

INTRODUCTION

PURPOSE AND NEED

BACKGROUND

The Crabtree, Rae Lakes, and Le Conte ranger stations are located on the John Muir/Pacific Crest Trail, the most heavily used wilderness trail in Sequoia and Kings Canyon National Parks. Each year, tens of thousands of backpackers and stock users travel all or part of this trail. Wilderness rangers operating from these stations carry out daily hikes of their patrol area, and monitor and rehabilitate wilderness resources during the three or more months they are stationed there. Rangers at each station contact, educate, and assist 2,000 to 4,000 visitors per year, conduct 50 to 100 search and rescue (SAR) operations, and perform more than 100 medical assists for visitors in the wilderness. In addition, under a cooperative agreement, the Crabtree station is used for winter snow surveys by the California Department of Water Resources (DWR) under its Cooperative Snow Surveys program.

For the past 60 years, rangers have been based from ranger stations located in the parks wilderness during the summer season to carry out the parks' wilderness stewardship mandate by providing wilderness resource protection and appropriate visitor services. The regular and extended presence of rangers in the wilderness of Sequoia and Kings Canyon National Parks is instrumental in the preservation of wilderness character and the subsequent experience of wilderness users. In the past 30 years, the effectiveness of this program has diminished as cabin maintenance has increased.

Two of the ranger stations (Le Conte and Rae Lakes) considered in this environmental assessment (EA) are in Kings Canyon National Park and one (Crabtree) is in Sequoia National Park (figure 1). The parks are collectively referred to as Sequoia and Kings Canyon National Parks throughout this document. The existing stations are deteriorating and approaching the end of their lifespan. As a result of the deteriorating structures, rangers must spend considerable and increasing time on maintenance of the stations. This results in less time performing wilderness stewardship and visitor protection activities. In addition, the stations are not in compliance with wilderness aesthetics or the Sequoia and Kings Canyon National Parks' *Sequoia and Kings Canyon National Park: Architectural Character Guidelines* (NPS 1989), which define the architecture style appropriate for construction and development within the parks (appendix A). During winter operations, the stations are marginally functional and do not meet health and safety standards. If these facilities are going to continue to be used for the administration of wilderness, replacement or repairs are necessary. The situation at Rae Lakes is particularly acute in that the wooden tent frame has deteriorated and the station is no longer functional.

Sequoia and Kings Canyon National Parks' total designated wilderness is 807,962 acres—approximately 93.4% of the parks' total acreage of 865,257. In addition, there is approximately 30,000 acres of proposed wilderness that is managed as wilderness in accordance with National Park Service (NPS) policy. Because of the large area and remoteness, wilderness ranger stations are used to provide an operating base for wilderness patrol rangers. Wilderness ranger activities provide for the stewardship of the wilderness resource, monitoring of the parks' biotic community, protection of resources, and visitor services.

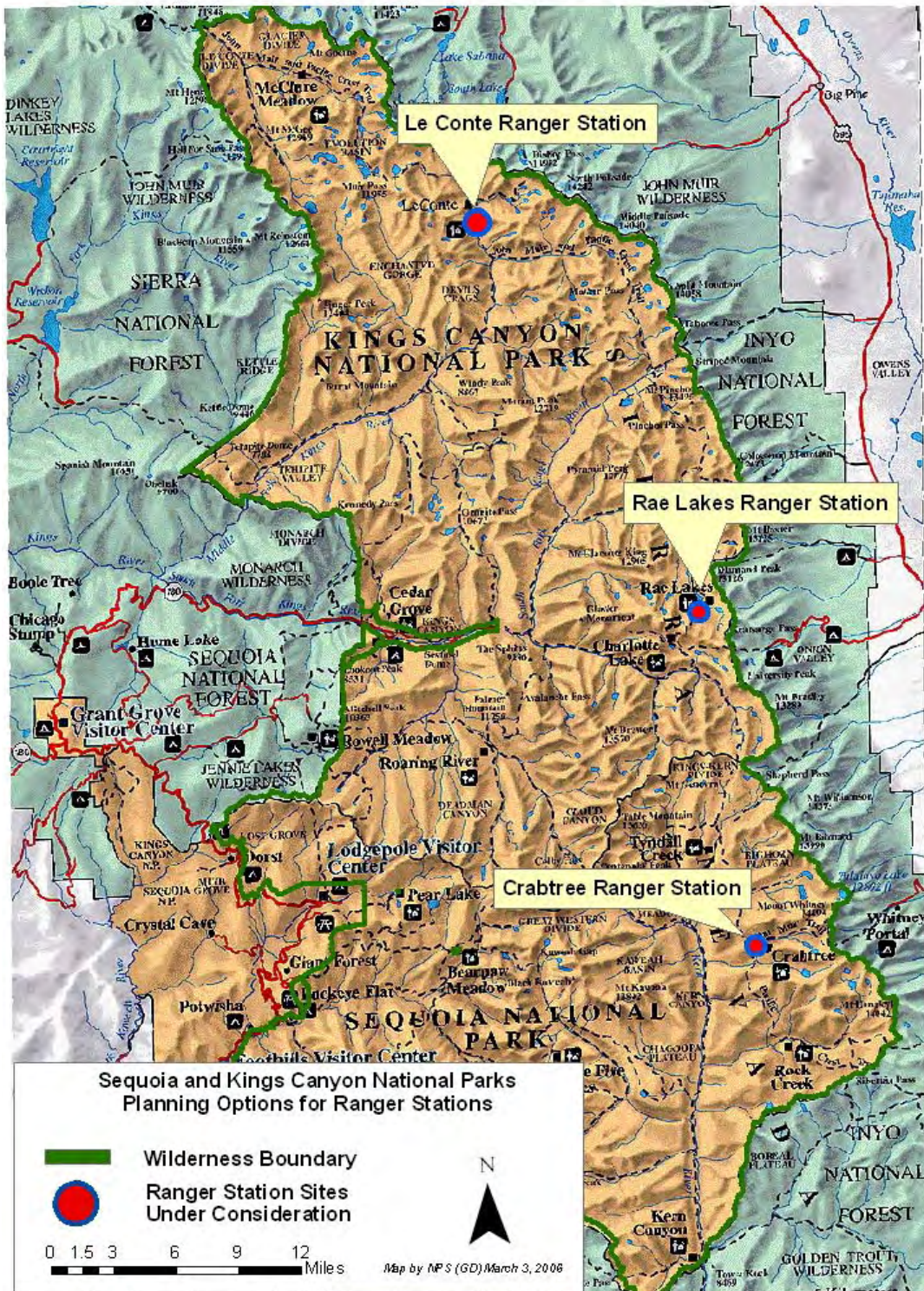


Figure 1. Location of Existing Ranger Stations under Review

PROJECT PURPOSE AND NEED

The purpose of this project is to continue to meet the parks' wilderness stewardship mandate by protecting park resources and by providing appropriate visitor services in wilderness. The parks' 2007 *Final General Management Plan and Final Environmental Impact Statement* (FGMP/FEIS) (NPS 2007) provides direction for desired conditions and appropriate facilities in wilderness. Within the wilderness, efforts will be made to preserve a sense of remoteness and freedom from human-caused impacts. However, simple amenities such as ranger stations may be present to support administrative activities, reduce or control resource impacts, or provide for research and monitoring. Facilities used to support the administration and protection of wilderness, including backcountry ranger stations, may be provided. In accordance with the FGMP/FEIS, there is a need to assess the existing wilderness ranger stations and determine if they would be removed, replaced, or rehabilitated. This EA provides that evaluation and includes the minimum requirement / minimum tool (appendix B) analysis in accordance with *Director's Order 41 in Reference Manual RM 41: Wilderness Preservation and Management* (NPS 1999).

The *Wilderness Act of 1964* (16 U.S.C. 1131–1136; P.L. 88-577), NPS wilderness policies, and the parks' *Sequoia and Kings Canyon National Parks: Backcountry Management Plan* (BMP) (NPS 1986a) all state that structures may be allowed in wilderness where such structures “enhance enjoyment and protect the wilderness resource.” It is also the responsibility of the NPS to ensure that the structures are not a major intrusion on the wilderness experience of visitors.

The objective of this project is to effectively provide for wilderness stewardship, visitor education, and emergency services in the Le Conte, Rae Lakes, and Crabtree areas while furthering wilderness goals and minimizing impacts on the parks' natural and cultural resources and wilderness values. Under an agreement with the California DWR, the parks must also continue to provide a safe and accessible station at Crabtree for winter snow surveyors.

The park interdisciplinary team used a “Choosing by Advantage” process (CBA) to establish specific project objectives. The CBA process is a selection and ranking process that is based on the relative advantages and costs of each project in accomplishing NPS-wide and park-specific goals and objectives. In using the CBA process, the NPS evaluated the advantages of the proposal and alternatives, the importance of the advantages of each alternative, and if those advantages were worth their associated cost economically and to park resources. Specifically, the project objectives developed through this CBA analysis included:

- Supporting the wilderness stewardship mandate

- Supporting visitor health and safety

- Supporting employee health and safety

- Supporting appropriate visitor services (education, information, emergency services)

- Protecting area water quality

- Preventing wildlife from obtaining human food

PROJECT HISTORY AND PLANNING CONTEXT

Park rangers patrol approximately 1,300 square miles of wilderness of Sequoia and Kings Canyon National Parks during the peak visitor season from June to mid-October. Their duties are to monitor and protect sensitive areas, wilderness values, and other resources and to provide emergency services and education to wilderness users. In addition, wilderness ski patrols and snow surveys are conducted in the winter months.

To facilitate ranger patrols of Sequoia and Kings Canyon backcountry, first the U.S. Army and then park administrators began building patrol cabins as early as the 1890s. Since then, 19 cabins (or stations) have been built throughout the 1,300 square miles of the parks' remote wilderness. In addition to patrols based from frontcountry locations, 12 of the wilderness patrol stations are still used yearly and 3 more are staffed as budgets permit.

Most stations are one room and approximately 12 × 15 feet. Six stations are larger, with two rooms, and the Pear Lake station is two stories with a basement storage area. All have very basic facilities: a woodstove for cooking and heating, a cot, a table, propane or solar-powered lights, storage cabinets, and an outhouse. Almost all of the stations have solar panels used to power 12-volt interior lights and recharge the batteries for the rangers' two-way radios. Few have sinks, and only four stations have running water. All are at least a day's hike or horse ride from a trailhead or road. All contact with other park personnel is done by two-way radio, or occasionally by satellite phone.

Most stations are of wood construction—either logs or plywood. Two are of local rock. Each station is marked on U.S. Geological Survey (USGS) maps and by a "Ranger Station" sign at the nearby trail junctions. Guidebooks also note station locations. Rangers arrive at their assigned stations in mid- or late June and stay through mid-September or October. Materials and station supplies for the entire season are brought in by horse and mule or, if snow or high water conditions don't allow stock access and if it is determined to be the minimum tool, by helicopter. All food and equipment is stored in the stations. Day and overnight patrols are carried out from the ranger stations. In general, the rangers do not leave the wilderness until the end of the season. In winter, several stations are used monthly by rangers on ski patrols as well as by snow surveyors from the California Cooperative Snow Survey.

In the late 1960s and early 1970s, the parks' backcountry received a significant increase in backpackers and changes in visitor use patterns. To better facilitate ranger patrols in these newly impacted areas, park managers needed low-cost structures that could be put in place as ranger stations. Two cabins from low-elevation (approximately 1,300 feet) housing areas were disassembled, taken into the backcountry, and reassembled at Le Conte and Crabtree (elevations of 8,700 feet and 10,600 feet, respectively). Additionally, wood frames for large canvas tents were built at several locations to serve what were thought to be temporary changes in use patterns. All but the Rae Lakes tent frame have been removed as use patterns have continued to evolve.

