening trees already subject to pre-existing stress (e.g., beetle infestations); this is especially true along park roadways and near some park infrastructure (see Table 2 on page 14).

Tree mortality in the action area, and thus the number and density of tree hazards, is generally higher in areas that burned at higher fire severity and lower in areas that burned at lower severity. For example, the number of tree hazards along a typical high severity burn section of the Generals Highway may be 20 trees per acre (735 tree hazards per road mile), while areas that burned at low to moderate severity during the KNP may have roughly one to three tree hazards per acre (115 tree hazards per road mile).

The threat of tree hazards to public and employee safety is a considerable concern for the NPS. Since 1919, the NPS has documented five fatalities resulting from tree failures in the parks, the most recent in 2004. As well, operational and incident response staff indicate that several direct strikes to unoccupied vehicles and infrastructure have occurred in the past 10 years. As but one example of this risk: an occupied vehicle was struck by a failed tree in 2018, narrowly avoiding occupant injury (D. Fox and T. Warner Personal Communication).

NPS maintenance staff routinely clear failed trees from the parks' roads, parking lots, trails, and other developed areas; many of these tree failures had the potential to result in injury or death if failure had occurred when someone was present. Because road corridors are meant for vehicular transportation, a potential human target is typically moving quickly past any given tree hazard. However, when visitors use these corridors as pedestrian walkways, or NPS staff and partners are conducting work within these areas, exposure time increases in concert with potential risk.

In addition to safety concerns associated with a high density of known tree hazards along roadways, downed woody debris along park roads can quickly become fuel for a wildfire and thereby reduce the opportunity to use roadways as evacuation routes and fire breaks during future fires. While road corridors do not have a specific defensible space target, the International Urban - Wildland Interface Code, adopted by the NPS, requires a 30-foot defensible space zone around structures, as well as up to 100-foot clearance in high fire hazard areas with regards to topography and fuels (where fuel loading is high or steep terrain is prone to carrying fire). Though fuel loading in portions of the action area is now relatively low due to recent wildfire, downed trees from the KNP have already created jackpots of fuels that extend 20 to 50 feet from the road's edge in several locations. These jackpots, combined with a high number of standing dead or dying trees, contribute to operational

and safety challenges for fire crews and decrease their ability to prep and utilize roads as control feature during future wildfires.

Alternative 1: No Action

Direct and Indirect Effects – Visitor and Employee Safety

Under the no action alternative, direct threats to public and employee safety would not be immediately addressed within the KNP footprint, and the risk of a tree hazard failure resulting in a strike to a human target, including those charged with felling weakened trees, would remain and increase over time as standing, dead trees and limbs continue to decay. These impacts would extend for roughly 10-15 years into the future until eventually tree hazards are either mitigated or fell naturally on their own.

Similarly, leaving existing and future tree hazard mitigation debris in place would increase the quantity and complexity of jackpots over time. These jackpots, in combination with the narrowing of the roadway corridor as fuels continue to build, would adversely affect firefighter safety, and decrease roadway defensibility in the case of future wildfires. The risk of reduced road defensibility due to downed logs would be expected to diminish over 15-30 years as downed debris continues to decay.

Cumulative Effects – Visitor and Employee Safety

Past, present, and reasonably foreseeable actions affecting visitor and employee safety include ongoing tree hazard mitigation parks wide, emergency medical services and law-enforcement activities, a parks wide safety program for operations, and fire and fuels management activities. To the extent that these activities can safely continue, they would cumulatively and beneficially affect visitor and employee safety both within and outside the action area. However, risks from tree hazards and associated debris would continue to be present within the project area until they could be mitigated or otherwise fall on their own. Given the high level of operational safety risk associated with working under standing snags in a wildfire, it is likely that some roadway locations would be abandoned as fire breaks during future fires.

Alternative 2: Mitigate Tree Hazards and Treat Woody Debris (Preferred Alternative)

Direct and Indirect Effects – Visitor and Employee Safety

Under Alternative 2, direct threats from tree hazards would be mostly addressed within the KNP footprint over a minimum period of 6-8 months, though some may remain for as long as 2-4 years in part due to delayed mortality. During felling operations, areas would be closed for visitor safety; therefore, operations would not pose a direct risk to visitors being struck by falling debris (see Appendix B).

Removing trees within a short timeframe post fire would reduce the risk of tree debris (widow-makers) falling on tree hazard workers and firefighters as trees would be relatively sound when mitigated. As well, the risk of a tree hazard failure resulting in a strike to a human target from these identified hazards would be eliminated for each tree hazard mitigated and would result in an overall beneficial impact to visitor and employee safety. In removing a portion of woody debris resulting from mitigation efforts, this alternative would also reduce safety concerns associated with maintaining roadways as defensible fire breaks.

Cumulative Effects – Visitor and Employee Safety

Past present, and reasonably foreseeable actions affecting health and human safety would be the same as Alternative 1. Although visiting any national park comes with inherent safety risks, these ongoing activities, in cumulation with this alternative, help to best ensure public and employee safety within the project area when compared to Alternatives 1 and 3.

Alternative 3: Mitigate Trees but Do Not Treat Woody Debris

Direct and Indirect Effects – Visitor and Employee Safety

Direct beneficial effects to visitor and employee safety from mitigating tree hazards within the next 2-4 years would be the same as Alternative 2.

As in Alternative 2, the overall exposure risk to tree hazard workers and firefighters would be reduced because trees would not be left to weaken prior to mitigation. However, due to the intensity of action and the quantity of debris left along roadways within a short time, this alternative would result in the immediate buildup of sound and continuous fuels along 61 miles of roads in the parks, further narrowing the roadway corridor in these locations. Therefore, the risk that roadways would become indefensible and evacuation routes would be compromised in the event of wildfire would be greatest under this alternative. These risks would be greater than those expected under other alternatives due to the sheer immediate volume of sound and contiguous surface fuels left onsite. The differences between these alternatives would diminish as fuels naturally decay and breakdown over the course of 15-30 years, depending on species and log diameter (Harmon 1987).

Cumulative Effects – Visitor and Employee Safety

Past, present, and reasonably foreseeable actions beneficially affecting health and human safety would be the same as Alternatives 1 and 2. However, debris buildup along park roads and associated narrowing of the roadway corridor would increase the degree of risk for roadway defensibility and ingress and egress to be compromised when compared to other alternatives.

Fuel Loading and Future Fire Effects

Affected Environment

Current Fuel Loading

In project areas that burned at high fire severity during the KNP, very little litter or duff remains on the forest floor, and standing dead trees lack needles or leaves. In most cases, these areas suffered near total overstory tree mortality and thousands of dead or dying trees remain standing. Fuels in these areas can currently exceed 250 tons per acre (t/a); far more than that found in areas where fire has been excluded for 100 years or more (NPS 2022b). Given high mortality in these areas and the NPS' mitigation of high priority tree hazards throughout the project area as an emergency action immediately post fire, fuel conditions along some road segments through high severity fire can be best described as jackpots and windrows[9] of naturally fallen or felled trees.

Areas that burned at low to moderate severity currently have a patchy accumulation of jackpot fuels in some areas. Unlike high severity burned areas, litter and duff were not consumed by fire, and dead or dying trees have maintained their needles and leaves and thus contain the finer fuel

[9] See Appendix D – Definitions

component necessary to carry fire. Tree mortality was mixed in these areas and, while tree mortality is lower than in high severity areas, there remain a mix of standing dead or dying trees intermixed with live green forest. The average amount of fuels in these areas do not exceed 26 t/a one-year post-fire based on prescribed burn monitoring plots.

Future Fire Effects

Prior to the KNP, an increase in tree mortality and associated tree hazard mitigation over the past 10 years had resulted in woody debris buildup, including jackpotted fuels, in some developed areas of the parks including along roadways. Data collected at jackpot sites prior to the KNP, as well as observations post KNP, suggest that areas where jackpots occur burn at high intensity during fire. As a result of the intensity at which jackpots burn, these areas have a high likelihood of experiencing localized severe fire effects (impacts on biophysical components of an ecosystem, including plants, animals, soils, and biophysical components). Fire effects can be direct, occurring during a fire or in the days following, or indirect, occurring over weeks to years after a fire.

As previously described, in portions of the action area that suffered heavy or complete overstory tree mortality and where imminent tree hazards were felled immediately post fire, the felled roadside tree hazards resulted in immediate and heavy surface fuel accumulations. These fuels will not be a fire hazard until accumulations of finer fuels—including litter and duff that are currently lacking—develop to carry fire and as these burned patches fill in with herbaceous and shrub species and small tree regeneration; a period of 5-10 years. Remaining snags in the action area would also fall naturally over time, further contributing to fuel loading. At some point these high severity patches (within and outside the action area) would be susceptible to reburning, and recent studies suggest they would have a greater probability of burning at high severity than areas that burned at lower severity during the KNP (Odion 2004, Taylor et al. 2022).

While the probability of high severity regional effects would not be driven by tree hazard mitigation, fuel models indicate that fire behavior in areas of high tree hazard felling, and where fuels remain on the ground, would be characterized by a very high spread rate and high flame lengths. Active flaming would be sustained for long periods and firebrands of various sizes may be generated which would contribute to spotting problems (National Wildfire Coordination Group (NWCG) 2014, Scott and Burgan 2005) (see Appendix B). NPS experience further supports fire behavior modeling; indicating that jackpot fuels would contribute to localized high burn severity, additional fire spread, and associated tree mortality (NPS 2022c, NPS 2022d). Expected fire effects would be dependent on factors such as aspect, slope steepness, and ultimately by the subsequent fire behavior when a fire occurs (e.g., fire spreads more quickly under dry fuels conditions, moves more quickly uphill, and can increase in intensity with sunlight and wind).

In areas of lower immediate mortality (low to moderate severity burn areas), where tree hazards have not been mitigated, or where fewer have been mitigated, fuel loading is currently lower, though some jackpots do exist in these areas. Where areas having finer fuels currently lie in proximity to jackpotted fuels, there would be a continued risk of fire spread and for locally adverse fire effects were fire to re-enter the area.

Roadside jackpots, both naturally occurring and from previous tree hazard felling, will continue to grow over the next 10-15 years narrowing the overall width of the roadway corridor over time. As the corridor narrows and fuels build, the potential that roadways locations where jackpots occur will become indefensible as fire breaks during wildfire will increase the risk of uncontrolled fire spread to other areas.

Alternative 1: No Action

Direct and Indirect Effects – Fuel Loading and Future Fire Effects

Under Alternative 1, fuel loading would be as described in the Affected Environment, where high fuel loads in the form of jackpot fuels would continue to exist in areas where previous tree hazard felling occurred and where trees have already begun to fail, and fuel loading would be lower in areas where little to no tree felling or failures have occurred. NPS' annual mitigation of roughly 500 trees would continue to contribute debris to the cumulative buildup of fuels as also described under the Affected Environment.

As previously mentioned, in areas where finer fuels currently remain in proximity to jackpotted fuels, there would be a continued risk of fire spread and for locally adverse fire effects were fire to re-enter the area. Over a period of 5-10 years these risks would also increase in areas of high severity due to the buildup of a fine understory fuel component necessary to carry fire.

Under the No Action Alternative, fuels would continue to build throughout the action area, such that the risk of the roadway being compromised as a control feature would be greater under this alternative than Alternative 2. Over a period of 15-30 years, fuels currently existing on the landscape as well as those resulting from tree hazard mitigation and natural failure would continue to decay; reducing their relative contribution to fuel loading, fire spread, and potential for locally adverse fire effects.

Cumulative Effects – Fuel Loading and Future Fire Effects

Past present, and reasonably foreseeable actions influencing fuel loading and fire effects in the action area include prescribed burning and fire exclusion activities. To the extent that operational safety hazards from jackpot fuels do not limit such activities, fire management activities would continue, and prescribed burning of existing burn units including Lost Grove, Cabin Creek, Atwell, and Quarry treatments would be implemented within the next 2-10 years. These efforts would serve to beneficially reduce fuel loading in the action area along the roughly 10 miles of roadway where prescribed burn units occur. However, areas where fuels are already jackpotted would continue to contribute to risk of fire spread and adverse fire effects when wildfire occurs, particularly if these conditions compromise, and thereby reduce, the NPS' ability to use roadways as control features during fire management activities (see also Visitor and Employee Safety section).