In the early 2000s, park administrators and wilderness managers were concerned that several of the ranger stations did not effectively and safely fulfill their purpose. Costs associated with maintenance were increasing with no significant improvement in facility or services, and rangers were spending increasing time on station maintenance, which meant less time spent on wilderness protection, resource management, and visitor services. In addition, the stations were not designed in accordance with the parks' *Architectural Character Guidelines* (NPS 1989) for rustic structures, nor were they designed for the extreme environmental conditions found above 8,000 feet. They do not have any approved method to treat gray water used in dishwashing and hygiene. Gray water is currently dumped by bucket into gravel and screened pits or, in two stations with sinks, drains into a settling box. Most stations use outhouse pits located fifty to several hundred feet away from the station. All stations use propane to supply interior

cookstoves that do not meet existing safety standards. Because of the costs and physical effort required to get personnel and equipment into these stations, most repairs and maintenance are done by the ranger assigned to that location rather than by more experienced workers with skills specific to the task. Insulation of all the stations is minimal or nonexistent. Heat is provided by woodstoves. Firewood is either brought in by helicopter or stock, or acquired locally.

Rangers and park administrators evaluated all the stations in consideration of wilderness stewardship needs, structural and maintenance needs, architectural compliance with park guidelines, projected lifespan of the station and effectiveness of visitor services (see Table 1). As a result of this analysis, the ranger stations at Rae Lakes, Le Conte, and Crabtree were determined to be most in need of rehabilitation or replacement.

Table 1. General Information on the Ranger Stations under Consideration

Ranger Station	Crabtree	Rae Lakes	Le Conte
Year built	ca. 1970	ca. 1970	1968
Ranger patrol area	39 sq mi	50 sq mi	98 sq mi
Maintained trails	25 mi	35 mi	35 mi
Visitor contacts per year	4,000	2,200	1,100–2,000
Stock-use nights per year	600–900	600	200–400

Crabtree Ranger Station

Crabtree Ranger Station is a two-room structure that was transported in 1970 from a low-elevation site to its current location (Figure 2) to replace a deteriorated log cabin that had been in place since the 1920s. Its box-like plywood construction is not consistent with current wilderness aesthetics standards and not in accordance with the parks' *Architectural Character Guidelines* (NPS 1989) that did not exist at the time of construction. The station is flimsy and appears out of place in the subalpine wilderness. Because it was not designed or engineered for the site, it has a very low-pitch roof. Extensive propping of interior beams with 4 × 4-inch supports is required because of winter snow loads that can reach 14 feet. The roof beam is sagging in places and there has been structural damage to the roof, siding, and interior walls from human break-ins.

Visitation to the Crabtree area and use of the station spans the entire year, with the peak season from June into November. A ranger is stationed there from June to mid-October. From January to April, the station is used monthly by the State of California Cooperative Snow Survey conducting snow measurements, SAR personnel, and rangers making winter patrols. Because the roof pitch and construction is inadequate for the snow load, a potential exists that the roof could collapse. This poses a danger to snow surveyors dependent on the station for shelter. A snow entry was added at the side of the station; however, winter entry and exit is extremely difficult because of the narrowness of the snow entry, which enters the living space through a trapdoor over the sink. Exit in an emergency would be extremely difficult and would pose a danger to personnel in a winter emergency situation, such as a station fire.

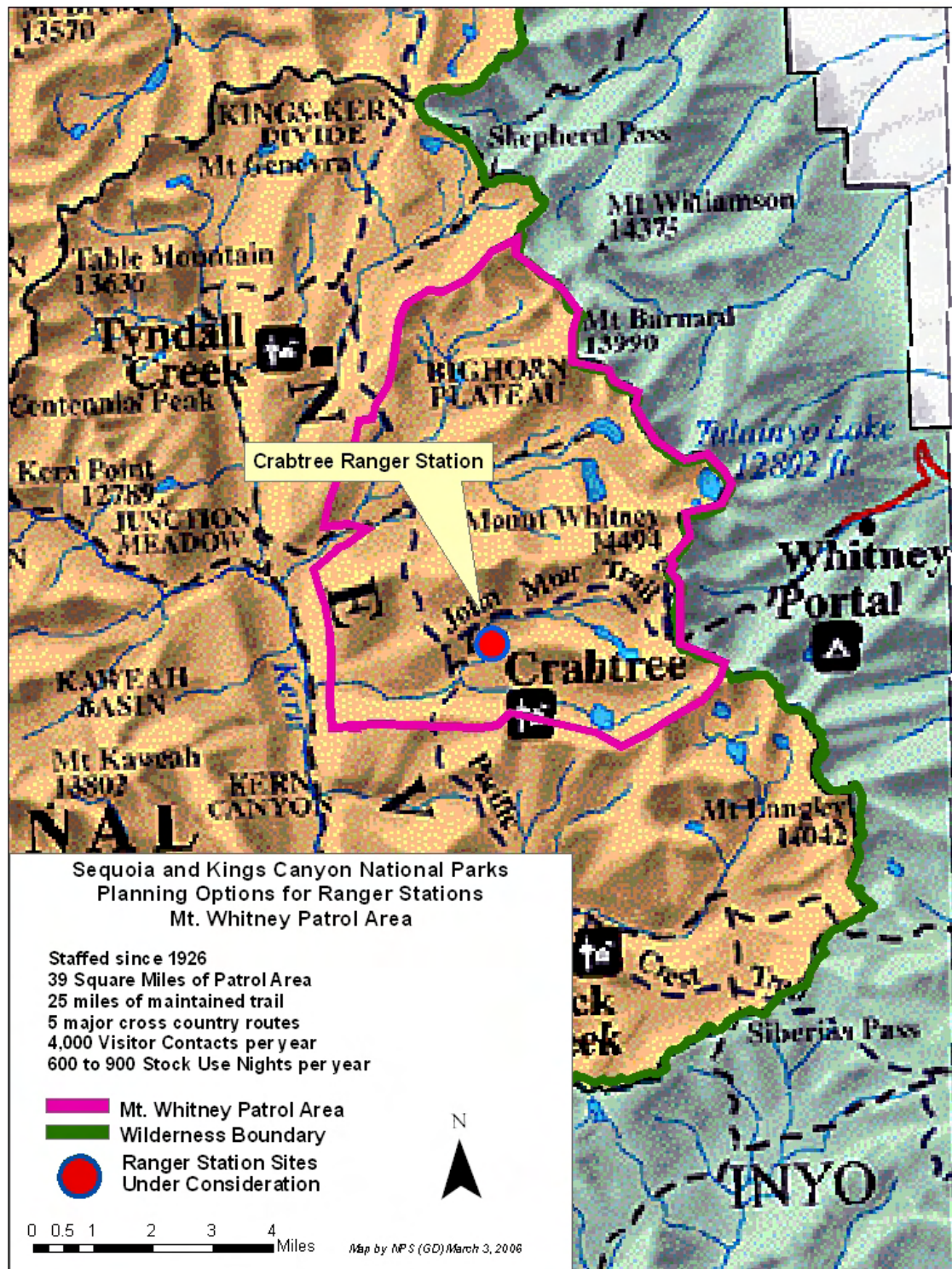


Figure 2. Location Map of Crabtree Ranger Station

Rae Lakes Ranger Station

Rae Lakes Ranger Station, built at its present site in 1970 (Figure 3), still retains much of its original construction material. When the canvas is removed in the fall, the station's supports are fully exposed to wind, rain, and snow for almost 9 months of the year. As a result the lumber is not structurally sound. The lumber has become too weak to safely support the ranger climbing on the station to put up and take down the tent canvas each year. The floor is badly buckled from water and snow damage, and gaps in the siding allow the wind to blow through, making the station impossible to heat. In addition, the canvas tent is not an adequate barrier to wildlife, and bears enter the station, take food, and damage the station and equipment throughout the year. Marmots routinely chew on the sides of the walls and door, and mice are common inside the station.

Because of a lack of secure bear- and human-proof storage at Rae Lakes, rangers have buried storage lockers behind the station to better anchor them against large animals. The station presents a cluttered and unkempt appearance out of character for its spectacular wilderness surroundings and not in accordance with the parks' *Architectural Character Guidelines* (NPS 1989). Continued repair of this station is infeasible due to the severity of the existing damage.

Le Conte Ranger Station

Le Conte Ranger Station was reassembled at its current site (Figure 4) in 1968 from a structure that previously stood at park headquarters. It replaced a tent station on that site. The structure was not designed for a wilderness environment and its plywood and box construction do not blend into its setting: it is not in accordance with the parks' *Architectural Character Guidelines* (NPS 1989). The present station lacks structural integrity and appears out of place at an elevation of 8,700 feet in the subalpine wilderness.

Park regulations require that all food in wilderness areas be secured from bears and other wildlife. Visitors use specially designed canisters or, for stock users, aluminum boxes. Because of the plywood construction used for siding at the Le Conte Ranger Station, bears have broken into the station several times to obtain food. Attracted by the glue laminate, porcupines routinely gnaw on the plywood siding and floor. The roof has been leaking for several years after an impact from a tree fall seriously compromised its structural integrity. The station is not easily or safely usable during winter patrols or searches. A snow entry was added at the roof peak; however, entry and exit are extremely difficult because of the narrowness of the crawlspace. Exit in an emergency would be extremely difficult and would be a danger to personnel in a winter emergency such as a ranger station fire. Because it was not designed or engineered for the site, propping of the roof beam with 4 × 4-inch supports is required each fall for the winter snow load. A fully functional and safe station is critical to winter patrol ranger's mission and survival.



Figure 3. Location Map of Rae Lakes Ranger Station

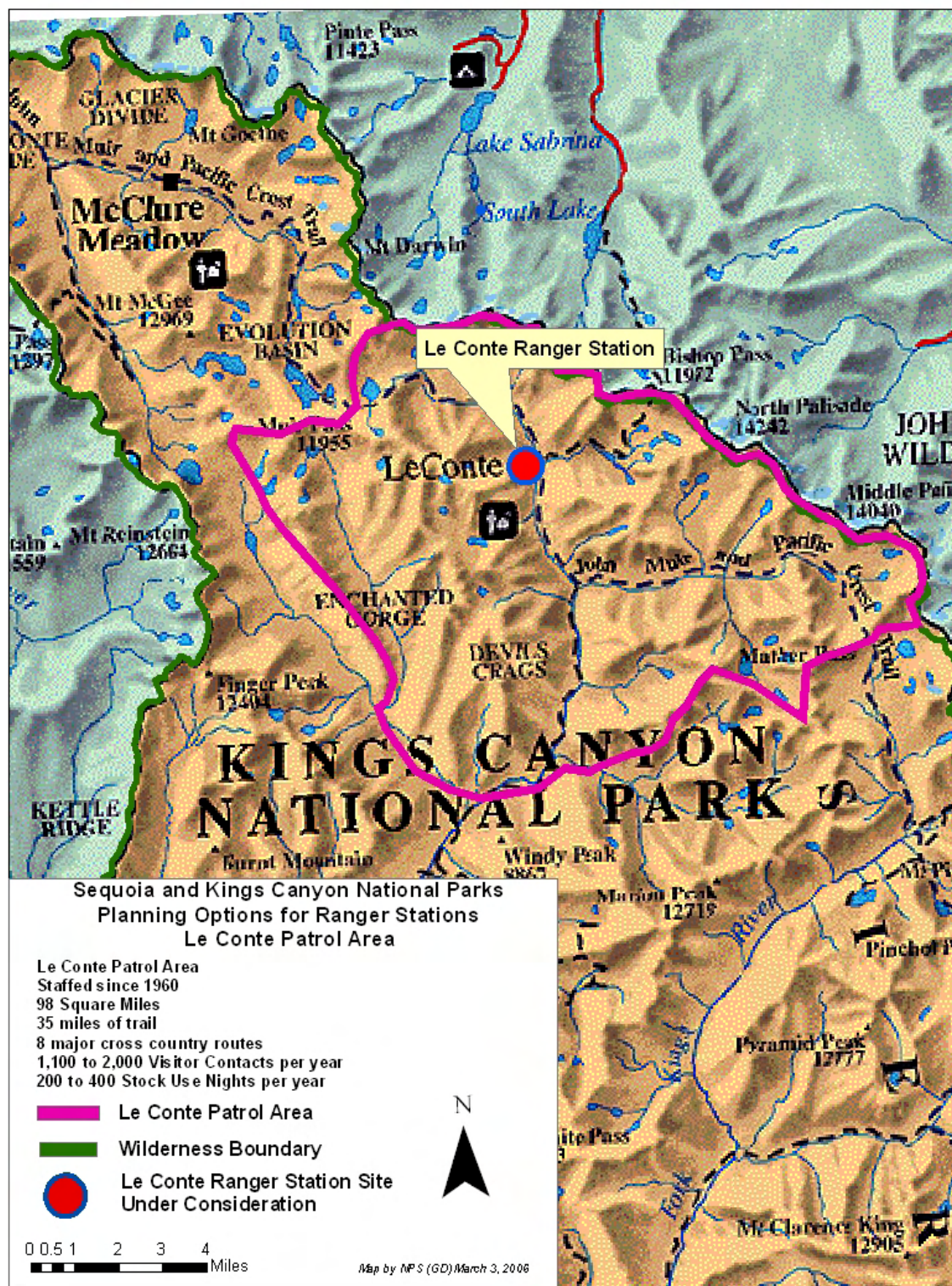


Figure 4. Location Map of Le Conte Ranger Station

LEGISLATION, GUIDANCE, AND PREVIOUS PLANNING

LEGISLATION AND GUIDANCE

The *NPS Organic Act of 1916* (Organic Act) (16 U.S.C. 1, 2–4) and the *General Authorities Act* (16 U.S.C. 1a–8) direct the NPS to conserve the scenery, natural and historic objects, and wildlife, and to provide for the enjoyment of those resources in such a manner as to leave them unimpaired for future generations. The *Redwood Act* (16 U.S.C. 1a-1) reaffirmed the mandates of the *Organic Act* and provided additional guidance on the national park system management as follows:

The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the national park system and shall not be exercised in derogation of the values and purposes for which these various areas have been established. (16 U.S.C. 1a-1)

The *Wilderness Act of 1964* (16 U.S.C. 1131–1136, P.L. 88-577) established the national wilderness preservation system in order to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. Under the provisions of this act, wilderness areas are to be administered for the use and enjoyment of the American people in such a manner as to leave them unimpaired for future use and enjoyment as wilderness.

Sequoia and Kings Canyon National Parks’ original wilderness designation occurred under the *California Wilderness Act of 1984* (16 U.S.C. 1131, P.L. 98-425, 98 Stat. 1619); additional acreage was designated as wilderness by the *Omnibus Public Land Management Act of 2009* (H.R. 146). Total designated wilderness for the parks is 807,962 acres—approximately 93.4% of the parks’ total acreage. In addition, there is approximately 30,000 acres of proposed wilderness that is managed as wilderness in accordance with NPS policy.

Wilderness is defined as follows:

... an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which:

generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable;

has outstanding opportunities for solitude or a primitive and unconfined type of recreation;

has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and

may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value. (*Wilderness Act*, 16 U.S.C. 1131–1136, section 2[c])

Except as necessary to meet the minimum requirement for the administration of the area for the purpose of this Act ... there shall be no temporary roads, no use of motor vehicles, motorized equipment or motor boats, no landing of aircraft, no other form of mechanical transport and no structure or installation within any such area (*Wilderness Act*, 16 U.S.C. 1131–1136, section 4[c]).

NPS *Management Policies 2006* (NPS 2006a) provides additional guidance for wilderness management. Management will include the protection of these areas, the preservation of their wilderness character, and the gathering and dissemination of information regarding their use and enjoyment as wilderness. The purpose of wilderness in the national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition, and in accordance with the *Wilderness Act*, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use (NPS 2006a, chapter 6).

Director's Order 41 in *Reference Manual RM 41, Wilderness Preservation and Management* (NPS 1999) provides accountability, consistency, and continuity to the NPS wilderness management program and guides NPS managers in meeting the letter and spirit of the *Wilderness Act*. It clarifies, where necessary, specific provisions of NPS *Management Policies 2006* (NPS 2006a), and establishes specific instructions and requirements concerning the management of wilderness areas.

The *Wilderness Act*, NPS *Management Policies 2006* (NPS 2006a), and *Director's Order 41* (NPS 1999) provide authority and direction to the managing agency to determine if a structure or installation is “necessary to meet minimum requirements for the administration of the area for the purpose of this Act” (*Wilderness Act of 1964*, 16 U.S.C. 1131–1136).

PREVIOUS PLANNING

The key park planning documents that affect this project are the FGMP/FEIS (NPS 2007), the 1986 *Sequoia and Kings Canyon National Parks Backcountry Management Plan / EA* (BMP) (NPS 1986a), the 2009 *Sequoia and Kings Canyon National Parks “Management Directive No. 49: Minimum Requirement Analysis and Determination”* (NPS 2009), and the *Sequoia and Kings Canyon National Parks Architectural Character Guidelines* (NPS 1989). Collectively, these documents guide the parks’ philosophy and practices in managing wilderness ranger stations, providing for wilderness stewardship and visitor services in wilderness, and conducting appropriate resource monitoring actions.

The parks’ FGMP/FEIS (2007) provides direction for desired conditions and appropriate facilities in wilderness, and reiterates and reinforces the parks’ purpose and significance. Within the wilderness, efforts will be made to preserve a sense of remoteness and freedom from human-caused impacts. However, simple amenities such as ranger stations may be present to support administrative activities, reduce or control resource impacts, or provide for research and monitoring. Facilities used to support the administration and protection of wilderness, including wilderness ranger stations, may be provided. In accordance with the FGMP/FEIS, existing wilderness ranger stations will be assessed and replaced or rehabilitated as necessary.

The BMP states while structures will not be allowed in the wilderness areas of the parks, “Exceptions will be made only for the designated historical structures, existing dams, specified Ranger stations, and those facilities necessary to protect and monitor the natural resources” (NPS 1986a, section 5.13.1, Management Objectives).

The following are excerpts from the BMP:

5.13.2. Management Policies. The ranger patrol cabins [stations] will be maintained for administrative use, including use by trail, research, or resources management crews, snow surveyors, etc.

5.14.2.4. Cabins (stations) are located at various places in the backcountry as needed for backcountry rangers, snow surveys, etc. These cabins will continue to be maintained and

used for such activities. Some of the cabins have historical significance and will be maintained to preserve their historic values. (NPS 1986a)

Sequoia and Kings Canyon National Parks' Management Directive 49 (NPS 2009) is tiered to both the BMP and the FGMP/FEIS. Through these documents, the park has concluded that wilderness ranger stations provide support to a variety of park wilderness stewardship and administrative functions (e.g., resource and visitor protection) and also provide support to park staff and park cooperators conducting research.

The *Sequoia and Kings Canyon National Parks Architectural Character Guidelines* (NPS 1989) define the appropriate architectural style for new development and replacements for old facilities within the parks, in an attempt to reinforce the integral identity of the parks.

PURPOSE AND SIGNIFICANCE OF SEQUOIA AND KINGS CANYON NATIONAL PARKS

An essential part of the planning process is understanding the purpose, significance, and mission of the parks for which this EA is being prepared. The Sequoia and Kings Canyon FGMP/FEIS reinforced the purpose and significance of the parks, establishing the overall management direction and mission for the parks.

Sequoia National Park was established on September 25, 1890. The primary purpose for establishing the park is described in the act's preamble:

Whereas, the rapid destruction of timber and ornamental trees in various parts of the United States, some of which trees are the wonders of the world on account of their size and limited number growing, makes it a matter of importance that at least some of said forests should be preserved. (26 Stat. L., 478)

The legislation further stated that Sequoia National Park is to be a place “dedicated and set apart as a public park, or pleasuring ground, for the benefit and enjoyment of the people,” and shall be managed “for the preservation from injury of all timber, mineral deposits, natural curiosities and wonders ... [and for] their retention in their natural condition.”

On October 1, 1890, legislation was enacted that tripled the size of the park and established General Grant National Park, extending the same protection to the new areas (26 Stat. L., 650). On July 3, 1926, Sequoia National Park was further enlarged (16 U.S.C. 688, 44 Stat. L., 821).

Kings Canyon National Park was established on March 4, 1940, absorbing General Grant National Park lands (54 Stat. L., 41). The park was “dedicated and set apart as a public park ... for the benefit and enjoyment of the people.” On August 6, 1965, Cedar Grove and Tehipite Valley were added to Kings Canyon National Park (79 Stat L., 446, P.L. 89–111).

Sequoia and Kings Canyon National Parks are two separate national parks, which share miles of boundary and are managed together as one park unit. The purpose of Sequoia and Kings Canyon National Parks as defined in the parks' FGMP/FEIS is as follows:

Protect the greater Sierran ecosystem—including the sequoia groves and high Sierra regions of the park—and its natural evolution forever.

Provide appropriate opportunities to present and future generations to experience and understand park resources and values.

Protect and preserve significant cultural resources.

Champion the values of national parks and wilderness.

Park significance statements capture the essence of a national park's importance to the natural and cultural heritage of the United States. Significance statements do not inventory park resources; rather, they describe the park's distinctiveness and help place the park within the regional, national, and international context. Defining park significance helps managers make decisions that preserve the resources and values necessary to accomplish the purpose of the national park.

Sequoia and Kings Canyon National Parks are significant because they contain the following resources (FGMP/FEIS):

The largest giant sequoia trees and groves in the world, including the world's largest tree, the General Sherman tree

An extraordinary continuum of ecosystems arrayed along the greatest vertical relief (1,370 to 14,497 feet in elevation) of any protected area in the lower 48 states

The highest, most rugged portion of the high Sierra, which is part of the largest contiguous alpine environment in the lower 48 states

Magnificent, deep, glacially carved canyons including Kings Canyon, Tehipite Valley, and Kern Canyon

The core of the largest area of contiguous designated wilderness in California—the second largest in the lower 48 states

The largest preserved southern Sierra foothills ecosystem

More than 300 known marble caverns, many inhabited by cave wildlife that is found nowhere else

A wide spectrum of prehistoric and historic sites documenting human adaptations in their historical settings throughout the Sierran environments

Sequoia and Kings Canyon National Parks have been designated as an international biosphere reserve, a program under the United Nations Educational, Scientific, and Cultural Organization that recognizes resources with worldwide importance. While this designation does not grant any form of control or ownership to the international body, it underscores the exceptional and singular qualities of the parks.

Park purpose describes the specific reason the park was established. Park significance is embodied in the distinctive features that make the park different from any other. Together, purpose and significance lead to a concise statement: the mission of the park. The mission of Sequoia and Kings Canyon National Parks is to protect forever the greater Sierran ecosystem—including the sequoia groves and high Sierra regions of the parks—and its natural evolution, and to provide appropriate opportunities to present and future generations to experience and understand park resources and values (NPS 2007).