Alternative 2: Mitigate Tree Hazards and Treat Woody Debris (Preferred Alternative)

Direct and Indirect Effects – Fuel Loading and Future Fire Effects

Under Alternative 2, understory re-growth would continue to build fine fuels as described under the Affected Environment and Alternative 1. Due to the intensity of tree hazard mitigation, this alternative would result in the immediate buildup of continuous fuels within 200 feet of either side of park roadways (i.e., throughout the action area), adding to already high fuel loading in some areas. Post tree felling, NPS' removal (through pile burning, chipping, and hauling) of mitigation related fuels, as described, would immediately reduce fuels within the debris treatment zone (80 feet of the roads edge) by roughly 40-50 t/a such that these fuels in this area would no longer contribute to potential future fire spread or localized fire effects. Roughly 10-15 t/a of mitigation related fuels in the form of logs 12" in diameter would remain in the debris treatment zone.

While some chips and slash would be spread within the debris treatment zone, these fine fuels would make up a small fraction of the debris expected to result from mitigation efforts and would

be treated using methods to reduce their risk of carrying fire when fire returns to the area (e.g., chipping to a depth of 2-3 inches, slash distributed to break up fuel continuity and to a depth of no greater than 12"). Fine fuels would further compress and decompose over a period of 2-4 years depending on weather and moisture – further reducing their contribution to overall fuel loading (Keane 2008).

Outside the proposed debris treatment area (greater than 80 feet from the road edge), fuel loading would be initially higher than that anticipated under Alternative 1, especially in areas where intensive tree felling would occur. However, the risk of these fuels contributing to fire spread would be offset by the maintenance of a fire break sufficient to support firefighting operations around the road corridor should fire return to the action area. The NPS would further mitigate the risk of fire spread in untreated areas by directionally felling trees so as to break up fuel continuity to the maximum extent feasible. Fuel loading from untreated boles (logs) would decrease over a period of roughly 15-30 years as logs continue to decay, resulting in long term fuels conditions similar to Alternatives 1 and 3 in this portion of the action area.

Though NPS treatment design would reduce the risk of fire spread, higher fuel loading from both untreated boles and fine fuels outside the debris treatment zone would result in some additional risk of locally adverse fire effects. As described under the Affected Environment, fire effects resulting from jackpot fuel loading can be severe and lead to residual forest loss. Conditions and fuels that result in severe fire behavior would be spatially variable throughout the entire action area, with areas of low fuel loads and others with heavy jackpot fuels. Areas where adverse fire effects would likely be most pronounced within a short-time post-fire would be in locations where high fuel loads lie in proximity to areas of live tree canopy.

However, given the Affected Environment, the narrow linear nature of the action area, NPS' intentional breakup of fuel continuity, and the maintenance of sufficient fuel breaks (to a width of 80 feet on each side of the road corridor) regionally adverse fire effects directly related to roadside jackpot fuels would not be anticipated when fire returns to the action area.

Cumulative Effects – Fuel Loading and Future Fire Effects

Past, present, and reasonably foreseeable actions would be similar to Alternative 1. However, post project, additional high intensity tree hazard mitigation actions would unlikely be necessary for the next 10 years as most tree hazards would have already been removed. As well, because fuels resulting from tree hazard mitigation would be removed along the roadway, this feature would be more likely to serve as a defensible firebreak such that ongoing fire and fuels management activities are more likely to be implemented safely and effectively. Such actions would serve to reduce the potential for fire spread and associated adverse fire effects outside the action area.

Alternative 3: Mitigate Trees and Do Not Treat Woody Debris

Direct and Indirect Effects – Fuel Loading and Future Fire Effects

Under Alternative 3, understory re-growth would continue to build fine fuels over the next 5-10 years as described in the Affected Environment. Due to the intensity of tree hazard mitigation, this alternative would result in the immediate buildup of continuous fuels within 200 feet of either side of park roadways (i.e., throughout the action area), adding to already high fuel loading in some areas. In locations where high numbers of additional tree hazards would be mitigated, fuel loading would increase by roughly 50,000-60,000 tons (50 – 60 t/a) of debris >12" in diameter within the action area, including adjacent to park roads, within 5-7 months of project implementation.

Though the NPS would attempt to limit the creation of jackpots by directional felling, the sheer volume of debris expected would still, almost undoubtedly, result in contiguous fuels along much of the road corridor. Because course woody debris would not be treated, it would further contribute to overall fuel loading and provide the fine fuel component necessary for jackpot ignition.

As described under the Affected Environment, fire effects resulting from jackpot fuel loading can be severe and lead to residual forest loss. Conditions and fuels that result in severe fire behavior would be spatially variable throughout the entire action area, with areas of low fuel loads and others with heavy jackpot fuels. Areas where adverse fire effects would likely be most pronounced within a short-time post-fire would be in locations where high fuel loads lie in proximity to areas of live tree canopy.

Due to a combination of high fuel loading and narrowed width of the roadway corridor, the risk that the roadway would become indefensible as a fire break would be greatest under this alternative. Likewise, the degree of risk for fire to spread from the action area, or to result in locally adverse fire effects is also greater under Alternative 3 than other alternatives considered given the wider width of heavy fuels accumulation (200 feet on either side of the road) and the reduced width of fire break (limited to the road prism). As previously described, these risks would slowly decrease as trees continue to decay; a period of roughly 15-30 years.

Cumulative Effects – Fuel Loading and Future Fire Effects

Past, present, and reasonably foreseeable actions influencing fire effects would be the same as Alternatives 1 and 2. However, the quantity, continuity, and sound nature of jackpotted roadside fuels in some areas would result in immediate operational challenges to firefighters in some locations. Should operational safety risks reach unacceptable levels, firefighters would abandon roadways as indefensible control features during wildfire. NPS inability to utilize the roadway as a fire break and for firefighting operations would further increase the degree of risk for fire to spread uncontrolled in the event of wildfire. The degree of fire spread—and number of acres affected—would depend on terrain, fuel loads, and weather conditions on the day the area experiences fire.

Threatened and Endangered Species – Fisher

Affected Environment

Fisher (*Pekania pennanti*) are dark-brown medium-sized carnivores within the Mustelidae (the "weasel family") that historically inhabited a broad swath of the forested landscapes within North America (Lofroth et al. 2010). While not exclusively dependent on old-growth forests, fishers are associated with many of the characteristics found in mature forests such as dense canopy cover, large diameter trees, and fine-scale habitat features created over time by decay (e.g., cavities in trees; Weir et al. 2013, Purcell et al. 2009, Green et al. 2019).

The U.S. Fish and Wildlife Service (USFWS) listed the Southern Sierra Nevada Distinct Population Segment of the fisher as Endangered under the Endangered Species Act (ESA), effective June 15, 2020 (FR 2020). Some primary causes of endangerment noted at the time of listing included "loss and fragmentation of habitat resulting from high-severity wildfire and wildfire suppression (i.e., loss of snags and other large habitat structures on which the species relies), climate change, and tree mortality from drought, disease, and insect infestations" (FR 2020). This southernmost population is also completely isolated from any extant populations to the north (Zielinski et al. 2005). Although fishers and the forest types in which they occur in the Sierra Nevada evolved with frequent, low to

moderate severity fire with occasional patches of high severity (as reported for mixed conifer and yellow-pine forests; Safford and Stevens, 2017), more than a century of fire exclusion, drought, and a warming climate are contributing to wildfires that are larger in scale and intensity than would have occurred historically (e.g., Meyer et al. 2022).

Landscape level habitat models for this region represent fisher habitat in a roughly north-south collection of large but narrow habitat patches ("cores") over elevations ranging from approximately 3,000 – 9,000 feet and which are separated by major river canyons including the Merced, San Joaquin, Kings, and Kaweah Rivers (Zielinski et al. 2005; Spencer et al. 2016). Habitat types of relatively high value for fisher in this area include Montane Hardwood-Conifer, Ponderosa Pine, Sierran Mixed Conifer, and White Fir forests (based on the California Wildlife Habitat Relationship (CWHR) systems) (R. Green, pers. comm.; https://wildlife.ca.gov/Data/CWHR/Wildlife-Habitats). Spencer et al. (2016) mapped the predicted fisher distribution in this area as a series of seven core areas (six of which are currently occupied) and six linkage areas, as consistent with data on fisher space-use patterns and landscape genetic patterns. While fishers are thought to be able to move and establish home ranges relatively freely within habitat cores, dispersal between them is relatively rare (especially by females; Tucker 2013; Tucker et al. 2014).

To consider where the KNP Complex fire may have impacted fishers and fisher habitat within park boundaries, the NPS quantified and compared the extent of potential fisher habitat within the parks pre-fire with how much occurred within the KNP footprint (in the parks) in a basic GIS analysis. Specifically, the NPS combined available spatial data into two categories: 1) "reproductive fisher habitat" and 2) "all fisher habitat". The basis for the fisher reproductive habitat category was the post-drought fisher reproductive habitat model (CBI 2021), but to be sufficiently inclusive, NPS also incorporated the slightly older pre- and post-drought denning habitat models from CBI. The goal of the "all habitat" category was to represent any areas where fishers might forage, travel, or disperse, as well as core resting and reproductive habitat; thus, for this broad category, NPS included all data in the reproductive habitat category plus fisher foraging and high-quality habitat from CBI (2015).

Using this model, NPS calculated 102,009 acres of modeled "reproductive fisher habitat" in the parks, with 43,733 acres in the park portion of the KNP Complex footprint (42.9% burned). NPS calculated 229,983 acres of modeled "all fisher habitat" in the parks, with 60,183 acres in the park portion of the KNP Complex fire footprint (26.2% burned).

Routine human disturbance due to human presence, traffic, and roadwork is common in much of the action area due to the proximity of developed areas and a high-speed highway. Roadside sounds may range from 80-106 dB and extend for ¼ to two miles, depending on level of highway activity, terrain, and forest cover. While fishers have been documented near some of the major roads in and around the parks, preliminary data suggest that they are expected to spend much of their time in habitat further from primary roads and developed areas, especially when establishing dens. This is likely, in part, due to their preference for areas where human disturbance is lower.

Due in part to their preference for areas with less disturbance, as well as the availability of snags and live trees throughout the parks with qualities suitable for fisher denning, the likelihood of a fisher occurring in the action area is relatively low. Likewise, the probability for a fisher to den in the action area, or in a tree slated for mitigation, is also relatively low. Roughly 1,200 standing dead tree hazards of sufficient size (27-35" diameter at breast height) to be used by fisher remain standing in the action area though these have not been assessed for den quality characteristics. As well,

thousands of non- hazardous large structures (e.g., snags leaning away from the road) provide denning and cover opportunities for fisher and prey species should they be within the project area.

Although not assessed here, some areas within the fire footprint burned at high intensity, and thus may not be used by fishers for many years to come (or at least as reproductive habitat). However, other areas burned at low to mid- or mixed severity, thus are likely to retain a higher suitability for fisher. The extent of high severity patches within the KNP Complex was explored in the report by Meyer et al. (2022), but more study on fisher response to post-fire landscapes is needed. The NPS expects the likelihood of a fisher using the moderate to high intensity burned areas in general (including areas near roads) would increase over time as vegetation grows back and food availability increases (e.g., berries, small mammals, birds).

Heavy fuel loading both within and outside of the KNP perimeter may pose a risk of additional fisher habitat loss in the event of another fire (R. Green, pers. comm.). While some woody debris is beneficial in providing refuges for fisher prey, escape cover from fisher predators, and secure locations for resting fishers, the current quantity of debris exceeds levels recommended as necessary by the *Interim Strategy for Southern Sierra Nevada Fisher Conservation* (Interim Strategy) in areas of high tree falling and are also contiguous in some locations (Thompson et. al. 2020). As described in previous sections, large quantities of woody debris along roadsides, especially when fuel continuity remains unbroken, would increase the risk of severe fire effects to remaining suitable fisher habitat in the case of another wildfire. Should high intensity fire spread to residual green forest, much of which also contains relatively high fuel loads, it would compound degradation of fisher habitat already experienced within the KNP burn perimeter and other recent fires (Meyer et al. 2022).

Alternative 1: No Action

Direct and Indirect Effects – Fisher

The no action alternative would result in little to no change to the Affected Environment. Noise disturbance would remain relatively stable and thousands of tree hazards – roughly 1,200 of which are suitable den size (snags ranging from > 27'- 35") – would remain standing for up to 10-15 years until they were mitigated or failed naturally on their own. Fuel loading would remain high in parts of the action area where jackpots already exist and would slowly accumulate in other areas; contributing to risks associated with high fuel loading previously described. Should fire return to the area and result in the loss of residual green forest, additional suitable fisher habitat may be lost.