ISSUES AND IMPACT TOPICS

SCOPING

Internal scoping for this project began in 2002 when it was determined that the Rae Lakes Ranger Station was in need of major repairs. Subsequently, as the issue was further discussed by park staff, two other ranger stations, Le Conte and Crabtree, were also determined to be in a state of disrepair. The three ranger stations were combined into one proposal. The proposal was presented to the park's interdisciplinary planning team. As part of this original proposal, a minimum requirement / minimum tool analysis was completed to determine if the proposed project would be appropriate or necessary for the administration of the area as wilderness and would not cause a significant impact to wilderness resources and character, in accordance with the *Wilderness Act*. Since the proposal was found to be appropriate, the wilderness minimum requirement / minimum tool analysis was completed to determine alternatives and the type of equipment that could be used for minimizing the impact of the installations to wilderness. The park conducted a CBA analysis from January 23 to 25, 2006, to develop preliminary alternatives and discuss potential issues related to the proposal. Through this process, park staff determined that an EA was needed to allow for public input, to further define alternatives, and to evaluate the potential effects from the proposal.

A letter and press release initiating public scoping and describing the project were issued on February 22, 2006 (appendix C). The press release was sent to approximately 50 media outlets, interest groups, public officials, agencies, and individuals in the central California area. Interagency scoping was also conducted and included agencies such as the U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), California State Department of Fish and Game (CDFG), California State Historic Preservation Office (SHPO), and the California DWR.

The park received five comments during the 30-day public scoping period, which ended March 24, 2006. All were generally in support of the project. Information on the proposed project was forwarded to the park from a Wilderness Watch Internet forum for review. Some of these comments questioned the need for structures in wilderness while other comments recognized the need for the stations to provide visitor services. In addition, from 2005 to 2008, park staff discussed the project with several representatives from interest groups at various events to obtain their opinion on the project. Ranger George Durkee communicated by email with representatives from Wilderness Watch in April 2006 to get their initial feedback on the proposed project. While some organizations have philosophical differences with the necessity of having ranger stations and structures in wilderness, these representatives stated that they understood the structures' value to improve the parks' ability to provide effective wilderness preservation and management as long as the structures were not enlarged as part of the project.

DERIVATION OF ISSUES AND IMPACT TOPICS

Specific impact topics were developed for discussion and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on internal and external scoping; federal laws, regulations, and executive orders; NPS *Management Policies 2006* (NPS 2006a); site visits; and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

The resources which could be affected and the impacts that could occur are described in detail in the "Affected Environment" and "Environmental Consequences" sections of this document.

ISSUES AND IMPACT TOPICS SELECTED FOR DETAILED ANALYSIS

The following impact topics were selected for detailed analysis: vegetation, wildlife, special-status species, water quality, wilderness resources, scenic resources, natural soundscapes, cultural resources, safety and park operations, and visitor experience and recreation (see Table 2).

Table 2. Impact Topics Retained for Further Evaluation and Relevant Laws, Regulations, and Policies

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Vegetation	The project would require the removal of small areas of vegetation for the installation of the ranger stations. Therefore, impacts on vegetation will be further evaluated in this document.	NPS <i>Organic Act</i> ; NPS <i>Management Policies 2006</i> (NPS 2006a); <i>Natural Resource Management Guidelines</i> , NPS-77 (NPS 1991)
Wildlife	The project would have the potential to affect wildlife during construction activities and flights. Therefore, this topic will be further evaluated in this document.	NPS <i>Organic Act</i> ; NPS <i>Management Policies 2006</i> (NPS 2006a); NPS-77 (NPS 1991)
Federally listed and other special-status species	One listed species, the Sierra Nevada bighorn sheep (<i>Ovis canadensis sierrae</i>), may be affected by construction activities and the presence of a ranger station at Rae Lakes because it is located within the historic range of bighorn sheep. In addition, critical habitat has been designated for bighorn sheep at the Rae Lakes area. Therefore, this topic will be further evaluated in this EA. Other species of concern have been dismissed from further evaluation because they either do not occur in the project areas or the project would result in less than negligible effects (see "Impact Topics Dismissed" section).	NPS <i>Organic Act</i> ; <i>Endangered Species Act of 1973</i> (ESA) (16 U.S.C. 1531–1544; P.L. 93-205); NPS <i>Management Policies 2006</i> (NPS 2006a); NPS-77 (NPS 1991)
Water quality	The existing ranger stations create a source of gray water, which can create localized impacts on park surface water and groundwater. Therefore, this topic will be addressed in the document.	NPS <i>Organic Act</i> ; <i>Clean Water Act of 1972</i> (33 U.S.C. 1251, P.L. 92-500); NPS-77 (NPS 1991)
Wilderness resources and wilderness operations	This project would occur within designated wilderness. Facilities in wilderness have the potential to impact wilderness values. Also, the construction and maintenance of these facilities could cause impacts on wilderness resources. The noise and visual presence of a helicopter could impact wilderness visitors. Wilderness park operations associated with the use of these ranger stations could be affected. Therefore, wilderness resources and operations will be further evaluated in this document.	NPS <i>Organic Act</i> ; <i>Wilderness Act of 1964</i> ; <i>The California Wilderness Act of 1984</i> (PL 98-425, 98 Stat. 1619); <i>Omnibus Public Land Management Act of 2009</i> ; <i>Director's Order 41</i> (NPS 1999); <i>Sequoia and Kings Canyon Management Directive 49</i> (NPS 2009)
Scenic resources	Scenic resources would be affected by the project because of the replacement of the ranger stations. Therefore, this topic will be addressed in this document.	NPS <i>Management Policies 2006</i> (NPS 2006a)
Soundscapes	Noise associated with the use of helicopters for flights and other motorized equipment would create human-generated noise in the project area. Therefore, soundscapes have been included as an impact topic.	NPS <i>Management Policies 2006</i> (NPS 2006a); <i>Director's Order 47</i> <i>Soundscape Preservation and Noise Management</i> (NPS 2000)

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Cultural resources	The immediate area around Le Conte Ranger Station has extensive signs of past prehistoric use. The park archeologist has determined that the present ranger station area is a potentially significant prehistoric site. Therefore, archeology is considered in detail for the Le Conte site. The other two sites show no evidence of archeological resources; therefore, they will not be included in the evaluation.	<i>National Historic Preservation Act of 1966</i> (NHPA) (16 U.S.C. 470 et seq., P.L. 89-665); Chapter 5 of <i>Management Policies 2006</i> (NPS 2006a); <i>Director's Order 28: Cultural Resource Management</i> (NPS 1998); other related policy directives such as the <i>NPS Museum Handbook</i> (NPS 2005) and the <i>NPS Manual for Museums</i> (NPS 1976)
Health and safety	The safety of park visitors and employees could be affected by this project. Therefore, health and safety will be addressed as an impact topic in this document.	<i>NPS Management Policies 2006</i> (NPS 2006a)
Visitor experience and recreational opportunities	The replacement of the ranger stations may affect the visitor experience and recreation in the parks. Therefore, visitor experience and recreation will be addressed as an impact topic in this EA.	<i>NPS Organic Act</i> ; <i>NPS Management Policies 2006</i> (NPS 2006a); <i>NPS-77</i> (NPS 1991); the <i>Redwood Act</i> , 1978

IMPACT TOPICS DISMISSED FROM DETAILED ANALYSIS

Special-Status Wildlife Species (other than the Sierra Nevada bighorn sheep)

Several candidates for federal listing as endangered occur in or near some of the project sites. The mountain yellow-legged frog (*Rana muscosa*) occurred historically in waters in the vicinity of all of the sites. Because of their rapid decline due to chytrid fungus and the historic impacts of introduced trout, they currently are absent from the immediate vicinity of all of the project sites. The nearest population is 0.7 mile from the Rae Lakes site and would not be affected by the station's repair or replacement. There is one historic record (1992) of a Yosemite toad (*Bufo canorus*) 3 miles from the Le Conte site. The nearest recently surveyed populations (1997) are 8.2 miles away. The project sites are farther from the range of the Yosemite toad. The Yosemite toad is a meadow species and would not likely be impacted by any of the project sites, even if they occurred within their range. The fisher (*Martes pennant*) typically occurs at lower montane elevations and would be extremely unlikely to be near any of the project areas. The nearest historic record (1932) is 5.6 miles from the Crabtree site. None of these species would be affected by the project and therefore they will not be further evaluated.

The California spotted owl (*Strix occidentalis occidentalis*) is a state species of special concern. Like the fisher, it occurs at much lower elevations than the project sites. The nearest habitat is about 8 miles east of the Rae Lakes site. There is one record (1999) that is only 2.6 miles from the Rae Lakes site. It was likely a juvenile traveling through the area. Since this species does not occur at the project site, and the project would not result in removal of habitat or work during owl foraging periods, this species would not be affected by project activities.

The delisted (formerly threatened) bald eagle (*Haliaeetus leucocephalus*) is a rare visitor to the park. A 1989 record exists from the Le Conte Ranger Station, and three records within 9 miles of the Rae Lakes site have been reported since 1951. The Crabtree site has one 2001 record within 2.2 miles of the site, and between 1993 and 2000, an additional 11 records occurred along the trench of the Kern River and 2 records east of the river that collectively are 6 to 16 miles from the Crabtree site. Eagles are not likely to be in the project area during construction activities, and the continued presence of ranger stations is not

likely to affect eagles due to their sporadic and limited use of the area (appendix E). Therefore, the effects on bald eagles will not be further evaluated in this document.

Other sensitive species that could be in the project area include the peregrine falcon (*Falco peregrinus anatum*), red fox (*Vulpes vulpes*), and wolverine (*Gulo gulo*). The sites are too high for occupation by breeding peregrine falcons, and observations of red fox and wolverine are very rare. Even if present, these species would not be affected by the project, as they generally stay away from human-occupied areas; thus, these species will not be further evaluated.

Other species of concern that could occur in the project area include the Mount Lyell salamander (*Hydromantes platycephalus*), northern goshawk (*Accipiter gentilis*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), American dipper (*Cinclus mexicanus*), rufous hummingbird (*Selasphorus rufus*), olive-sided flycatcher (*Contopus cooperi*), spotted bat (*Euderma maculatum*), pine marten (*Martes americana*), and white-tailed jackrabbit (*Lepus townsendii*). None of these species are expected to be impacted by the project. Mount Lyell salamanders have not been found around buildings. The hawks, flycatcher, and American dipper are not normally associated with ranger stations other than for incidental foraging in their vicinity, and they appear accustomed to human activity along trails. The rufous hummingbird is rather rare and would normally be near meadows rather than near the ranger stations, which are not located near meadows. The spotted bat roosts in cliff faces and would only be disturbed while foraging if lights were turned on at night in the project area, which would not occur for this project. The pine marten is a characteristic species of the project habitat, and they have been known to occupy buildings in other areas of the park. However, they are not known to occupy the project buildings analyzed in this EA. The white-tailed jackrabbit is uncommon to locally common in subalpine areas and would not be affected by project activities.

None of the special-status species considered above would be affected by the project. Therefore, the only special-status species that will be further evaluated within this document is the Sierra Nevada bighorn sheep.

Listed Plants and Plant Species of Concern

The *Endangered Species Act* (ESA) defines an endangered species as any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. At this time, no federally listed or candidate plant species are known to occur within Sequoia or Kings Canyon National Parks.

No California state-listed endangered, threatened, or rare species were identified by the USFWS as occurring on the three topographic map quadrangles affected by the project. Therefore, this topic will not be addressed in the EA.