Due to the low probability for fisher to be resting or denning immediately adjacent to a primary road, the unlikelihood of an active den to be removed, and conservation measures previously developed in coordination with the U.S. Fish and Wildlife Service for the protection of the fisher during tree hazard mitigation work, it is not anticipated that this alternative would result in injury or mortality of a fisher (see Appendix B).

Cumulative Effects – Fisher

To the extent that operational safety hazards from tree hazards do not prevent these actions from occurring, past, present, and reasonably foreseeable actions that may affect fisher in the project area include rehabilitation of the Mineral King Road (MKR) – scheduled to begin within the next two years; fire and fuels management activities including prescribed burning Lost Grove, Cabin Creek, Atwell, and Quarry treatments – being planned or implemented within the next 2-10 years; and fire exclusion should another fire ignite. None of these projects intentionally remove den-quality trees though would cumulatively contribute to the short-term noise disturbance resulting from individual

trees mitigated under Alternative 1. These projects beneficially affect fisher and their habitat in the long term; either immediately post-project or, in the case of prescribed fire, within 3-5 years as understory habitat recovers.

Alternative 2: Mitigate Tree Hazards and Treat Woody Debris (Preferred Alternative)

Direct and Indirect Effects – Fisher

Potential direct effects to fisher in the project area include disturbance from machinery used (ranging from 80-110 dB) for tree hazard mitigation and treatment over a 6–8-month time period, with some implementation occurring intermittently over the course of up to 4 years. Absent mitigations, felling of thousands of standing burned snags could result in direct mortality or injury of a fisher. This risk would be greatest if trees of sufficient den size and having den quality characteristics are felled during the LOP. Direct effects would also include removal of roughly 40-50 t/a of course woody debris that may otherwise be used for hunting or escape cover from predators especially in areas of high severity fire where intensive tree felling would occur. Potential indirect effects include felling of standing burned snags that might be used by prey, removal of a subset of logs that could provide prey with cover, and the short-term "openness" of sites post snag and log removal (e.g., reduced escape cover, increased exposure to thermal conditions, and precipitation).

Under Alternative 2, the NPS would mitigate the risk for NPS' tree hazard felling actions to result in mortality or injury to a fisher by avoiding work during the denning LOP to the maximum extent feasible. Under circumstances where work during the LOP must occur, additional mitigations would be implemented such that mortality or injury of fisher would likewise not be anticipated (see Appendix B).

Tree felling and the use of debris treatment equipment that would run 10 hours per day for 1-7 days per road stretch would cause a higher degree of disturbance than anticipated under Alternatives 1 and 3 due to the intensity of work conducted. However, as previously discussed, fisher are unlikely to be present in much of the action area where the most intensive tree hazard felling would occur; at least for the immediate future. Further, the NPS would mitigate disturbance by conducting the most intensive project actions during periods of time when fisher are less sensitive such that, were a fisher to travel through the area, negative impacts from noise disturbance would not be anticipated.

Though Alternative 2 reduces overall cover (both standing and down), retention of 3-5 large diameter logs per 100-foot stretch of roadside would provide roughly 10-15 t/a of cover for fisher and their prey in the debris treatment area. This quantity far exceeds the 3-5 t/a advised for fisher cover recommended by the Interim Strategy in heavy tree felling areas (Thomson et. al 2020). The project would also retain debris in a manner that, to the maximum extent feasible, breaks up roadside fuel continuity to prevent spread of fire and maintains roadway sightlines also as recommended by the Strategy (Thompson et al. 2020). These methods would serve to decrease both the degree of risk for fire spread and vehicle strike over those anticipated under other alternatives considered.

While the degree to which fisher may be directly affected by some project components implemented under Alternative 2 are greater than Alternatives 1 and 3, the NPS has determined that, overall, Alternative 2 would achieve several beneficial effects other alternatives would not, including: 1) Tree hazard mitigation actions would occur prior to forest recovery when fisher are less

likely to be present and therefore less likely to be disturbed or killed when compared to Alternative 1, 2) Maintenance of a fire break would be sufficient to increase the likelihood of successful control of wildfire should it threaten residual green forest when compared to Alternatives 1 and 3, and, 3) The intentional retention of woody debris provides recommended cover for fisher and their prey while reducing the risk of vehicle strike to fisher when compared to Alternative 3.

Cumulative Effects – Fisher

Past, present, and reasonably foreseeable actions cumulatively affecting fisher in the project area would be as those described in Alternative 1 though the degree to which the project may cumulatively contribute to noise disturbance resulting from these projects would be greater due to more intensive actions. The elimination of operational safety risks posed by tree hazards and roadside jackpot fuels under this alternative would result in cumulative beneficial effects for fisher habitat as the likelihood for fire management activities (firefighting) to continue and be successful would be greater under this alternative than other alternatives considered.

Alternative 3: Mitigate Trees and Do Not Treat Woody Debris

Direct and Indirect Effects – Fisher

The intensity of tree hazard mitigation under Alternative 3 would be greater than Alternative 1 and equal to Alternative 2. However, because the NPS would not treat debris under Alternative 3, an estimated 40 - 50 additional t/a (40,000 – 50,000 tons) of additional woody ground cover (mostly > 12" in diameter) would remain along park roadways. The degree to which project noise would disturb fisher moving through the action area would also be lower under this alternative as the NPS would not use industrial chippers (running continuously at 110 dB) or other machinery to treat debris. Overall, the NPS expects that project duration and associated disturbance to fisher would be reduced by one to two months due to the lack of debris treatment.

While this alternative would retain additional ground cover and result in a lower degree of overall disturbance when compared to Alterative 2, the quantity of debris remaining on site (50-60 t/a) would far exceed that recommended (3-5 t/a) as necessary by the Interim Strategy while failing to achieve recommended breakup of fuel continuity adjacent to the roadway. The degree of risk of wildfire, should one occur, spreading from roadside action areas to residual green forest is therefore greatest under this alternative, negating any potential benefits of increased cover. Likewise, the risk of a fisher being struck by a passing vehicle may also be greatest under this alternative due to sightlines being limited by debris buildup (R. Green, Personal Communication, 2022).

Cumulative Effects – Fisher

Past, present, and reasonably foreseeable actions cumulatively affecting fisher in the project area would be similar to those described under Alternatives 1 and 2. However, the continued operational safety risks posed by roadside jackpot fuels under this alternative would decrease the likelihood for fire management activities (firefighting) to either occur or be successful when compared to other alternatives considered; likewise the degree of risk that this alternative would result in adverse effects to residual green forest should another fire occur is more likely under this alternative (see also Fuel Loading and Future Fire Effects).

Wilderness

Affected Environment

Roughly 840,000 acres – nearly 97% – of Sequoia and Kings Canyon National Parks are designated or managed as wilderness (NPS 2015). In accordance with the Wilderness Act and further supported by NPS policy, these lands are to be managed for the preservation of wilderness character and wilderness resources in an unimpaired condition (NPS 2006).

Wilderness character is a holistic concept based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal experiences in natural environments relatively free from the encumbrances and signs of modern society, and (3) symbolic meanings of humility, restraint, and interdependence that inspire human connection with nature (NPS 2021b). The five tangible qualities of wilderness character that stem from the Wilderness Act of 1964 include natural, undeveloped, untrammeled, outstanding opportunities for solitude or primitive and unconfined recreation, and other features of value (Landres et. al. 2015). The status and trends of the four primary qualities are described further below; other features of value are not discussed further as these features have not specifically been identified in the action area (Tricker et al. 2014).

The boundaries of the Sequoia-Kings Canyon and John Krebs Wilderness areas are as close as 100 ft to the centerline of roads in portions of the action area, where action may be taken 150 feet or more from the road edge. Applying a standard 150-foot buffer, the NPS estimated that direct effects could occur across 425, largely linear, acres of designated wilderness; representing <0.1% of lands managed as wilderness in these parks. Action would not occur throughout this entire acreage because most tree hazards along road segments are located outside the wilderness boundary; only relatively tall trees threaten roadways from locations within wilderness.

Wilderness character across the 425 acres of the project that lies in wilderness is more degraded relative to the eastern and northern areas of these Wildernesses. While some qualities of wilderness character in this area are stable, others are regionally declining (Tricker et al. 2014, Wilderness Stewardship Plan 2015). The following are descriptions of wilderness character and influences on wilderness character within the 425-acre wilderness portion of the proposed action area.

Influences on Natural Quality

Wilderness is comprised of ecological systems that are substantially free from the effects of modern civilization.

Prior to the KNP, the low to mid-elevation forest within the proposed action area was significantly departed from the historic fire regime, and high fuel loading resulting from a century of fire exclusion led to unnaturally severe fire effects in many locations within the burn perimeter. Currently, fuel loading is greatly reduced in much of the proposed action area, though some areas of high fuel loading, particularly those that did not burn or burned at low severity continue to exist. Other influences on natural quality within the action area include the presence of invasive species, air pollution from vehicle exhaust and other regional sources, deposition of contaminants, and ambient light originating from the nearby population centers (Wilderness Stewardship Plan, 2015).

Influences on Untrammeled Quality

Wilderness is essentially unhindered and free from the intentional actions of modern human control or manipulation.

Both fire exclusion activities and prescribed fire have recently occurred and/or would continue to occur in the proposed action area. As a full suppression wildfire with extensive tree felling and other suppression activities, the 2021 KNP represents the most intense recent trammel action in the project area, but mitigation of high densities of tree hazards within a given area may also affect the untrammeled quality of this wilderness.

Influences on Undeveloped Quality
Wilderness is essentially without permanent improvements or the sights and sounds of modern human occupation.

There are relatively few non-recreational developments in the wilderness portion of the action area though some mechanized use may occur at times.

Influences on Opportunities for Solitude or Primitive and Unconfined Recreation Quality
Wilderness provides opportunities for solitude or a primitive and unconfined type of recreation.

Despite the close proximity of the wilderness in the action area to the road corridor, this area is seldom visited due to steep terrain and lack of trails. Visitation is concentrated where trails intersect the action area, providing opportunities for day hiking. The road prism (paved surfaces, signs, culverts, cut banks, etc., cut stumps or log ends from tree hazard mitigation) and other facilities are visible from the wilderness portions of the action area in some locations. In addition, the sights and sounds from roadway maintenance and construction, traffic, and vehicle lights, though not originating from wilderness, impacts wilderness near roads.

Alternative 1: No Action

Direct and Indirect Effects – Wilderness
Action to use chainsaws to mitigate KNP tree hazards within the wilderness boundary would negatively affect the untrammeled, undeveloped, and opportunities for solitude or primitive and unconfined recreation qualities of wilderness character. The mitigation of an estimated 500 tree hazards with the wilderness boundary over the course of 10-15 years would negatively affect the untrammeled quality of wilderness character. The use of mechanized tools operating for roughly 85 -100 hours over this time frame would diminish the undeveloped quality of wilderness character. The sounds from this work could be heard up to 2 miles away, impacting opportunities for solitude.

The affected area represents a minor proportion of parks overall wilderness acreage and impacts would be intermittent (amounting to 100 hours over up to 15 years), of low intensity, and would terminate upon completion of work. Ample opportunity for solitude would continue to exist in other locations during tree hazard mitigation efforts and in the project area when the project ceases. The impacts to wilderness character would be temporary – lasting the duration of the project – and would result in no change in the current overall status and trends in wilderness character in the southern portion of the parks or result in significant impact to wilderness more broadly.

Cumulative Effects – Wilderness
Past present, and reasonably foreseeable actions cumulatively affecting wilderness character in the project area are those described in the Affected Environment. Prescribed fire activities would continue to contribute to short term negative effects of the action on undeveloped and un-trammeled qualities while benefiting natural quality in the long-term by maintaining natural fuel loading in those areas where those actions occur.

Under this alternative, high level of operational safety risk associated with working under standing snags in a wildfire may result in decreased fire suppression activities in some areas (see Visitor and Employee Safety Sections). If that were to occur, decreased fire suppression would benefit the untrammeled, opportunities for solitude or primitive and unconfined recreation, and undeveloped qualities of wilderness character in the action area; it would also cumulatively benefit natural quality in areas where fire would benefit the landscape. However, as noted in the Fire Effects and Future Fuel Loading section, un-naturally severe fire is likely to result in areas of high fuel loading. In these areas, inability to control fire spread due to inadequacy of fire breaks may contribute to the regionally negative long-term trends in natural quality (Tricker et. al. 2014).

Alternative 2: Mitigate Tree Hazards and Treat Woody Debris (Preferred Alternative)

Direct and Indirect Effects – Wilderness

Alternative 2 would increase the degree of effect on the undeveloped and untrammeled qualities of wilderness character over Alternative 1 by mitigating an estimated additional 250 trees and increasing chainsaw run-time in wilderness by roughly 40 – 50 hours. This alternative would also shorten the duration of time under which tree hazard mitigation work would be implemented. Rather than a duration of 10-15 years, as outlined in alternative 1, all 750 trees and 125 – 150 total hours of chainsaw use would occur within 6-8 months, with some work potentially occurring up to 4 years from project initiation.

The degree of impacts to opportunity for solitude would be higher than Alternative 1 due to anticipated increased noise levels (up to 110 dB) emanating from work occurring near the wilderness boundary over a period of 6-8 months. However, debris, removal adjacent to but outside the wilderness boundary would reduce the visual effects of tree hazard mitigation when compared to other alternatives, benefiting opportunity for solitude immediately post project.

Similar to Alternative 1, the preferred alternative would result in no measurable change in the current overall status and trends in wilderness character in the southern portion of the parks or within the action area specifically. Further, this alternative would not result in significant impact to wilderness more broadly given that all impacts would be temporary in nature (lasting up to 4 years); overall wilderness character would be preserved.

Cumulative Effects – Wilderness

Past present, and reasonably foreseeable actions indirectly and negatively affecting wilderness character in the 425-acre project area are those described in the Affected Environment and under Alternative 1.

Prescribed fire activities would continue to contribute to short term negative effects and long-term beneficial effects as previously described. Improved capacity to suppress wildfire due to maintenance of sufficient fire breaks, when compared to other alternatives, would cumulatively contribute to the negative long-term trend of unnaturally high fuel loads in some areas outside the action area should fire return and be suppressed. However, fire suppression may also benefit long term trends in natural quality in cases where unnaturally severe effects would otherwise occur.

As previously described, the affected area represents a minor proportion of overall wilderness acreage of these parks. Though temporary impacts to wilderness quality would be more intensive (750 trees removed, and an increase of 40-50 hours of chainsaw run time over a period of 6-8 months) than those under Alternative 1, they would likewise terminate upon completion of work

the project would result in no measurable change in the current overall status and trends in wilderness character or result in significant impact to wilderness more broadly.

Alternative 3: Mitigate Trees and Do Not Treat Woody Debris

Direct and Indirect Effects – Wilderness

Actions to mitigate tree hazards as proposed under Alternative 3 would result in the same effects on wilderness character as Alternative 2. Due to a lack of debris treatment however, this alternative would be implemented over a shorter duration and less noise would be produced immediately adjacent to the wilderness. This would decrease the short term visual and noise effects on Solitude when compared to Alternative 2. However, the retention of highly visible jackpots at the edge of the wilderness boundary would conversely have a greater degree of negative effect on Solitude than Alternatives 1 and 2. These effects would be longer in duration than those anticipated from project implementation and would last 5-30 years until materials and stumps began to break down, were overgrown with vegetation, or were consumed by fire.

As previously described, the 425-acres of wilderness within the project area represents a minor proportion of overall wilderness acreage of these parks and would result in no measurable change in the current overall status and trends in wilderness character or result in substantial impact to wilderness more broadly.

Cumulative Effects – Wilderness

Past, present, and reasonably foreseeable actions cumulatively affecting wilderness character in the project area would be similar to those previously described. However, the increased level of operational safety risk associated with high fuel loading in the form of jackpots are likely to result in decreased fire suppression activities in some areas (see Visitor and Employee Safety Sections). As described under Alternative 1, decreased fire suppression would benefit the untrammeled, opportunities for solitude, and undeveloped qualities of wilderness character in the action area. There may also be beneficial effects on natural quality in areas where fire, that would otherwise be suppressed, would produce beneficial fire effects landscape. However, as noted in several areas of this EA, un-naturally severe fire is likely to result in areas of high fuel loading. In these areas, inability to control fire spread due to inadequacy of fire breaks may contribute to the regionally negative long-term trends in natural quality (Tricker et. al. 2014).

Visitor Use and Experience

Affected Environment

In 2021, Sequoia National Park hosted over one million visitors and Kings Canyon National Park hosted roughly 560,000 (NPS 2022a). Park visitation is typically highest on weekends, especially during the summer. About 80% of visitation occurs between May and October, with peak visitation occurring in July and August. The lowest visitation occurs during December, January, and February; however, the density of visitation on holiday weekends during this time is comparable to the busiest summer days (NPS 2022a). Most visitors arrive at the parks by private automobile. About 98% of visitor use occurs in front country areas, with the remaining 2% of visitor use occurring in wilderness areas. Recreational activities in the parks include driving park roads, photography, hiking, camping,

bicycling on park roads, wildlife watching, swimming and wading, and fishing. Cross-country skiing, snow play, snowshoeing, and sledding are popular winter activities[10].

The Generals Highway (Generals) is one of two main access roads into the parks and the only year-round access for visitors to Sequoia National Park. The highway provides the most direct year-round access to some of the park's most popular features including the Giant Forest, Crystal Cave, Lodgepole Visitor Center and Village, Wuksachi Village, Giant Forest Museum, several campgrounds, and numerous day use areas and trailheads. Visitors traveling the section of highway in the project area could also continue north to visit Grant Grove in Kings Canyon. Many visitors enjoy viewing scenery while driving along the Generals and often stop at pullouts to take photographs and observe wildlife. Visitors traveling the Generals generally experience free-flowing traffic traveling at park highway speeds (45 mph), though congestion and slowing traffic are often experienced near parking areas, villages, and popular recreational zones, particularly during high visitor use periods. Temporary traffic stoppages up to one hour in length during road rehabilitation work routinely occur during summer months.

Other roads in the action area include the Mineral King Road, which provides the only access to trailheads, camping areas, private inholdings, and permitted recreational cabins in the Mineral King Valley; Crescent Meadow and Redwood Mountain Roads, which provide access to popular frontcountry and wilderness trailheads; and Crystal Cave Road, which serves as the only access to Crystal Cave, one of the parks' primary visitor attractions. Traffic along these roadways is typically free flowing with occasional congestion but is generally slow moving due to the nature of the topography and the poor condition of some roads (e.g., Mineral Kings Road).

But for recent flood damage to Mineral King Road and the Generals (which temporarily closed roads to public vehicular access in January 2023 while stabilization actions are needed), the public has been able to access and drive along Mineral King Road, Crescent Meadow Road, and the Generals Highway since the KNP. That said, access to Crystal Cave and Redwood Canyon has not yet been restored following closures during the KNP (in fall 2021) due to several factors, including the presence of unevaluated tree hazards which pose an undetermined level of risk to public safety.

Along the Generals Highway and in other areas where access was restored post KNP, visitors currently experience forest conditions ranging from mixed coniferous and oak foothill communities where fire did not burn or burned at low severity, to severely burned areas where most vegetation was killed, soils are scorched, trees are charred and, in some cases, devoid of foliage. In the most severely burned areas, vistas are open for many miles due to widespread tree mortality and loss of forest cover. In locations where emergency tree felling operations occurred, piles of woody debris, cut ends, and stumps are readily visible. Along the Mineral King Road in particular, some vegetation remains coated with fire retardant. Many trees immediately adjacent to park roads are marked with blue paint identifying them as hazards and signs have been posted along some road sections warning travelers not to stop due to hazardous conditions.

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[10] See Sequoia and Kings Canyon General Management Plan, 2007 for more information on park roads and recreational opportunities.

Should visitors be allowed along Crystal Cave and Redwood Mountain roads, they would experience similar conditions to currently accessible park roads. However, evidence of recent fire would be more widespread due to the high fire severity in these areas.

Alignment with desired conditions under the parks' General Management Plan is currently varied in the proposed action area. Temporary closure of the Generals Highway has temporarily limited public access to the Giant Forest and the longer-term but temporary closure of Crystal Cave has limited public opportunity to directly experience the parks' significant cave resources. As well, thousands of tree hazards and warning signs directing visitors not to stop decrease sightseeing opportunities in high-use scenic driving zones. While pullouts remain available, visible impacts from debris (including jackpots) and cut stumps may detract from scenic vistas or otherwise clutter the "natural" viewshed along much of the roads within the project area. The degree to which individual visitor experiences are affected by these conditions is dependent on visitor perceptions and expectations. For some, the experience may be diminished, while the experience of others may be largely unaffected.

Alternative 1: No Action

Direct and Indirect Effects – Visitor Use and Experience

Under Alternative 1, visitors would experience post-fire landscape recovery over the next 1-5 years though evidence of wildfire attributed to the KNP would be noticeable for the foreseeable future. The visual influence of existing roadside debris and jackpots would remain for the next 5-15 years; until debris began to break down, overgrew with vegetation, or was consumed by fire. Some existing piles would likely remain visible for 20-30 years or more; new jackpots would form as tree hazard mitigation continues and as trees fall naturally overtime. Noise disturbance from tree hazard mitigation work lasting up to roughly one hour would occur intermittently during felling if imminent tree hazards.

Until trees were fully mitigated or failed naturally, existing closures would remain in place until high priority trees were mitigated. These and other areas in the project area could be re-closed and/or long-term closures could be instituted if the quantity or condition of tree hazards were determined to pose an unacceptable safety risk. Should additional area closures become necessary, visitor access would be further limited and may result in crowding in locations that remain open. Over a period of years, these factors may increasingly result in a diminished experience for park visitors.

Cumulative Effects – Visitor Use and Experience

Past, present, and reasonably foreseeable actions benefitting visitor use and experience in the action area include continuation of park interpretive and educational programs, upgrades to wayside exhibits, diverse recreational opportunities, trail maintenance and improvements, upgrades to visitor services, including food and lodging, mitigation of tree hazards, and replanting of native vegetation in areas vulnerable to erosion. Under Alternative 1, temporary closures and traffic from road rehabilitation (e.g., recently completed pavement preservation or the Rehabilitation of Mineral King Road, planned for implementation in 2025-2026), would cumulatively contribute to temporary adverse effects but long-term beneficial effects on visitor experience.

Closures and smoke related to Fire and fuels management activities (prescribed fire and fire suppression) may also cumulatively diminish visitor experience in the short-term. However, these activities also serve to reduce the likelihood of high severity fire resulting in conditions such as those described in the Affected Environment and therefore benefit visitor experience in the long-term. As tree hazards continue to weaken over a period of years, operational risks anticipated under this

alternative may limit these actions in some areas; reducing the beneficial contributions of fire management activities on visitor use and experience (see Visitor and Employee Section; see also Fuel Loading and Future Fire Effects).

Alternative 2: Mitigate Tree Hazards and Treat Woody Debris (Preferred Alternative)

Direct and Indirect Effects – Visitor Use and Experience

Under Alternative 2, visitors would continue to experience postfire landscape recovery over the next 1-5 years though evidence of wildfire attributed to the KNP would be noticeable for the foreseeable future. Increased sound disturbance from project implementation (up to 110 dB) and increased traffic from debris hauling would negatively affect visitor experience during the 6-8 months of project implementation as these sounds and traffic could frustrate some visitors and further disturb their ability to hear natural sounds within the project area beyond existing conditions. These impacts are expected to be transient and short term as visitors travel through projects areas. More notably, temporary delays/closures during the summer season of up to 3 hours along the Generals between the Foothills and Wuksachi and up to 6 hours along the Mineral King Road would delay visitors' access to key destinations within these road segments such that visitors would likely adjust their trip planning to accommodate the schedules. And full weekday closures along the Crystal Cave, Redwood Mountain, Crescent Meadow, and the section of the Generals between Wuksachi and the northern boundary would divert visitors to other locations in the parks during these days, and would require temporary closure of Dorst Campground, similar to conditions since 2020. Notably, temporary construction closures—such as those proposed in this alternative—are routine in these parks and have had no measurable effect on park visitation that the NPS is aware of. Rather, annual visitation has remained relatively stable over the last 10 years outside of park closures associated with the Covid-19 pandemic, wildfires, and major winter storm events (NPS 2022a). Anticipated longer closures over the fall, winter, and spring would closely align with typical access patterns to the respective areas. In addition, the NPS would mitigate negative effects to visitor experience to the maximum extent feasible by broadly sharing project information with the public, staggering closures such that multiple high visitation areas did not have simultaneous extended closures, implementing longer closures during time periods where fewer visitors would be affected, and sharing closure schedules well in advance of being implemented to assist visitors in planning around closures.