A single species of concern was identified by the USFWS as occurring on one of the topographical quadrangles within the project area. This plant is alpine jewelflower (*Streptanthus gracilis* Eastw.) and it is known to occur on the Mount Clarence King quadrangle. Within the parks, jewelflower occurs from 6,600 to 12,000 feet but is most common from 8,000 to 11,000 feet. Within the Rae Lakes Basin, a large population of jewelflower occurs approximately 0.5 kilometer north of Dollar Lake along the John Muir Trail. However, no jewelflowers were encountered on or near the current Rae Lakes Ranger Station during a September 2005 survey (*Results of LeConte Canyon Ranger Station Plant Survey, July 24–25, 2006*, NPS 2006b). In addition, no populations of jewelflower are known to occur in the vicinity of the Le Conte or Crabtree ranger station sites. Based on the result of these surveys, we conclude that no populations of jewelflower would be affected by this project.

Geology

Sequoia and Kings Canyon National Parks occupy approximately 1,350 square miles within the central and southern portion of the Sierra Nevada. Included in the parks' rugged landscape is the highest peak in the contiguous United States, Mount Whitney, which rises to about 14,497 feet above sea level. In Kings Canyon National Park, prominent ridges extend westward from the crest creating the Goddard and Monarch divides and rising to over 13,000 feet. In Sequoia National Park, a second prominent ridge of mountains, the Great Western Divide, parallels the Sierra crest.

As none of the alternatives would have any impact on the geology or on visitors' ability to appreciate the geology of this region, geology was dismissed as an impact topic in this EA.

Soils

Soil and water chemistry characteristics in the Sierra Nevada are largely geologically controlled. Because the Sierra Nevada is underlain by mostly granitic rocks, soils that develop from these foundations are thin and rocky with low nutrient capital (fertility), especially at higher elevations. Due to recent glaciations, soils at the project sites are thin and have a poorly developed organic component. They are mostly composed of decomposed granite sand, gravel, and rock. None of the station sites have developed soils in the immediate areas proposed for the action alternatives. All stations are located on decomposed sand and gravel.

Should any of the action alternatives be selected, all ground and soil disturbance would be done by hand, using shovels and handheld power tools. No heavy equipment would be used. Sensitive areas would be flagged off and pointed out to work crew members. Less than 15 cubic yards of sand and gravel would be disturbed in digging a foundation under alternatives 2 and 3. Because there would be limited ground disturbance in a small area with poor soils, resulting in negligible impacts, this topic was dismissed from further evaluation.

Wetlands and Floodplains

Executive Order 11988, (*Floodplain Management*, 42 FR 26951), Executive Order 11990, (*Protection of Wetlands*, 42 FR 26961), and NPS policies require an examination of impacts on floodplains and wetlands. The project sites would not be within the floodplain of any park rivers or tributaries. The Rae Lakes site is well above the lakes, which are at the head of the watershed; Le Conte is about 15 vertical feet above the river and above the floodplain; Crabtree is approximately 30 to 40 vertical feet above a smaller stream outside the floodplain; and there are no jurisdictional or NPS-defined wetlands within the project areas. Therefore, wetlands and floodplains have been dismissed as an impact topic in this EA.

Air Quality and Greenhouse Gas Emissions

The 1977 amendment to the *Clean Air Act of 1963* (42 U.S.C. 7401 et seq., P.L. 88-206) requires federal land managers to protect park air quality. Sequoia and Kings Canyon National Parks were designated Class I under the 1970 *Clean Air Act*, as amended. A Class I area is subject to the most stringent regulations of any designation. Further, the 1970 *Clean Air Act* provides the federal land manager (the Assistant Secretary for Fish and Wildlife and Parks and the Park Superintendent) with an affirmative responsibility to protect the parks' air-quality-related values (including visibility, plants, animals, soils, water quality, cultural and historic resources and objects, and visitor health) from adverse air-pollution impacts. Section 118 of the *Clean Air Act* requires the parks to meet all federal, state, and local air-pollution standards.

The proposed project is located within the San Joaquin Valley Air Pollution Control District (SJV Air District). Most of the air pollutants within the parks originate outside the park boundaries. Non-point sources continue to be the major contributor of air pollutants in the SJV Air District, including cars, trucks, farm equipment, and other agricultural activities. According to 2006 air-quality monitoring data, the main contributor in the park to the criteria air pollutants (CAPs) and greenhouse gases (GHGs) is transportation, contributing 66%. The largest portion of this is from visitor vehicle miles travelled.

GHGs contribute to climate change on a global scale. Naturally occurring greenhouse gases include carbon dioxide, methane, nitrogen oxide, and water vapor. Human activities (e.g., fuel combustion and waste generation) lead to increased concentrations of these gases (except water vapor) in the atmosphere. While GHGs contribute to climate change on a global scale, the impacts of CAPs are often local and regional in nature.

In an effort to reduce air-pollution sources within the park, the park has formed a partnership with the EPA to collaborate on controlling greenhouse gases and climate change through the Climate-Friendly Parks Program. As part of this program, the park has developed an action plan to reduce CAPs and GHGs. Transportation strategies described in the plan relative to the proposed project include improving vehicle efficiency and reducing idling (*Climate-Friendly Parks: Sequoia and Kings Canyon National Parks*, NPS 2008).

Should any of the action alternatives be selected, local air quality would be temporarily affected, primarily by the use of small gasoline-powered engines, such as those on generators, and by the use of helicopters to transport materials. However, while these activities would result in a slight degradation of air quality in the project area, the emissions from the project activities would not be likely to exceed National Ambient Air Quality Standards. Hydrocarbon, nitrogen oxide, and sulfur dioxide emissions from the use of the engines at the project site would be dissipated rapidly by air movement since air stagnation is rare at these locations. The impacts would last only as long as construction occurred, and would result in local, short-term, negligible adverse impacts on air quality. Therefore, air quality was dismissed as an impact topic.

The stations also use wood as a source of fuel for heating. Wood use is no more than approximately 1/8 of a cord per season per station. Dispersal of smoke at all the stations is very good. Passive monitoring of ozone (O₃) near one of the stations (Le Conte) found no significant effect from wood smoke generated by the ranger station. There would be no change from existing conditions, and wood smoke from these ranger stations would continue to have a negligible adverse effect on air quality.

Emissions from equipment and helicopter use associated with the proposed project work would contribute to overall park emissions of CAPs and GHGs. However, because the project would occur over an extended period of time (at least 2 years per ranger station over a period of approximately 6 to 10 years), the contribution of CAPs and GHGs would be less than minor when compared with the baseline emissions in the park, and in the long term, would result in fewer emissions from helicopter use. Therefore, the impacts from increased GHGs to climate change will not be further analyzed in this document.

Cultural Resources, including Archeological and Historic Resources (at Rae Lakes and Crabtree)

Approximately 51,000 acres of Sequoia and Kings Canyon National Parks (approximately 6%) has been systematically surveyed for the presence of cultural resources, both historic and prehistoric. Historic sites are at least 50 years old by definition and can extend back to the early 1800s in this part of California. The prehistoric sites are by definition Native American in nature; the oldest Native American artifacts

(projectile points) recovered in the parks are approximately 5,000 to 7,000 years old. These resources document prehistoric, ethnographic, and historic use of park areas.

Cultural resources surveys have been conducted at both the Rae Lakes and Crabtree ranger stations (Burge 2007). No surface-visible cultural resources were discovered at either location. Additionally, the Rae Lakes and Crabtree structures are less than 50 years old and neither is classified as a historic structure. Because no cultural resources are located at either the Rae Lakes and Crabtree areas, this topic (for these two areas) will not be further addressed in this document.

In addition, cultural landscapes, ethnographic resources, and museum objects are dismissed from further analysis as these resources do not occur in the project area.

Socioeconomic Environment

No alternatives associated with this project have the potential to directly affect economic activities outside the parks. Therefore, socioeconomics will not be addressed in this EA.

Indian Trust Resources

Secretarial Order 3175: Identification, Conservation, and Protection of Indian Trust Assets requires that any anticipated impacts on Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The lands comprising Sequoia and Kings Canyon National Parks are not held in trust by the Secretary of the Interior for the benefit of Indians because of their status as Indians. Therefore, Indian trust resources have been dismissed as an impact topic in this EA.

Environmental Justice

Executive Order 12898, (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, 59 FR 7629) requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. No alternative under consideration would have health or environmental effects on minorities or low-income populations or communities as defined in the EPA's *Final Guidance For Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (EPA 1998). Therefore, environmental justice has been dismissed as an impact topic in this EA.

Prime Farmland

In 1980, the Council on Environmental Quality (CEQ) (40 CFR 1500) directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the U.S. Department of Agriculture Natural Resources Conservation Service. Prime farmland soil produces general crops, such as common foods, forage, fiber and oil seed; unique farmland produces specialty crops, such as fruits, vegetables, and nuts. There are no prime or unique farmlands within the project area; therefore, this topic is dismissed from further analysis.

Designated Critical Habitat, Ecologically Critical Areas, Wild and Scenic Rivers, International Biosphere Reserve, Other Unique Natural Areas

No areas within the project sites are designated as critical habitat or ecologically critical areas. The Le Conte Ranger Station is near the Middle Fork of the Kings River, which is a wild and scenic river. Rae Lakes Ranger Station is in the drainage of the South Fork of Woods Creek, a tributary of the wild and scenic South Fork Kings River. Crabtree Ranger Station is near Whitney Creek, a tributary of the wild and scenic North Fork Kern River. The proposed project does not threaten the established outstandingly remarkable values and resources of these wild and scenic rivers. The proposed action would not threaten the associated qualities and resources that make the parks significant nor would it affect the parks' status as an international biosphere reserve. These topics are therefore dismissed from further analysis.

Compliance with Federal Accessibility Laws

Section 504 of the *Rehabilitation Act of 1973* (29 U.S.C. 794 P.L. 93-112) and the *Architectural Barriers Act of 1968* (42 U.S.C. 4151) require that programs be reviewed for accessibility for access and for federal services. The purpose of the proposed action is to provide employee housing to wilderness rangers and, secondarily, to provide a point for public contact. No significant change in the current access to these stations would occur as a result of any of the alternatives. Should alternatives 1, 2, or 3 be adopted, accommodation can be provided by the ranger going to meet visitors at the front of the station. Should a visitor need entry to the station because of an injury or other reasons, the ranger would carry or assist that person. Both accommodations are currently employed by rangers at the existing stations and no change in procedure is contemplated as a result of any of the alternatives under consideration. As such, compliance with federal accessibility laws was dismissed from further consideration.

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ALTERNATIVES

INTRODUCTION

This chapter describes the alternatives that were considered to determine the future status of three wilderness ranger stations within Sequoia and Kings Canyon National Parks: Le Conte, Rae Lakes, and Crabtree. During the scoping process, a full range of alternatives for meeting the project purpose and need were developed. The park interdisciplinary team used a CBA process to develop specific project objectives and to determine which alternatives would be selected for detailed analysis.

The criteria used to develop the action alternatives included the project objectives (see “Project Purpose and Need”) to effectively provide for wilderness stewardship, visitor education, and emergency services in the Le Conte, Rae Lakes, and Crabtree areas while furthering wilderness goals and minimizing impacts on the parks’ natural and cultural resources and wilderness character.

In addition, specific project objectives developed and analyzed through the CBA analysis include:

- Supporting the wilderness stewardship mandate

- Supporting visitor health and safety

- Supporting employee health and safety

- Supporting appropriate visitor services (education, information, emergency services)

- Protecting area water quality

- Preventing wildlife from obtaining human food

Below are descriptions of the alternatives that were selected for detailed analysis, followed by those alternatives considered but dismissed from further evaluation.