In addition to closures that could be expected within the first two years of implementation, visitors to the park in winters of 2023/2024 and 2024/2025 may experience poor air quality during pile burning activities that could extend for 5-10 days. See impacts to air quality under Issues Considered but Dismissed in Chapter 1.

Despite the modified landscape and temporary impacts attributed to project work, this Alternative would benefit visitor use and experience to a greater degree than Alternative 1 by fully restoring parks wide visitor access, including access to the Crystal Cave, by no later than 2023 (anticipated). As well, visitor experience and opportunity currently diminished by the presence of tree hazards, marking paint, and roadside debris piles in high-uses scenic driving zones would also be restored to desired conditions over a shorter timeframe than anticipated under Alternative 1.

Cumulative Effects – Visitor Use and Experience

Past present, and reasonably foreseeable actions benefitting visitor use and experience in the action area would be similar to those described in Alternative 1. As well, the benefits to visitor use and experience resulting from successful fire management activities are more likely under this Alternative

due to decreased operational risks of standing tree hazards when compared to Alternatives 1 and high fuel loading compared to Alternative 3 (see also Visitor and Employee Safety and Fuel Loading and Future Fire Effects). However, closures lasting 1 hour to several days in length and heavy traffic from debris hauling would cumulatively contribute to negative effects of previously completed or ongoing or road rehabilitation work particularly over the course of 6-8 months in 2023 and 2024.

Alternative 3: Mitigate Trees and Do Not Treat Woody Debris

Direct and Indirect Effects – Visitor Use and Experience

Under Alternative 3, visitors would continue to experience postfire landscape recovery over the next 1-5 years though evidence of wildfire attributed to the KNP would be noticeable for the foreseeable future. Similar to Alternative 2, increased sound disturbance from project implementation (up to 106 dB from chainsaws), and increased traffic from work crews would negatively affect visitor experience during the 5-7 months of project implementation; though the degree of effect from sound disturbance would be lower due to the lack of debris treatment (e.g., no chippers would be used, and no hauling of debris would occur). Impacts from temporary closures would also be similar to Alternative 2, except they would be implemented for 1-2 months less and would likely be of shorter duration given that less debris treatment would occur. the NPS would mitigate negative effects to visitor experience to the maximum extent feasible by broadly sharing project information with the public, staggering closures such that multiple high visitation areas did not have simultaneous extended closures, implementing longer closures during time periods where fewer visitors would be affected, and sharing closure schedules well in advance of their being implemented to assist visitors in planning around closures.

Like Alternative 2 the mitigation of 12,000-15,000 trees would fully restore parks wide visitor access, including access to the Crystal Cave, by no later than 2023 (anticipated). As well, visitor experience and opportunity currently diminished by the presence of tree hazards, including the visual effects of marking paint, in high-uses scenic driving zones would also be restored to desired conditions. The visual influence of roadside debris created during felling operations, however, would remain and would be greater than those expected under Alternatives 1 and 2 due to the intensity of the action and the quantity of debris expected to result.

Cumulative Effects – Visitor Use and Experience

Past present, and reasonably foreseeable actions benefitting or diminishing visitor use and experience in the action area would be like those described in Alternatives 1 and 2 with the exception that the degree to which fire and fuel management activities – primarily fire suppression – benefit visitor experience is expected to be lowest under this alternative as they are less likely to occur. Adverse temporary effects from road rehabilitation traffic, project noise, and closures would be slightly lower under this Alternative than Alternative 2 due to the more limited project duration (5-7 months rather than 6-8 months) and lack of debris treatment.

Chapter 4: Consultation and Coordination

Public Scoping

The NPS solicited public feedback on the KNP Tree Hazard Environmental Assessment during a 30-day public comment period extending from July 22 through August 21, 2022.

The NPS posted the proposed action and associated review materials for public review and comment on the National Park Service's (NPS) Planning, Environment, and Public Comment (PEPC) website: https://parkplanning.nps.gov/KNPTreeHazards. The availability of the documents and the public comment period dates were announced though a press release and social media post. Public comments were accepted via U.S. mail, email, and the PEPC website.

This public scoping effort resulted in the receipt of 26 pieces of correspondence from members of the public. As well, the NPS received comments from the U.S. Fish and Wildlife Service and the Environmental Protection Agency. These pieces of correspondence were reviewed by park staff, and considered in the decision-making process and in the writing of this EA.

Consultation with Tribes

On August 10, 2022, the NPS sent a letter initiating consultation with the 14 federally recognized tribal chairs associated with the parks. The NPS also shared information about the KNP Complex Wildfire Tree Hazard Mitigation EA with an additional 17 tribal chairs recognized by the State of California. An additional 235 tribal individuals or representatives from tribal entities were also informed of the proposed action and were invited to comment on this planning process. As of the date of releasing this EA to the public, no response has been received from any tribal chair or interested party.

The NPS will also follow up with a second consultation letter to tribes in early February 2023 to notify them of the release of the EA and provide the opportunity to tribes to comment and/or meet to discuss the preferred alternative or this planning process more broadly.

The NPS will provide all comments and concerns expressed by any member of the tribal community to the SHPO per their request.

National Historic Preservation Act

The NPS has initiated consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act (NHPA) in accordance with the standard process outlined in 36 CFR Part 800.3.

In an initiation letter to the SHPO dated July 29, 2022, the NPS identified the proposed action as an undertaking with the potential to affect historic properties and the Area of Potential Effect (APE) for the project. The SHPO concurred with the NPS' determination that the project constituted an undertaking with the potential to affect historic properties and that the APE was sufficient to take direct and indirect effects into account. The SHPO requested that the NPS share any comments and concerns received during consultation including Tribal consultation.

The NPS is continuing consultation with the SHPO in February 2023, requesting SHPO concurrence with the NPS' identification of historic properties and determination that implementation of the preferred alternative would have no adverse effect to historic properties.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA), as amended, requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) on any action that may affect endangered or threatened species or candidate species, or that may result in adverse modification of critical habitat. In summer 2022, the NPS preliminarily determined the proposed action may affect endangered fisher (*Pekania pennanti*) and informed USFWS of the public scoping comment period on July 22. On August 12, 2022, the FWS formally responded to NPS scoping outreach (FWS-2022-0072726).

In their scoping response letter, the USFWS indicated their belief that the proposed project had the potential to affect fisher and as such required consultation in accordance with the *Programmatic Biological Opinion on Proposed Activities of the National Park Service that May Affect the Southern Sierra Nevada Distinct Population Segment of the Fisher* (Programmatic BO - 08ESMF00-2020-F-2011-1). As well, the USFWS recommended that the EA analyze the potential impacts to fisher from the various alternatives—which the NPS has done—and recommended several strategies to reduce impacts to fisher, which have either been incorporated into the proposed action or identified as mitigations/conservation measures, as appropriate.

On December 14, 2022, the NPS initiated Section 7 consultation under the parks' Programmatic Biological Opinion requesting USFWS concurrence that the project *may affect but is not likely to adversely affect* the fisher. The USFWS responded to the NPS on January 18, 2023, concurring with the determination that the project *may affect but is not likely to adversely affect* the fisher because (1) fishers are less likely to den within the action area due to its proximity to the road; (2) the proposed project occurs alongside roads, and fishers are likely habituated to moderate levels of noise along these roads; (3) the proposed project is within the KNP Complex Wildfire footprint and is less likely to be used by fisher for denning; (4) research to monitor fisher movement and use in the parks' will be ongoing during the proposed project's duration; and (5) the parks will implement additional conservation measures to avoid negative impacts (FWS-2022-0072726).

IDT Members and Reviewers

Sequoia and Kings Canyon National Parks

Ned Aldrich, Facilities Manager, Roads, Auto, and Trails
Jane Allen, Park Archeologist and Tribal Liaison
Elly Boerke, Program Manager, Environmental Planning and Compliance
Andrew Bishop, Restoration Ecologist, Vegetation Management
Danny Boiano, Branch Chief, Wildlife and Physical Sciences
Juanita Bonnifield, Program Manager, Cultural Resources
Tony Caprio, Fire Ecologist, Wildlife and Physical Sciences
Tyler Coleman, Wildlife Biologist, Wildlife and Physical Sciences
Andrew Cremers, Fuels Specialist (Former)
Theresa Fiorino, Environmental Protection Specialist, Environmental Planning and Compliance

Dave Fox, Sequoia District Ranger, Visitor, Fire, and Resource Protection
Josh Flickinger, GIS Specialist, Information Resources
Rebecca Green, Wildlife Biologist, Wildlife and Physical Sciences
Rick Hall, Chief, Facilities, Maintenance, and Construction
Ann Huber, Ecologist, Vegetation Management
Leif Mathieson, Fire Management Officer, Visitor, Fire, and Resource Protection
Erik Meyer, Physical Scientist, Wildlife and Physical Sciences
Marc Neidig, Chief, Division of Interpretation
Tom Warner, Program Manager, Vegetation Management

Regions 8, 9, 10, and 12

Jalyn Cummings, Physical Scientist, Air Quality Division
Eamon Engber, Regional Fire Planner
Erik Frenzel, Regional Wilderness Coordinator
Brent Johnson, Regional Vegetation Ecologist
Nick Mitrovitch, Regional Environmental Protection Specialist
Andrea Stacy, Environmental Protection Specialist, Air Resources Division
Stacy Wertman, Regional Health and Safety Wellness Manager
Rachel Wolstenholme, Regional Wildlife Biologist
Danette Nolan Woo, Regional Environmental Coordinator

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Appendix A:
Seven Point Rating System – Excerpt from PW-062

The seven point rating system is comprised of two components incorporating the following factors: (1) tree failure potential; (2) target damage potential; (3) target impact potential; and (4) target value.

The Tree or Defect Rating Value component represents an estimation of the tree's relative potential for imminent failure and its damage potential based upon an evaluation of tree condition (defect), including site factors, plus size and height of the potentially hazardous portion of the tree. There are three possible ratings, 1-3, with three representing the highest failure/damage potential. An additional point may be added for severe lean, which increases the likelihood of failure. Thus, 4 is the maximum defect rating possible, and represents a very defective (and/or predisposed to failure) tree with a severe lean which has great potential for damage and/or injury/death.

Defect ratings for high, medium, and low ratings are usually assigned and/or modified on a local/regional basis and reflect variations in species and environmental factors. The following is provided as an example and may need to be revised for local conditions:

High (3): Significant Visible Defect/Damage (Predisposed to failure w/in 3 years or before next scheduled inspection)

- Conifer crown > 70% dead; hardwood crown >50% dead
- Dead limbs 4-6" diameter > 40% of crown
- Dead limbs 6-8" diameter > 20% of crown
- Dead limbs > 8" diameter
- Live limbs with visible signs of rot or splits
- Hangers ≥ 2" diameter
- Heart rot/hollow > 70% diameter
- Multiple conks ≥ 6" wide on bole or limbs, indicating extensive heart rot
- Catface/canker > 50% circumference
- Shallow rooting/soil saturation; obvious signs of uprooting (e.g., mounding, cracking)
- Conks or mushrooms of root decay fungi at root crown, or loose bark at ground level, indicating root rot
- Characteristics (e.g., slabbing bark, extensive decay, etc.) which could result in unsafe deferred removal

Medium (2): Moderate Visible Defect/Damage (Failure unlikely within 3 years or before next scheduled inspection.)

- Reduced growth; flattened conifer tops
- Numerous scattered dead/dying limbs
- Conifer crown 30-70% dead; hardwood crown 30-50% dead
- Dead limbs 4-6" diameter 20- 40% of crown
- Dead limbs 6-8" diameter 10- 20% of crown
- Live limbs with rot, hollow, or dead areas
- Heart rot/hollow 30-70% diameter
- Single conk < 6" wide on bole or limbs

- Catface/canker 30- 50% circumference
- Proximity to identified root rot center

Low (1): Limited Visible Defect

- Reduced growth; rounded conifer tops
- Discolored and/or sparse foliage
- Conifer crown < 30% dead; hardwood crown <30% dead
- Dead limbs 2-4" diameter <20% of crown
- Dead limbs 4-6" diameter <10% of crown
- Heart rot/hollow <30% diameter
- Catface/canker <30% circumference
- Proximity to suspected root rot center

The second component is the **Target Rating** and represents impact potential and target value (monetary or possibility of injury/death). The ratings for this element are similarly rated 1-3, with 3 being the highest. A target rated 3 is one which has a high value (property or person) with a high likelihood of being impacted in event of failure. These ratings are usually more standardized with following an example:

High (3): Overnight Exposure

- Campgrounds
- Lodges, hotels, dormitories
- Residences
- 24-hour visitor service facilities

Medium (2): Daytime Exposure

- Paved trails
- Interpretive sites, such as amphitheaters, kiosks
- "High use" road networks where occupancy is "constant"
- Roadside attractions, such as vista points or historic stops
- Information stations, visitor centers, fee collection portals
- High-use facility designated parking areas; designated trailhead parking areas
- Utilities, infrastructure
- "High-use" areas with "constant" occupancy, such as plazas, staging areas, commercial sites
- Picnic areas

Low (1): Transitory Exposure

- Highway corridors
- Unimproved roads
- Turnouts
- Bicycle paths
- Structures with sporadic occupancy, such as restrooms associated with parking areas, storage buildings

Appendix B: Mitigations

General Measures

- The NPS project manager or project specialist and park superintendent would ensure that the project remains within the mitigation limits and parameters established in the compliance documents and that mitigation measures are properly implemented.
- Work zones would be signed at approach points. No work activity would be permitted outside the limits.
- All protection measures would be clearly stated in the mitigation specifications/special mitigation requirements, and workers would be instructed to avoid conducting activities beyond the mitigation limits as defined by mitigation plans or marked limits.
- A hazardous spill plan would be in place, stating what actions would be taken in the case of a spill, notification measures, and preventive measures to be implemented, such as the placement of refueling facilities, storage, and handling of hazardous materials.
- Where appropriate and available, "environmentally friendly" grease, hydraulic oil, and bar and chain oil would be used. These lubricants are vegetable or mineral oil based, less toxic, and biodegradable.
- All equipment on the project would be maintained in a clean and well-functioning state to avoid or minimize contamination from mechanical fluids as well as meeting California Air Resource Board On-Road emission requirements. All equipment would be checked daily.
- BMPs for drainage and sediment control, as identified and used by the FHWA and NPS Stormwater Pollution Prevention Plan, would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas.
- Use of BMPs in the project area for drainage area protection would include all or some of the following actions, depending on site-specific requirements:
    - Keeping disturbed areas as small as practicable to minimize exposed soil and the potential for erosion.
    - Locating waste and materials outside of drainages to avoid sedimentation.
    - Conducting regular site inspections during the mitigation period to ensure that erosion-control measures were properly installed and are functioning effectively.
    - Storing, using, and disposing of chemicals, fuels, and other toxic materials in a proper manner.
- Delays for emergency response vehicles would be kept to a minimum by having the emergency responders notify the traffic monitors via park radio/frequency immediately when the vehicle is dispatched, thus allowing approximately 10 minutes to clear the road before the arrival of the emergency vehicle.

Air Quality and Natural Soundscapes

- Dust control would occur, as needed, on active work areas where dirt or fine particles are exposed using water from developed sources.
- Mitigation debris would be hauled from the parks to an appropriate disposal location.
- Visitors would be asked to not idle their vehicles while waiting for the traffic delay to be reopened.
- Heavy equipment and vehicles would meet or exceed standards set by the EPA: EPA Emission Standards for Heavy-Duty Highway Engines and Vehicles | US EPA.

- The following measures would be taken to limit emissions and sound disturbance from vehicles and mitigation equipment:
    - Contractors would be required to properly maintain mitigation equipment (i.e., mufflers) to minimize noise from equipment use and follow California state idling regulations/laws.
    - Equipment would not be allowed to idle longer than necessary.
    - Prohibit engine tampering to increase horsepower, except when meeting manufacturer's recommendations
    - Use lower-emitting engines and fuels, including electric, liquified gas, hydrogen fuel cells, and/or alternative diesel formulations, if feasible.
    - Locate diesel engines, motors, and equipment staging areas as far as possible from residential and visitor use areas.
    - Prepare an inventory of all equipment prior to construction and identify the suitability of add on emission controls for each piece of equipment before start of project.
    - Reduce construction-related trips of workers and equipment, including trucks.
    - Develop a construction traffic and parking management plan that minimizes traffic interference and maintains traffic flow.
    - All motor vehicles and equipment would have mufflers conforming to original manufacturer specifications that are in good working order and are in constant operation to prevent excessive or unusual noise, fumes, or smoke.
    - Mufflers and sound attenuation devices (such as rubber strips or sheeting) would be installed and maintained on all equipment, if feasible. This includes truck tail and other gate dampeners (both opening and closing) for all dump trucks in the project area.
    - Use of air horns within the park would be limited to emergencies only.
    - Project activities would be limited to the hours of 8am – 5pm.

Pile Burning

- A smoke management plan would be submitted for approval to the SJVUAPCD seven days in advance of burning.
- New ignition would not occur on "No Burn Days" unless necessary for safety and holding purposes or otherwise approved by the SJVAPCD.
- Ignition would cease if smoke impacts exceed approved levels and until more favorable smoke dispersion conditions develop.
- Aggressive mop-up tactics would be considered and implemented as needed to mitigate an established smoke impact problem.
- Piles would be built teepee shaped and be built a minimum of three feet and a maximum of six feet high no more than 15 feet wide.
- Piles would not be built within 15 feet of a residual green tree in downhill or sidehill direction of the pile, and at least 20 feet from any residual green tree upslope of the pile.

Aquatic Resources – Including Wetlands and Water Quality

- Trees would be felled directionally away from waterways to the maximum extent feasible.
- Debris treatment activities would not occur within 100 feet of riparian zones.
- Piles would be located at least 30 feet away from any riparian area or meadow.

- Protect stream courses on steep slopes from deposits of sediment using erosion control mechanisms as necessary.
- Debris would be treated in such a way as to minimize skidding and dragging.
- Locate machinery servicing and refueling areas away from streambeds and washes to reduce the possibility and minimize the impacts of accidental spills or discharges.
- Ensure that spill plans are up to date and have spill kits at staging areas for quick use if needed.
- Immediately clear ephemeral drainages and culverts of debris or other obstructions placed by or resulting from tree felling operations.
- Ensure that culverts are not blocked with debris creating barriers to upstream or downstream passage of amphibians/aquatic species.
- Water needed for mitigation and dust control would come from the existing developed water systems within the parks and would not be diverted from surface waters.
- Project activity in or within 30 ft of riparian areas, wetlands, including meadows and other wetlands, would be avoided.
- In the event trees are felled into wetlands, the portions of the trees that fall within these habitats would be left in place undisturbed.
- Appropriate permits (404 permit and 401 certification) would be acquired should there be any anticipated impacts to wetlands or waterways that require a permit.

Cultural Resources

- Known historic sites and isolated occurrences would be flagged and avoided during mitigation, and a NPS archeologist would be on-site during the entire ground disturbance near the site.
- Protection of Archeological Remains: In the event of the inadvertent discovery of historic properties such as archeological resources, suspected human remains, funerary objects, sacred sites, or objects of cultural patrimony, the cultural resources branch chief, park archeologist and superintendent would be immediately notified. Work in the affected area(s) would stop immediately until the historic properties are reviewed by the park. As appropriate, consultation with the California SHPO and American Indian tribes would also take place regarding disposition of affected artifacts and remains as per 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). During consultation, reasonable measures would be taken to protect the discovery site, including any appropriate stabilization, or covering; to ensure the confidentiality of the discovery site; and to restrict access to the discovery site. Depending on the location of the discovery, security may be warranted.
- Should unknown archeological resources be uncovered during mitigation, work would be halted in the discovery area, the cultural resources branch chief would be notified immediately, the site would be secured, and appropriate parks' staff would consult with the California SHPO and affiliated tribes.
- In compliance with the NAGPRA, the NPS would also notify, and consult concerned American Indian tribal representatives for the proper treatment of human remains, funerary, and sacred objects should these be discovered during project mitigation.
- Archeological specimens found within the mitigation area would be removed only by cultural resources staff or their designated representatives.

Dark Skies

- Work shall not occur at night unless specifically authorized.
- Any lighting used for night work, if approved, would follow NPS night sky guidelines (Sustainable Outdoor Lighting - Night Skies (U.S. National Park Service) (nps.gov)).

Fuel Loading

- Whenever feasible, retain a minimum of roughly three, and no more than roughly five logs, 12 inches in diameter or greater, along each 100-foot section of road. In cases where number of logs onsite already meets or exceeds this standard, all additionally felled trees would be removed.
- Space logs a minimum of roughly 20-30 feet apart to the maximum extent feasible. If feasible, trees would be felled directionally to achieve appropriate spacing.
- Retain the largest logs available over 12 inches in diameter along each treated section unless smaller logs were marked for retention.
- Preferentially retain logs furthest from the roadway along each roadway section if multiple large logs are available.
- Felled logs slated for retention may be stacked up to two logs high if they lie roughly perpendicular to one another and rough spacing of a minimum 20-30 feet on average is otherwise attained.
- Fell trees not slated for removal directionally away from the road in a manner that prevents buildup of roadside fuels and ensures logs are spaced apart to break up fuel continuity.
- Do not leave jackpots.

Health and Safety

- Tree hazard signage would continue to be posted in locations where high numbers of tree hazards pose a safety risk.
- Tree hazards on slopes uphill from roadways, or where they would otherwise create a hazard should they roll downhill, would be felled perpendicular to the slope to the maximum extent feasible.
- If needed, minimum acceptable visibility and speed limits, or traffic control, for all public roadways would be enforced by speed limit signs or traffic controllers during pile burning.
- Traffic monitors would have park radios with the appropriate park frequency, appropriate safety clothing, and reflective signs.
- Visitors and NPS staff would not be allowed to stop/park in a pullout or on the road in the active mitigation zone. Emergency vehicles would be allowed on an as-needed basis.
- Visitors and local communities would be notified, in English and Spanish, if smoke impacts from pile burning were anticipated.

Migratory Birds

- Project would be implemented over the shortest timeframe feasible.
- To the extent feasible, work would be conducted outside the nesting season (all birds 1 February – 1 August; raptors 1 February – 1 August).
- If work is to occur during this time, nesting surveys would be conducted before any activity occurring within 500 feet of suitable nesting habitat.
    - Surveys shall be timed to maximize potential to detect nesting migratory birds and should be repeated within 5 days of the start of project-related activity.
- A minimum 500-foot buffer would be implemented around any active special-status species nest.
- If an active bird nest of other bird species is found an appropriate no-disturbance buffer shall be determined by the park terrestrial ecologist based on site-specific conditions, the species of nesting bird, nature of the project activity, noise level of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances.
- If establishing a buffer zone is not feasible, contact the U.S Fish and Wildlife Service for guidance to minimize impacts to migratory birds associated with the proposed project.
- Monitoring of active nests by the park terrestrial ecologist during construction activities would be required. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer would remain in place until the chicks have fledged or as otherwise determined by the park terrestrial ecologist.

Park Operations and Management

- Once the winter season halts mitigation, the turnouts should be cleared of all mitigation storage equipment and materials.
- Delays for emergency response vehicles would be kept to a minimum by having the emergency responders notify the traffic monitors via park radio/frequency immediately when the vehicle is dispatched, thus allowing approximately 10 minutes to clear the road before the arrival of the emergency vehicle
- Protect existing asphalt and utilities by use of bumper logs if a fall is directed towards the road.
- All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion.
- Any asphalt surfaces damaged during mitigation of the project would be repaired to original conditions.
- All demolition debris would be removed from the project site and disposed of outside the park in an approved location.

Soils

- Treated logs and debris would be removed from felling location in a manner that prevents skidding or dragging to the maximum extent feasible.

Threatened and Endangered or Special Status Species

California Spotted Owl

- Where feasible, tree removal would not be conducted between March 1-August 15 in known owl territories.
- If project work need occur within this timeframe, known territories would be surveyed for active owl nesting and roosting prior to acting. Surveys would be conducted in April of each year where project activity occurs.
- If nesting or roosting sites are detected, no action would occur within a 0.25 miles buffer until after August 15th unless a wildlife biologist determines the owl pair is no longer nesting or non-reproductive.
- No trees identified as being used for nesting would be removed.