ALTERNATIVE 1: NO ACTION

Under this alternative, periodic maintenance would continue on the existing stations but no major construction work would occur. The no-action alternative provides a baseline from which action alternatives can be compared, magnitudes of proposed changes can be evaluated, and environmental impacts of those changes can be measured.

Under the no-action alternative, the stations would continue to deteriorate. In the near future, the stations would continue to provide shelter to rangers at these locations. However, to remain usable in the future, the stations would require repairs to prevent further deterioration. In the case of the Rae Lakes Ranger Station, further repair of the structure is not feasible because the station is in an advanced state of deterioration and repairs would be ineffective. Currently the food storage is so ineffective that prior to the ranger patrolling, all food within the station needs to be secured in bear-proof containers. Therefore, under this alternative, it is assumed that the Rae Lakes Ranger Station would not exist in the future.

Over time, at the other two stations, more ranger patrol time would be diverted to station repairs, securing food and equipment from rodents and bears, and attempting to keep the stations’ appearance compatible with the wilderness aesthetic.

The stations would continue to be insufficiently designed for the specialized purpose they are serving. The Le Conte and Crabtree stations were taken from the low-elevation employee housing areas, transported to their current wilderness locations and reassembled. They were not engineered or designed for the snow loads or extreme environmental conditions of high elevation. They were not designed to function for efficient wilderness ranger operations.

The stations would continue to be vulnerable to park visitors breaking in and stealing government and personal equipment. The length of time in a year that the stations could be used for ranger patrol would continue to be limited because the stations do not offer adequate shelter from extreme conditions. They would continue to be dangerous for winter patrol use because they are not engineered for snow loads or designed for safe winter access. The stations would not meet the parks' *Architectural Character Guidelines* (appendix A) for rustic structures in wilderness locations.

Under the no-action alternative, ranger stations would continue to deteriorate to the point of not being usable. No extraordinary management action or rehabilitation effort would be taken to prevent this deterioration.

ALTERNATIVE 2: REPAIR AND REHABILITATE EXISTING RANGER STATIONS AT EXISTING SITES

Under this alternative, the Le Conte Ranger station would receive only routine repair work similar to what is currently being performed by rangers. No subsurface repairs would occur because of the unacceptable adverse impacts that the repair work would have on the existing prehistoric site in the area. No major construction or renovations would occur to the station. All deferred maintenance would be accomplished and some capital improvement would be completed to improve efficiency and sustainability at the Crabtree Ranger Station. The Rae Lakes Ranger Station would be demolished and rebuilt in the same style at the same location. If possible, rehabilitation would adhere to the parks' *Architectural Character Guidelines*.

Rae Lakes Ranger Station

Under this alternative, the Rae Lakes Ranger Station would be demolished and rebuilt because rehabilitation of the existing station at Rae Lakes is infeasible. The existing lumber and supports show major wear, deformity, and damage. Several of the existing support posts have no anchored footings and are standing on rock or bare ground. Therefore, a new tent frame would be constructed to replace the existing tent frame. With the new tent frame, wildlife would continue to have access to the station, which would require additional wildlife-proof food-storage structures outside the tent. Space for ranger living quarters and storage for 3 to 4 months' supply of food and equipment would not be provided. An external temporary gray-water treatment system would be provided.

Work Sequence

Mobilize work crews and deliver supplies and equipment.

Dismantle and remove the existing damaged and worn lumber and materials.

Pack and fly in materials for foundation and tent frame/platform.

Pack and fly out debris as backhaul.

Construct footings or a minimal support foundation.

Construct the new tent frame and platform.

Demobilize work crews and remove supplies and excess materials.

Materials and Tools Needed

Log siding:

Approximately 6,000 pounds of lumber, log siding, and materials.

Equipment and tools:

Approximately 15 helicopter flights totaling approximately 11 hours' flight time would be required to move supplies, materials, and debris too heavy or bulky for stock. A Type 3 (light) helicopter would be used, based at Cedar Grove. Flights would be in June or September to avoid high visitor-use periods in the backcountry. Approximately five flights would be required in June. The remaining flights would occur in September within a 2-week operational period.

3.5 kW generator (ultra-quiet, "inverter" type), small chainsaw, electric air compressor to run power nailers, etc.

Handheld power tools (electric circular saws, cordless drills).

Handheld non-power tools.

Equipment Resupply, Crew Size, Camp

Between 900 to 1,200 pounds of material would be transported by stock to the project site at the start of the project. This would require approximately three pack trains (a maximum of 21 stock total). Approximately 200 pounds per week would be transported to the project site by stock for the duration of the project. Three pack trains with six to eight head of stock per train would be used for the operations. Stock would deliver supplies to the site on a rotating basis, staging out of meadows en route. Demobilization is expected to take eight mule loads. Temporary holding corrals or other means would be used to confine the stock at durable locations. In addition, stock would be fed with supplemental feed and would not be permitted to graze in area meadows.

Crew size and duration on site:

Site visit with construction supervisor and helper—2 days on site. Main construction crew includes a minimum of five people for 1 month.

Camp location:

Crew would camp within 1/4 mile of the site at an existing and previously impacted camp. The camp would be screened from the main trail and more than 100 feet from water. All minimum impact and "Leave No Trace" guidance and considerations would be followed.

Crabtree Ranger Station

Rehabilitation at Crabtree would require exterior installation of natural half-log facing to prevent damage by porcupines and entry by humans and bears, and to comply with the parks' *Architectural Character*

Guidelines for rustic architecture. The logs would be obtained from a source outside the parks; no wood material would come from the parks' wilderness.

Protecting the foundation post supports and floor from porcupines and other rodents would require the installation of a concrete foundation wall. The station would be raised with hydraulic jacks and a trench dug approximately 24 inches deep around the perimeter, below the frost line and deep enough to prevent tunnel access by rodents.

The roof would be removed and supports strengthened to withstand winter snow loads without the need for propping the structure. The addition of roofing material of shingles, cut from cedar obtained in the frontcountry and treated to fire retardant standards, would allow the station to blend in to its surroundings better.

Wood-framed windows would be installed to replace the current aluminum windows. Steel security shutters would be installed on the windows to replace the existing wooden shutters in order to prevent entry by people and wildlife. Interior repairs would be made with natural materials more appropriate to the parks' *Architectural Character Guidelines*. The interior space would be made more efficient for visitor and emergency services, storage, and ranger quarters with the addition of cabinets, architecturally conforming paneling, and traditional window design.

The propane system would be redesigned to health and safety standards with rigid black iron piping and valves. The propane tank would be located outside in an enclosed box anchored on a concrete pad. Gray-water treatment would be added, with a sink, trap, drain, and sump designed for treatment. No modifications of the snow entry crawl space would be possible. All materials would be selected for their ability to blend into a wilderness setting.

Work Sequence

Mobilize work crews and deliver supplies and materials to project site from Horseshoe Meadow (eastside base of operations).

Jack up the station, excavate a trench, and establish a foundation (12–15 cubic yards of material would be excavated for foundation wall trench).

Replace the roof and superstructure (for snow load).

Replace furnishings and cabinetry to comply with the parks' *Architectural Character Guidelines* and to make space more efficient.

Sheath the outside of the building with natural log siding from a commercial supplier to comply with the parks' *Architectural Character Guidelines* for rustic structures in wilderness settings.

Replace the doors, windows, and shutters.

Remove supplies and excess materials from site and demobilize work crews.

Materials and Tools Needed

Foundation:

Approximately 10,000–20,000 pounds of concrete and mortar (final needs vary by site and would not be known until foundation excavations are completed).

Ready-mix concrete and rebar.

Insulated concrete forms—these would be used and left in place, protecting and insulating the foundation. The exposed foundation would be faced with mortared local stone.

Log siding and roofing materials:

Approximately 20,000 pounds of log siding and materials.

Equipment and tools:

Approximately 30 flights totaling approximately 21 hours of flight time using a Type 3 (light) helicopter would be required for transporting supplies and materials too heavy or bulky for stock to transport. Flights of large materials would be completed in 5 to 6 days of continuous flying.

3.5 kW generator, electric cement mixer, small chainsaw, electric air compressor to run power nailers and roofing staplers.

Generator (ultra-quiet, “inverter” type).

Handheld power tools (electric circular saws, cordless drills).

Handheld non-power tools.

Equipment Resupply, Crew Size, Camp

Between 900 and 1,200 pounds of material would be transported by stock to the project site at the start of the project. This would require approximately three pack trains (a maximum of 21 stock total).

Approximately 200 pounds per week would be transported to the project site by stock for the duration of the project. Three pack trains with up to seven head of stock per train would be used for the operations. Stock would deliver supplies to the site on a rotating basis, staging out of meadows en route. Temporary holding corrals or other means would be used to confine the stock at durable locations. In addition, stock would be fed with supplemental feed and would not be permitted to graze in area meadows.

Crew size and duration on site:

Site visit with construction supervisor and helper—2 days on site. Main construction crew—six to eight crew members, 10 to 12 weeks on site (2 weeks to set up, demolition, and prep; 1 week to dig foundation; 1 week to pour; 5 weeks to construct, furnish, and clean up—extra time allotted for contingencies).

Camp location:

Crew would camp within 1/4 mile of the site at an existing and previously impacted camp. The camp would be screened from the main trail and more than 100 feet from water. All minimum impact and “Leave No Trace” guidance and considerations would be followed.

During construction at Rae Lakes and Crabtree ranger stations, the area ranger would operate out of a tent on the site. Visitor services and patrols would continue. The ranger would still be available to visitors at the same marked location of the ranger station. Temporary storage boxes would be supplied for secure food and equipment storage for the ranger and work crew. The additional boxes would be removed at the end of the construction phase.

ALTERNATIVE 3: REPLACE RANGER STATIONS WITH NEW STRUCTURES (PREFERRED ALTERNATIVE)

Alternative 3 would involve constructing new stations in accordance with the parks’ *Architectural Character Guidelines* for rustic structures in a wilderness location. The stations would be engineered for the environmental conditions and snow loads of the sites.

The new stations would be designed to approximately fit the footprint of the existing ranger stations. The existing station at Crabtree is slightly larger than the other stations to accommodate snow survey personnel in the winter. The Crabtree station would still remain within the same approximate footprint as the old station.

The stations would be designed to effectively accomplish the goal of providing for wilderness stewardship actions, safe and efficient structures for ranger living quarters, food and supply storage, visitor services, and emergency operations. Due to the limited work windows (due to weather conditions), it is expected that each cabin would take 1 year to complete, starting the preliminary work in the fall and completing the work in the following summer.

For Rae Lakes and Le Conte ranger stations, the proposed structures would be made of logs with exterior dimensions of approximately 13 × 17 feet, with the roof peaking about 18 feet above the ground. The replacement for Crabtree would be approximately 14 × 22 feet, which is no larger than the current footprint. All materials would be selected in consultation with the parks’ architectural committee. Design would adopt rustic architecture and use natural non-reflective textures and materials and traditional window design. The stations would reflect traditional cabin architecture expected in a mountainous wilderness setting (Figure 5).