Fisher

- The park wildlife biologist (or trained wildlife technician) would teach NPS work crews how to identify high quality potential den trees and cavities based on characteristics (e.g., dbh, decay, tree species) documented in previous studies (Green et al. 2019).
- The park wildlife biologist (or trained wildlife technician) would provide NPS and contracted work crews with materials to instruct them how to identify fisher and provide additional training when feasible and/or as needed.
- KNP tree hazard mitigation would be conducted outside the fisher denning LOP (March 1 – June 30) to the maximum extent feasible.
- KNP tree hazard mitigation proposed to occur during the fisher denning LOP (March 1-June 30) would be conducted only in areas where the wildlife biologist determines fisher are unlikely to be present (e.g., pre-determined high severity burn areas, or areas outside of suitable habitat) with the exception that high priority trees may be removed in other areas under the following conditions:
    - If trees identified as having denning characteristics were proposed for removal during the LOP in areas where the park wildlife biologist determines fisher are potentially present, NPS crews would evaluate the tree for recent fisher "sign" (e.g., fresh scat, tracks in snow, squirrel tail, hairs at cavity entrance) and contact the wildlife biologist for a secondary assessment prior to the individual tree's removal.
    - Crews would provide relevant information regarding the tree to the wildlife biologist including a photo showing scale. Assessment of individual trees could occur in person or using the photo and information provided (with subsequent follow-up if needed).
    - If a tree is confirmed as a potential den tree, it would not be removed during the LOP unless it posed an immediate safety risk that could not otherwise be mitigated through safety signage or other measures.
    - If active dens were identified in the course of project work, work crews would be immediately notified, and all work would cease, following, at a minimum, the restricted work guidelines near den clusters outlined in the Programmatic Biological Opinion.
    - If work is proposed during the LOP in 2024 through 2026, in addition to the above measures, park biologists would use any new monitoring data gathered during 2023 that might confirm fisher presence in project area or likelihood of fisher use prior to authorizing work.
    - If work is conducted during LOP near any potential den trees, it would not occur during early morning and evening to avoid disturbing fisher when they are likely to be leaving or returning to a den tree with kits. Hours would vary depending on time of season and would be determined in consultation with the wildlife biologist.

- If a fisher is spotted moving through the forest, work crews would be instructed to stop work until the animal moves on without harassment.
- If a fisher is spotted in, on the trunk of, or near a hazard tree that is marked to be felled (i.e., may have just climbed down, remains in area, or appears interested in climbing up), work would cease until the animal moves on without harassment. The wildlife biologist should be contacted for guidance as this could indicate a den tree with kit(s) inside (remote cameras could potentially be used to confirm one way or another).
- Chipping activities, which would cause consistent noise (more than 4 hours each day for more than one day, particularly if completed before 10:00AM or after 3:00PM) in areas where human disturbance is not already present (e.g., in areas that have been closed to the public for an extended period of time) would not occur between March 15 and April 30, and would largely be avoided between May 1 and June 30, except where the wildlife biologist has determined in advance that impacts to fisher are not likely based on site specific conditions (e.g., high severity burn areas, or areas outside of suitable habitat).
- Fungicides to treat cut tree stumps would be non-toxic (e.g., Cellu-Treat) and must dry within 8 hours of application.

Vegetation – General

- All equipment would remain on disturbed gravel or paved roadway surfaces within the road prism.
- No machinery or equipment should access areas outside the mitigation limits.
- No trees or other plants would be removed or injured without prior approval.

Vegetation – Exotic Species

- Remedial actions would include controlling nonnative plant species with herbicide.
- Minimize soil disturbance.
- Pressure wash and/or steam cleaning all mitigation equipment to ensure that all equipment and machinery are cleaned and weed free before entering the parks.
- Equipment would be inspected by NPS staff prior to entering the parks to ensure compliance with cleanliness requirements; inadequately cleaned equipment would be rejected.
- Limit disturbance to roadsides and culvert areas.
- No hay or straw bales would be used for temporary erosion control.
- Staging areas outside the park would be inspected for invasive plants and approved prior to use.
- Survey for and treating invasive plants for one to three years after mitigation.

Vegetation – Special Status Plants

- Populations of special status plant species growing adjacent to the project area would be protected by limiting disturbance to the actual project footprint when working in the vicinity of the plant.
- Locations where burn piles would be built would be surveyed and populations mapped, and locations shared with the park CO. Where feasible these locations would also be flagged.
- Burn piles would not be built on top of known special status plants populations.

Visitor Experience

- A detailed traffic control plan would be implemented to minimize impacts on visitors and complete mitigation work as quickly and efficiently as feasible.
- Extended closures would occur only on weekdays and shoulder seasons when visitation is reduced.
- Extended closures along the Generals Highway and Mineral King Road would be staggered to avoid cumulatively impacting visitors traveling to several areas of the parks.
- Visitors would be notified when road closures or traffic delays would occur and information would be posted in neighboring communities, on the park web pages, on social media, at visitor centers, and at entrance stations.
- At the traffic delay locations, and if conditions warrant, a NPS interpretive ranger would be present to answer questions from visitors and advise them of procedures and mitigation expectations.
- No work would take place between 5:00 pm Fridays and 9:00 pm Sundays without prior approval.
- Debris treatment would be conducted in a manner that reduces the visibility of cut ends and produces a gradual transition between treated and untreated areas.

Wildlife – General

- Mitigation personnel would be informed of the occurrence and status of special status species and would be advised of the potential impacts on the species and penalties for taking or harming a special status species.
- Contractors must attend park-led training on food storage and garbage removal.
- Feeding or approaching wildlife would be prohibited.
- Any wildlife collisions would be reported to park personnel.
- The park biologist or ranger would be notified if bears loiter in the area or if fisher sightings occur.
- A litter-control program would be implemented during mitigation to eliminate the accumulation of trash.
- A dedicated individual would be assigned the duty to patrol the project site and ensure litter does not exist and beverage items are stored properly. At the end of each shift the said individual is assigned the responsibility to ensure staff has complied with regulations by disposing and securing litter in proper receptacles.
- All food would be stored in bear-proof containers.
- Food in vehicles would be stored in bear-proof containers.
- Spilled food would be cleaned up.
- Dispose of waste at least once a week at appropriate dumps outside of Sequoia and Kings Canyon National Park subject to State, County, and local regulations.
- Visitors in traffic delays would be instructed by NPS staff, when available, to not approach or feed wildlife.

Appendix C: Relevant Law and Policy

The Organic Act of the National Park Service

"Sec.1. …. The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is 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."

Parks' Enabling Legislation

Sequoia National Park Enabling Act of 1890: Preamble: "…dedicated and set apart as a public park, or pleasure ground for the benefit and enjoyment of the people…"

Kings Canyon National Park Enabling Act of 1940: Sec. 3. "That the National Park Service shall… administer for public recreational purposes the lands withdrawn."

Federal Tort Claims Act

Under the Federal Tort Claims Act of 1946 (28 USC 2671-80 and 1346 (b)), the Service is responsible to reasonably protect visitors as invitees to parklands. The landowning agency can be held liable for any loss of property, personal injury or death which was caused by the negligence with respect to visitor protection. As detailed in the Natural Resource Management Guidelines (NPS-77), the impetus for tree hazard management derives from aspects of that liability.

The Federal Tort Claims Act requires landowning agencies to have superior knowledge of dangers which would not be obvious to the visitor if such dangers are discoverable in the exercise of due care. The agency is then responsible to take reasonable care to avert harm to visitors from such dangers.

Reasonable care may take the form of either mitigation or abatement. Inaction is generally excusable when the agency is unaware of a hazard, provided the agency has exercised due care by putting a reasonable hazard identification program in place. But once an agency is aware of a hazard, action is required.

Reasonable care may take the form of action and/or warnings. Harvey and Hessburg (1992) address the issue of when warnings are acceptable in *Long-Range Planning for Developed Sites in the Pacific Northwest: The Context of Hazard Tree Management.* As documented in that publication, courts have held that informing the public of dangerous conditions does not eliminate liability when a fee is charged by the manager of the site. Furthermore, responsibility to actively minimize tree hazards is roughly proportional to the degree of development at the site.

Numerous court decisions have held that failure to conduct periodic tree hazard inspections and to correct reasonably detectable tree hazards exposes site managers to lawsuits and claims when damage to people or property occurs. In general, the public expects that public facilities will be as safe and as free of hazards as possible. A prudent, well-documented hazard reduction program can greatly reduce the liability of the site manager when injury or loss occurs.

Occupational Safety and Health Act

The Occupational Safety and Health Act places a similar burden on federal agencies in their role as employers. Section 5(a)(1) of the act (a.k.a. the General Duty Clause) requires an employer to furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees. OSHA standard 29 CFR 1960.8(a) explicitly establishes this as a basic responsibility of each federal agency. If a hazard exists, citations may be issued under this standard when the following criteria are met:

- The employer fails to keep the workplace free of a serious hazard.
- The hazard is or should have been recognized by the employer.
- There is a feasible and useful method to correct the hazard.

Native American Graves and Repatriation Act (NAGPRA)

Since 1990, Federal law has provided for the repatriation and disposition of certain Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony. By enacting NAGPRA, Congress recognized that human remains of any ancestry "must at all times be treated with dignity and respect." Congress also acknowledged that human remains and other cultural items removed from Federal or tribal lands belong, in the first instance, to lineal descendants, Indian Tribes, and Native Hawaiian organizations. With this law, Congress sought to encourage a continuing dialogue between museums and Indian Tribes and Native Hawaiian organizations and to promote a greater understanding between the groups while at the same time recognizing the important function museums serve in society by preserving the past.

OSHA Corrective Action Plan

A tree failure in Grant Grove killed a firefighter in 2004. As a result of that fatality, the park was cited by OSHA under the General Duty Clause for failure to provide a safe workplace free from recognized hazards. In response, the park prepared the 2005 Corrective Action Plan which was accepted by OSHA. One of the requirements of that plan was for the NPS to prepare a nationwide job hazard analysis (JHA) that would identify and deal with tree hazards. That JHA was prepared and approved by the NPS in 2005. Under that JHA, tree hazards will be avoided wherever possible. When such abatement is not feasible, the tree hazard will be directly mitigated through limbing or felling.

Management Policies 2006

The National Park Service has several sources of detailed written guidance to help managers make day-to-day decisions. The primary source of guidance is the 2006 edition of Management Policies, which is also the foremost element of the Service's directives system.

Management Policies 2006 addresses the management of hazards in national parks and the deposition of resulting woody debris. The Service recognizes that the park resources it must protect are not only a visitor attraction, but that they may also be potentially hazardous.

Under Section 4.4.2 of the management policies, the Service may intervene to manage populations or individuals of native species only when (1) 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 and (2) when management is necessary for at least one of the following conditions [only applicable conditions cited]:

- To protect specific cultural resources of parks.
- To accommodate intensive development in portions of parks appropriate for and dedicated to such development.
- To protect property when it is not possible to change the pattern of human activities.
- To maintain human safety when it is not possible to change the pattern of human activities.

Section 4.4.2.5 of the management policies states that a historic tree that is diseased beyond recovery and has become hazardous will be removed.

Sections 4.1.5 and 9.1.1.5 states that trails and other facilities should be sited outside of hazardous areas wherever practicable (i.e., abate the risk). Facilities that are damaged by a hazardous natural event will be thoroughly evaluated for relocation at a different location that is removed from the hazard. When a facility must be located in a hazardous area, it will be designed and sited to avoid or mitigate the risks to human life and property.

Section 8.2.5.1 establishes the policy for visitor safety. The saving of human life will take precedence over all other management actions as the service strives to provide for injury-free visits. The Service will do this within the constraints of the 1916 Organic Act. The primary — and very substantial — constraint imposed by the Organic Act is that discretionary management activities may be undertaken only to the extent that they will not impair park resources and values.

The Service and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The Service will strive to identify recognizable threats to the safety and health of persons and to the protection of property. When practicable, and consistent with congressionally designated purposes and mandates, the Service will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education.

Section 8.8 states that "Natural resource products that accumulate as a result of site clearing for development, hazard tree removal, vista clearing, or other management actions will be recycled through the ecosystem when practicable. *When recycling is not practicable, the products may be disposed of by other means. Disposal may be accomplished by contract, if the result of the work done under contract and the value are calculated in the contract cost, or by sale at fair market value in accordance with applicable laws and regulations* [emphasis added]. Wood that accumulates as a result of the management actions described above may also be used for park purposes, such as heating public buildings or offices or for interpretive campfire programs."

Section 9.2.1 states that "park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience."

Section 9.2.1.1 states that "the purpose of park roads is to enhance visitor experience by providing access to park facilities, resources, and recreational opportunities. Park roads are not intended to provide fast and convenient transportation, but rather to access areas of recreation while being sensitive to the natural and cultural resources in the area.

Occupational Safety and Health Program (DO-50B)

Under this director's order, parks must identify recognizable threats to employee safety and health and to the protection of property. Where practicable and not detrimental to the Service mandates to preserve park resources, known hazards must be reduced or removed. The superintendent is charged with identifying, evaluating, and controlling occupational health hazards. In the event that an imminent danger condition is found, corrective/protective action will be immediately initiated.

Risk management program elements that are fundamental to an effective safety and occupational health program and for the achievement of Service-wide GPRA goals addressing safety, health, and workers' compensation case management include:

- Identification of existing or potential hazards in the workplace.
- Regular work site inspections with written documentation as required.
- Mitigation of identified hazardous conditions and unsafe work practices.
- Documentation of all identified hazards until controlled or eliminated.
- Visitor protection from all identified hazards which park operations create or should reasonably control.

Public Risk Management Program (DO-50C)

This director's order confirms that the saving of human life takes precedence over all other management actions. The Service will strive to protect human life and provide for an injury-free visit, doing so within the constraints of the 1916 Organic Act and available resources.

The Service (specifically the park superintendent) will strive to minimize the number and severity of visitor incidents. Through risk assessments, park areas will develop appropriate mitigation strategies, which may include elements of communication, education, facility design, and facility maintenance.

The park will strive to locate, design, build, operate and maintain facilities so as to minimize hazards. All visitor facilities will be inspected on a regular basis to identify and mitigate unsafe conditions. If it is not possible to correct an unsafe condition, the park will take reasonable action to protect the public from that condition.

Natural Resource Protection (DO-77)

These guidelines confirm that the Service is responsible to reasonably protect visitors as invitees to parklands. The Service must seek to reasonably protect visitors from unnecessary risks resulting from tree hazards. The program should be directed toward the public welfare. A tree hazard reduction program provides a systematic method for mitigating tree hazards to avert damage to people and property.

NPS- 77 identifies the need for park tree hazard management plans: "Even though any tree or portion of a tree may present some degree of risk or hazard to visitors, employees and property simply by its proximity, in most cases only such trees that are determined to possess a structural flaw or structural defect may be deemed hazardous … The need for these plans arises from the responsibility of the NPS to reasonably protect visitors as invitees to parklands. Failure to do so could make the NPS liable … A deliberate effort by the NPS to manage for tree hazards will reduce the risks and liability by avoiding vulnerability to claims of negligence or breach of duty." The order specifies that each park containing trees should prepare a tree hazard management plan. Tree hazard plans are action plans and are part of the park's natural and cultural resources management plan.

Management of Tree Hazards Directive (PW-062)

This directive establishes guidelines for a common approach to tree hazard management throughout the Pacific West Region under the authority of 16 U.S.C. Sections 1-4 (the National Park Service Organic Act). It prescribes a rating system that provides a logical basis of judging relative degrees of hazards and assigns priorities for management actions.

Regular inspection of developed areas is required. Once a hazardous condition is detected, it must be monitored for the duration of potential exposure to the hazardous condition. If for reasons of insufficient work force, inadequate funding, or some other management constraint, these scheduled surveillance and examination schedules cannot be achieved, the superintendent will ensure public notification about the risk of exposure to known hazardous conditions. Where seven-ratable hazards (e.g., high defect, predisposing lean, and overnight target) potentially may be involved, prompt closure of such areas to public entry must be undertaken.

Once a hazardous condition is detected and rated, exposure should be reduced either through abatement (removing target) or mitigation. Known hazards should generally be isolated from public use by closing the facility, relocating it, or restricting its use. Otherwise, the hazardous condition should be directly mitigated.

In addition, PW-062 provides supplemental guidance on treatment of debris resulting from mitigation efforts under the authorities of 48 CFR Part 1437, and 16 U.S.C Section 54, and in alignment with NPS Management Policies, 2006 Section 8.8.

"Whenever possible, consideration should be given to recycling felled hazard trees into the ecosystem in place, except where the trees will inhibit use of the area, *create unacceptable fuel loads*, will contribute to unacceptable pest infestations, are incompatible with the historic scene, or where they have been approved for use in maintenance projects [emphasis added]. Lopping, burning, or chipping may facilitate recycling of biomass into the ecosystem.

"*In situations where large numbers of trees have been felled*, *some trees may need to be removed while some are left on the site. When mitigation results in volumes of woody debris that exceeds the amount that can reasonably be recycled naturally in place, site rehabilitation requires disposal of the excess. This can entail lopping and scattering limbs on site, piling, and burning on site, broadcast chipping, chipping and hauling, hauling woody debris to a burn pit for burning, administrative use, donation to Tribal or other appropriate organizations, sale as firewood, or sale as saw logs* (16 U.S.C. Section 54 (Sale of matured, dead, or down timber) [emphasis added]."

The Department of the Interior allows and encourages contractors to remove and use woody biomass from project areas when: (1) The biomass is generated during land management service contract activity; and (2) Removal is ecologically appropriate (*48 CFR Part 1437*).

Contracting instruments for biomass removal include:

- Timber Sale (value of biomass removed subsidizes work and results in payment to U.S. Treasury).
- Stewardship Contract (value of biomass removed subsidizes work; excess value may be applied to other stewardship contracts.)
- Personal-Use Permits (allow for gathering of marginal-value biomass such as firewood, posts and poles, etc.; permits may be free or low-cost.)
- Service Contracts (economic value of biomass treated insignificant; contractor paid for efforts; should maintain the option for contractor removal of woody biomass (48 CFR 1437.7202), where ecologically appropriate.)

Relevant Park Planning Documents

General Management Plan

The parks' General Management Plan (GMP) was finalized in 2006 and the Record of Decision became final in 2008. One of the parkwide desired conditions established by the GMP was: "When practicable and not detrimental to NPS mandates to preserve park resources, known hazards will be reduced or removed. When providing for persons' safety and health is inconsistent with congressionally designated purposes and mandates, or impracticable, efforts will be made to provide for such safety and health through other controls, including closures, guarding, signing, or other forms of education."

The GMP goes on to state that: "Tree crews assess the condition of trees in developed areas, and those that pose a public safety hazard are removed on a priority basis. Storms, wind, insects, and disease all cause tree maintenance work. Because sequoia trees have shallow root systems, they have been known to topple without warning, and leaning sequoias are closely monitored."

Desired Conditions – High Use Scenic Driving

High-use scenic driving corridors provide sightseeing opportunities in areas of natural beauty, offer scenic views, and connect heavily visited park features and visitor service areas. Roads are paved; they may be subject to winter closures High–use scenic driving (Example: Generals Highway).

Appropriate activities include pleasure driving, sightseeing (with opportunities to stop at viewpoints and features), bus touring, picnicking, and photography. Activities related to using transit shuttles, such as parking and queuing, may occur.

Vegetation Management Plan Addendum

The 1997 Tree Hazard Management Addendum to the 1987 Vegetation Management Plan provides specific and detailed guidance for management of the tree hazard program. The addendum recognizes that not all risks can be removed; a certain level of risk must be accepted.

It recognizes that nearly all trees possess some probability of failure. Tree hazard management becomes a compromise between control cost, aesthetic value, and expected accident losses. The addendum establishes a desired future condition of providing a relatively safe environment for human use and enjoyment. Management action is required whenever there is an identified high priority tree hazard.

The tree addendum specifies that certain categories of trees (i.e., "old-growth", high-value specimen trees, sequoia trees along trails, and marker trees in historic districts or cultural landscapes) should be retained as long as the hazard remains at an acceptable level. The risks should generally be reduced through abatement or pruning rather than by felling the tree. For example, when giant sequoia trees present a severe hazard to nearby trails, the trail should be closed or relocated.

The addendum primarily deals with tree hazards in the frontcountry. But it also calls for inspecting and treating high priority tree hazards in backcountry administrative sites (patrol cabins), designated historic structures, concession-operated facilities (Bearpaw Meadow), designated campsites, and designated high-value bridges.

Fire and Fuels Management Plan 2003 (FFMP) (as amended)

The FFMP outlines broad direction for fire and fuels management activities. Relevant to this project, the FFMP summarizes tools used to achieve fuel loading objectives and locations where such treatment may be appropriate or necessary.

"Manual fuel reduction is the use of hand-held manual equipment to cut grass, and cut and remove woody fuels, either standing or downed. Removed fuels may be chipped, lopped and scattered, or prepared for burning through piling. Manual treatments are intended to help in achieving resource management objectives, most often a combination of ecosystem restoration and reduction of high hazard fuel loading objectives. "

"In addition to achieving structural goals, *manual treatment may also be conducted with the primary goal of creating a defensible space zone*. This type of work would focus on removal of lower limbs and brush to *break-up fuel continuity and decrease fuel ladders*. *Front country developed areas where manual treatment* is used to create defensible space include, but is not limited to visitor centers, campgrounds, parking lots, picnic areas, interpretive areas, lodging, park housing, *transportation corridors (designated roads and trails)*, and similar areas [*emphasis added*]."

Appendix D: Definitions

Abatement – is the indirect control action to remove hazard by removing target.

Archeological Site (parks' definition per Hull and Mundy 1985:

1. A concentration of at least five objects (historic and prehistoric materials) within a 500 m^2 area (i.e., 20 x 25 m).
2. A single feature and one associated artifact.
3. A stationary milling feature with more than a single mortar or milling slick.
4. Rock modifications such as pictographs or petroglyphs.

Debris – is any woody material resulting from tree hazard mitigation efforts including slash, brush, and logs (boles).

Defect – is an imperfection or condition of the tree that may have been caused by growth, disease, insects, decay, fire, wind, or physical injury/wounds or environmental factors.

Fire Effects – refers to the impact of fire biological and physical components of an ecosystem, that include plants, wildlife, soils, hydrology, air, soundscapes. Fire effects are further defined as short-term (1st order, the immediate impacts of the fire) or long-term (2nd order) (Higuera 2020, Reinhardt and Dickerson 2010).

Fuel Loading – refers to the amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total and is usually dry weight (nwcg.org).

Dry Climate Shrub & Timber Understory Fuel: FB10 (TU 10) – dead down fuels include greater quantities of 3-inch or larger limbwood resulting from over maturity or natural events that create a large load of dead material. Crown fire and spotting is more frequent in this fuel situation.

Hazard Tree/Tree Hazard – any tree, either alive or dead, which, due to outwardly visible defects, has potential to fail (in part or in its entirety) and strike a person or property within a developed area. Hazard incorporates not just the condition of the tree but also the potential target. If there is no identifiable target, then a tree is not considered hazardous (see PW-62).

Mitigation – direct control action, including removal or limbing/topping of tree hazard to reduce or eliminate hazard.

Road prism – all parts of a road including cut banks, roadside drainages, ditches and channels, road surfaces, road shoulders, guard-walls, and road fills.

Slash – in this Environmental Assessment, slash refers to all woody debris under eight inches in diameter.

Slash Blowdown Fuel FB13 (SB 13) – fuels where fire is generally carried across the area by a continuous layer of slash. Large quantities of greater-than-3-inch material are present. Active flaming is sustained for long periods and firebrands of various sizes may be generated. These contribute to spotting problems. Situations where the slash still has "red" needles attached but the total load is lighter, more like model 12, can be represented because of the earlier high intensity and quicker area involvement.

Slash Blowdown Fuel SB2 (SB 202) – the primary carrier of fire is moderate dead and down activity fuel or light blowdown. Fine fuel load is 7 to 12 t/ac, evenly distributed across 0-0.25-, 0.25-1-, and 1–3-inch diameter classes, depth is about 1 foot. Blowdown is scattered, with many trees still standing. Spread rate is moderate; flame length moderate.

Slash Blowdown Fuel SB4 (SB 204) – the primary carrier of fire is heavy blowdown fuel. Blowdown is total, fuelbed not compacted, most foliage and fine fuel still attached to blowdown. Spread rate very high; flame length very high.

Target – the object, structure, or person that potentially may be hit or impacted by a tree failure.

Jackpot – concentration of fuels, both horizontally as well as vertically.

Windrow – slash that has been piled into long continuous rows.