Photo 1. Sample Prefabricated Ranger Station

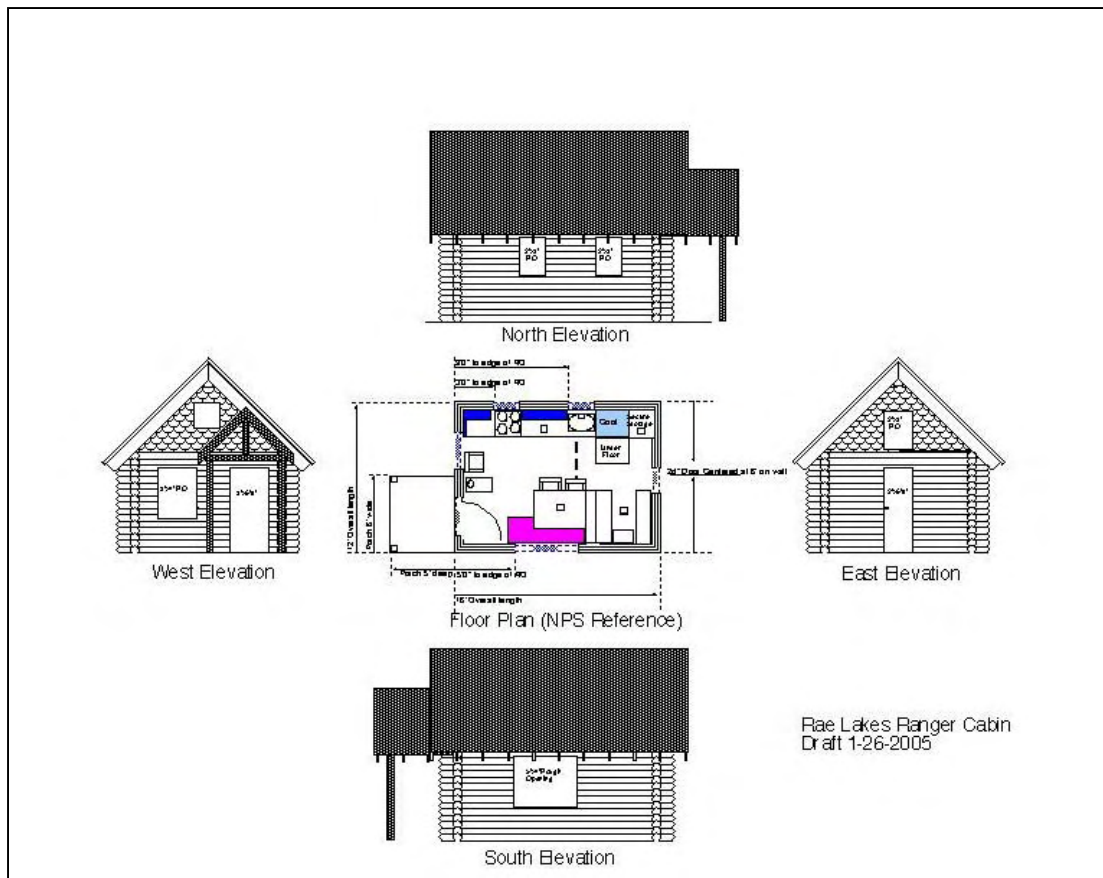


Figure 5. Typical Building Plan for Ranger Stations (Rae Lakes diagram shown)

The station logs would be cut to size by a company specializing in log cabin design and building. The logs would come from sources outside the parks; no wood material would come from the parks' wilderness. All materials would be chosen for their ability to blend into a wilderness setting and efficiently serve their purpose.

During removal and construction, the area ranger would operate out of a tent on the site. Visitor services and patrols would continue. The ranger would still be available to visitors at the same marked location of the ranger station. Temporary storage boxes would be supplied for secure food and equipment storage for the ranger and work crew. The boxes would be removed at the end of the construction phase.

Le Conte Ranger Station Site Selection

Under this alternative, the existing station would be demolished and removed. The site would be restored to a natural setting. The new station would be constructed at a location approximately 100 feet to the south. The site proposed for new construction is also within the area of the potentially significant archeological resources. However, it is an area where the lithic scatter is much less dense than in the existing ranger station area. After lengthy analysis of the entire patrol area, the interdisciplinary team identified this location as the best possible location with the lowest potential environmental effects. A detailed discussion of the criteria used to determine the new site location for Le Conte Ranger Station is located in appendix D.

Construction sequence and loads for Le Conte would be the same as for the Rae Lakes and Crabtree ranger stations. The park archeologist has determined that the existing Le Conte Ranger Station site is a significant prehistoric cultural site. Building on that site would cause unacceptable environmental impacts on park resources; therefore, the following mitigation was developed to prevent unacceptable impacts:

The new station would be placed on a location 100 feet south of the existing station.

The former station site, surrounding grounds, and access trail would be rehabilitated to a natural state.

A small archeological field crew would be used to complete a data recovery effort at the station site prior to construction and rehabilitation.

An archeologist would be on site during all construction activities where ground disturbance occurs.

The park archeologist would identify paths to minimize disturbance to archeological resources. Crews would be instructed to remain within these paths while working.

Approximately 150 feet of new access trail to the new station would be built.

Rae Lakes and Crabtree Ranger Stations

Much of the prefabrication would be done in the frontcountry, leaving only assembly of components in the wilderness. Construction needs and materials would not be significantly different for any of the stations. However, the removal of the Rae Lakes station would require less material flown in and packed out because of the nature of the structure (tent frame as opposed to building).

Specific site conditions would dictate how much digging, fill material, and concrete would be necessary, but the differences would be no more than a cubic yard or two of fill. The following describes the work sequence, materials and tools needed, and equipment and resupply requirements for each station.

Work Sequence (for Le Conte, Rae Lakes, and Crabtree stations)

Mobilize work crews and deliver supplies and equipment.

Demolish existing station.

Excavate approximately 12–15 cubic yards of material for foundation/foundation wall trench.

Pack and fly in materials for foundation, log shell, and framing.

Pack and fly out debris as backhaul.

Pour foundation.

Erect new station shell.

Fly in furnishings and install.

Demobilize work crews and remove supplies and excess materials.

Materials and Tools Needed per Ranger Station

Foundation:

Approximately 10,000–20,000 pounds of concrete and mortar (final needs vary by site and would not be known until foundation excavations are completed).

Building shell and furnishings per ranger station:

Approximately 30,000 pounds of logs, lumber, and large tools.

Equipment and tools:

No more than 50 helicopter flight per station, based on a Type 3 (light) helicopter. The project flights would occur in early summer and late summer/early fall and would be done within 2-week operational periods. The helicopter would be based at Cedar Grove for the Rae Lakes and Le Conte ranger stations, and approximately 28 hours of flight time would be needed for the Rae Lakes operation and 31 hours of flight time for Le Conte. The base of operations for Crabtree would be at Horseshoe Meadows east of the park, and approximately 35 hours of flight time would be necessary for project work.

3.5 kW generator (ultra-quiet, “inverter” type), electric cement mixer, small chainsaw, electric air compressor to run power nailers and roofing staplers.

Handheld power tools (electric circular saws, cordless drills).

Handheld non-power tools.

Equipment Resupply, Crew Size, Camp

Between 900 and 1,200 pounds of material would be transported by stock to the project site at the start of the project. This would require approximately three pack trains (a maximum of 21 stock total). Approximately 200 pounds per week would be transported to the project site by stock for the duration of the project. Three pack trains with six to eight head of stock per train would be used for the resupply operations. Stock would deliver supplies to the site on a rotating basis, staging out of meadows en route. Demobilization is expected to take eight mule loads. Temporary holding corrals or other means would be used to confine the stock at durable locations. In addition, stock would be fed with supplemental feed and would not be permitted to graze in area meadows.

Crew size and duration on site

Site visit with construction supervisor and helper—2 days on site. Main construction crew—six to eight crew members, 7 to 9 weeks on site (1 week to set up, demolition, and prep; 1 week to dig foundation; 1 week to pour; 4 weeks to construct, furnish, and clean up—extra time allotted for contingencies).

Camp location

Crew would camp within 1/4 mile of the site at an existing and previously impacted camp. The camp would be screened from the main trail and more than 100 feet from water. All minimum impact and “Leave No Trace” guidance and considerations would be followed.

ALTERNATIVE 4: REMOVE RANGER STATIONS

Removal of the stations and rehabilitation of the sites would remove the visual intrusion of the structures from the wilderness setting, which is conceptually consistent with the *Wilderness Act*. Removal of the structures would mean there would no longer be ranger stations in these three areas as a point of public contact. Removal would reduce ranger patrol time in the areas currently served by the stations. Rangers on patrol would hike into the patrol area from the nearest trailhead and return to the trailhead at the end of their work week. As these patrol areas are a minimum of a day's hike from the nearest trailhead, this would require at least 2 days each week for accessing the primary patrol area.

Demolition of the structures and removal of the construction materials would require a minimum of a five-person crew, approximately 1 month of labor, use of mechanized hand tools, and helicopter and stock use for removing materials and resupplying the work crew. The areas would be restored to natural conditions.

Work Sequence (for Rae Lakes and Crabtree)

Mobilize work crews, equipment, and supplies.

Tear down old station and package for flight out. Dig out any posts or piers in the ground.

Re-contour and aerate soil (turn over soil to a depth of 12–16 inches to break up compacted ground).

Transplant local vegetation; use local logs and rocks to camouflage and discourage future use.

Demobilize work crews and remove equipment and excess materials.

Materials and Tools Needed per Ranger Station

Equipment and tools:

Up to six helicopter flights with Type 3 (light) helicopter for each station to haul large objects that cannot be transported by stock. Rae Lakes would require approximately 4 hours of flight time; Crabtree and Le Conte would require approximately 5 hours of flight time for each station.

Non-powered hand tools to demolish stations.

The structures would be torn down and cut up with hand tools for packing on stock.

Bear boxes would be flown out, or smashed and cut into pieces for packing on stock.

Weight, total crew time, and mule load estimates (assumes most debris would be taken out by stock):

Rae Lakes: 2,000 pounds, 4 weeks, 20 mule loads.

Crabtree: 15,000 pounds, 5 weeks, 150 mule loads.

Le Conte: 12,000 pounds, 5 weeks, 120 mule loads.

Equipment Resupply, Crew Size, Camp

Approximately 900 pounds of material would be transported by stock to each station at the start of the project. This would require approximately three pack trains (a maximum of 21 stock total). Approximately 200 pounds per week would be transported to each project site by stock for the 3-week project. Three pack trains with six to eight head of stock per train would be used for the resupply operations. Stock would deliver supplies to the site on a rotating basis, staging out of meadows en route. Temporary holding corrals or other means would be used to confine the stock at durable locations. In addition, stock would be fed with supplemental feed and would not be permitted to graze in area meadows. Approximately eight additional mule loads would be needed for the final demobilization from the site after all the cabin debris is removed.

Crew size and duration on site

Site visit with construction supervisor and helper—2 days on site. Main construction crew—four crew members, 3 weeks on site (1 week to move in and tear down each station, 1 week to rehab old site, 1 week to fly out old station and move camp).

Camp location

Crew would camp within 1/4 mile of the site at an existing and previously impacted camp. Their camp would be screened from the main trail and more than 100 feet from water. All minimum impact and “Leave No Trace” guidance and considerations would be followed.

Le Conte Ranger Station

Because the area around the Le Conte Ranger Station has been determined to be a significant prehistoric cultural site, an archeologist would be present to supervise any phase that requires ground disturbance. The following mitigation was developed to prevent unacceptable impacts:

A data recovery effort by a small archeological field crew would be carried out at the station site prior to construction/removal/restoration activities.

An archeologist would be on site during all activities where ground disturbance occurs.

Paths would be identified by the park archeologist to minimize disturbance to archeological resources. Crews would be instructed to remain within these paths while working.

Native herbs and grasses would be planted in disturbed areas under the direction of the park vegetation rehabilitation/restoration specialist.

MINIMUM TOOL CONSIDERATIONS AND MITIGATION

All construction options for alternatives 2, 3, and 4 would require transport of materials (tools, equipment, building material, and removed construction debris) in and out of the job site. Support of the construction crew would also require transport of food and gear to and from the construction site. Transport of food, equipment, and material would be done by packstock and/or helicopter. The type of transport is guided by NPS *Director’s Order 41* (NPS 1999) and *Sequoia and Kings Canyon National Parks’ Management Directive 49* (NPS 2009) (appendix E).

As defined in *Director's Order 41* (NPS 1999), section C.2: “Minimum Tool means a use or activity, determined to be necessary to accomplish an essential task, which makes use of the least intrusive tool, equipment, device, force, regulation, or practice that will achieve the wilderness management objective. This is not necessarily the same as the term “primitive tool,” which refers to the actual equipment or methods that make use of the simplest available technology (i.e., hand tools).”

The 2009 *Sequoia and Kings Canyon National Parks Management Directive 49* (NPS 2009) defines the minimum tool as “the management method (tool) that causes the least amount of impact to the physical resources and experiential qualities (character) of wilderness.” Stock is generally the preferred method of supporting field crews in the park wilderness areas. Helicopter support is used (1) to transport equipment that is too fragile for other methods; (2) to transport samples and other cargo which are time-dependent, require stable conditions, or are of large volume or weight; (3) where stock are not allowed or would be unduly damaging to resources; or (4) in areas that are inaccessible to stock.

Stock would be the transport method used to support this project except when one of the following conditions applies:

Equipment is fragile.

Cargo is time-dependent or requires stable conditions.

Cargo is large, typically over 8 feet in any one dimension, which would include most logs or large lumber and very bulky items.

An individual piece of cargo weighs over 250 pounds. This would include items such as building logs and possibly some construction equipment.

Stock is not allowed in the area or the area is otherwise inaccessible to stock.

Stock would create unacceptable environmental impacts and it is impractical to reschedule stock use for a less damaging time.

Use of stock would cause more environmental impact than a helicopter.

Environmental hazards to personnel or animals (e.g., snow or high water crossings) create unsafe conditions for stock use and transport of the material cannot wait until conditions improve.

Whenever any one of those conditions applies, a helicopter would be defined as the minimum tool for transportation of heavy and bulky equipment and supplies (appendix B).

STOCK-USE CONSIDERATIONS AND MITIGATION

The presence of stock is recognized as a traditional wilderness use. Stock has long been used to transport personnel and material to remote wilderness areas in Sequoia and Kings Canyon National Parks. When stock are used, while not in immediate use they are usually tied in one area during the day and then turned loose at night to graze the surrounding meadows and other vegetation. When stock are tied or confined to one area, their hooves disturb the ground, eroding the surface or sometimes exposing tree roots.

Standard mitigation practice is to choose a site at least 100 feet from water, on ground with minimal vegetation, and that avoids terrain where tree roots might become exposed by trampling. A line is strung between trees about 50 feet apart and stock is tied along the line. Additional mitigation for this project

would include placing temporary hitch rails to remove stock lines from trees or constructing temporary enclosures to spread out stock use over a wider area.

Supplemental stock feed would be used and would be carried in by mules. Feed would be certified weed free. Before leaving, packers would rake and scatter manure and clean up all loose feed so it would not be available to wildlife.

Under the direction of the parks' plant ecologist, meadows would be monitored by the area ranger to make sure that unacceptable environmental impacts on meadows are not occurring as a result of grazing (removal of biomass) or mechanical impacts on meadow sod or stream banks. Where established criteria show that unacceptable environmental impacts are occurring or would soon occur, the area is limited or closed to stock.

Sequoia and Kings Canyon National Parks' packstock operations are subject to the same minimum impact standards and grazing regulations as general park users. In addition, for each station, the parks' plant ecologist or their designee would survey the areas where stock would travel or be held and write a site-specific grazing plan for construction operations. The site-specific grazing plan would outline mitigation measures and best management practices to be used to reduce environmental impacts as a result of stock use.

All crew supplies would be carried in and taken out by packstock. Where possible, materials would also be transported by stock. However, if stock is not the selected method of transport for any of the reasons detailed above, then helicopters would be used to transport materials.

HELICOPTER TRANSPORT CONSIDERATIONS AND MITIGATION

Helicopters have been used in Sequoia and Kings Canyon National Parks for project work since the early 1950s. From May through October, the parks have a helicopter based at park headquarters for use in patrol and law enforcement functions, fire activities, SAR, resource management, and research, as well as supporting park wilderness management activities. When approved for use on a particular task (for use in wilderness, a minimum requirement / minimum tool analysis is required), the helicopter flies from park headquarters and then either hovers, delivering a load via a line and cargo net, or lands at the work site. A trained helicopter crew member is always present at the work area to direct air operations, handle cargo, and ensure public and employee safety. Except for SARs, most helicopter operations are completed in less than 30 minutes at the operation site.

The helicopter normally based at Sequoia and Kings Canyon National Parks is classified as a light helicopter (Type 3). It is limited to loads of about 600 to 800 pounds per flight.

Mitigation measures for helicopter use would include:

- Helicopter use would be guided by minimum tool determinations and best management practices.

- Use would be limited to the absolute minimum necessary to bring in and carry out material and debris that is too large for packstock to carry or when packstock are determined to be inappropriate based on the previous guidance.

- If possible, flights would be scheduled before and/or after the peak visitation periods of July and August.

Flights would occur only between 8:00 a.m. and 5:00 p.m. and would follow flight paths to and from the project sites designed to avoid sensitive and highly pristine areas, as determined by the wilderness coordinator (Figure 6).

Park staff would inform hikers of possible noise intrusions, when they would occur, and alternative routes or times visitors can use to avoid the noise. Park staff would inform visitors camping near the construction and landing areas of flights and construction activities.

Rae Lakes bighorn sheep use areas: The parks' wildlife biologist would provide a map of known bighorn sheep areas, and the helicopter would avoid flying above or landing in those areas; the final approach to the landing zone would stay below the area of the historic sightings. Flights would be suspended if sheep are observed within 1/2 mile of the construction area. The landing zone for the helicopter would be located approximately 500 feet from an area where sheep have been observed.

ADDITIONAL MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

Mitigation measures are designed to prevent or minimize adverse impacts or to contain impacts within acceptable limits during and after project implementation. In addition to the previously described minimum tool considerations and mitigation for stock and helicopter use, the following are guidance and mitigation measures that would be incorporated into project implementation.

Work Crews

The maintenance supervisors and crew leaders would select a previously impacted site for project base camps.

All crews would be instructed in and expected to use "Leave No Trace" and minimum impact camping practices.

Approved food-storage boxes would be provided for the construction areas and crew camps.

Crew camps would be located at previously impacted areas with minimum potential to disrupt wildlife habitat or habits.

Crews would be instructed on proper food-storage practices and camps would be inspected to make sure food is properly stored.

Water for the work crews both on site and in camp would be taken from a river or stream that would only be accessed by established paths. Sensitive areas in both the work site and crew camp areas would be flagged or marked and crews would be instructed to avoid them.

Gray water would be disposed of over 100 feet from any surface water and would be poured into a rock-lined pit screened to prevent rodents or birds from accessing it.

Special containers, which would be packed out to a sewage treatment facility, would be used for toilets.

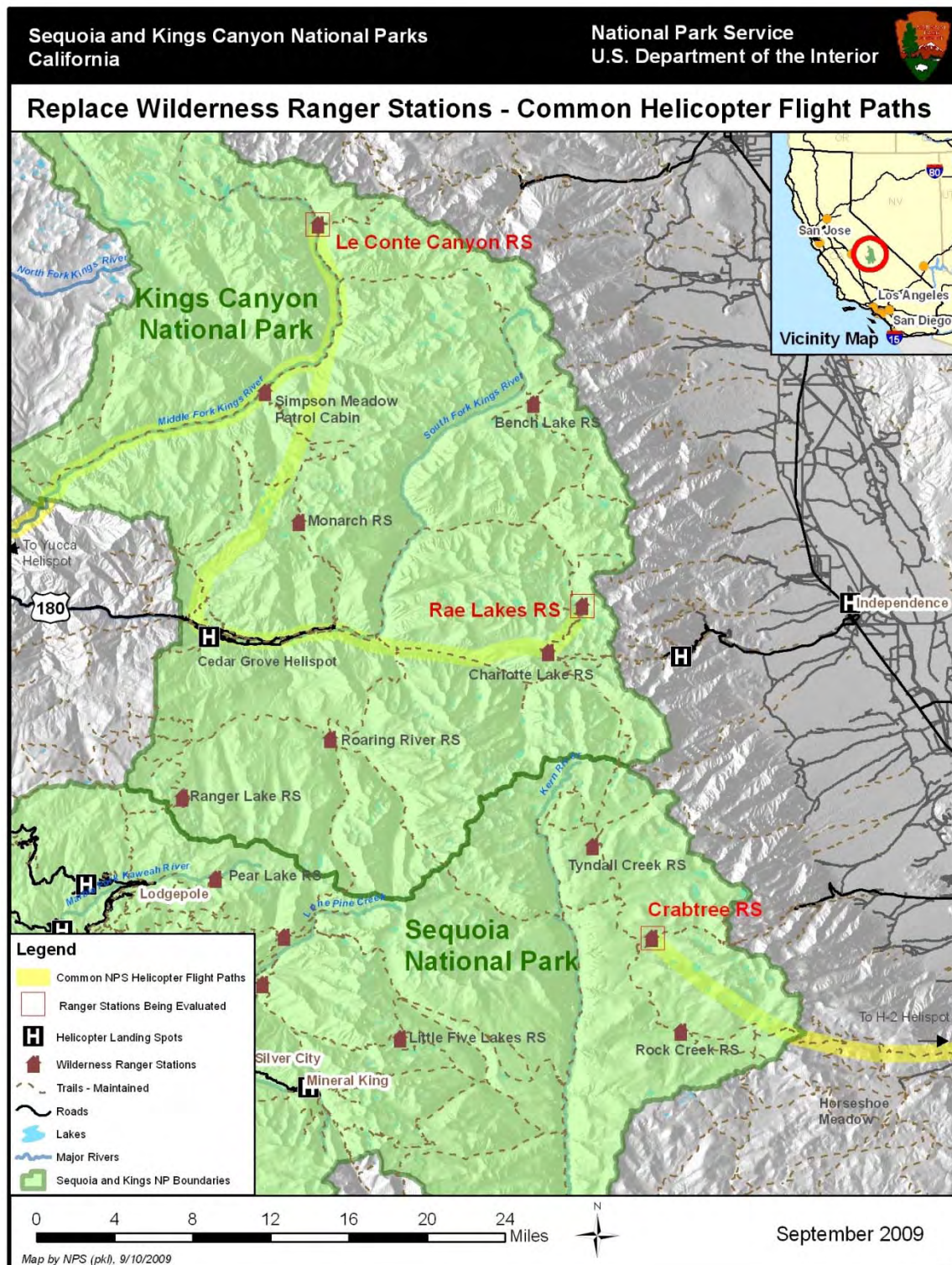


Figure 6. Flight Path Map

No motorized equipment would be used in camp. A propane/white gas or battery-powered lantern would be used to light the cooking area inside the cook tent. All other light would be from personal flashlights and headlamps.

Supervisors would ensure that group noise levels do not disturb nearby campers.

Construction Timing and Techniques

Depending on snow, construction would begin in July and be finished by mid-August. If weather is a factor, construction on a station may be split into two seasons to reduce work during peak visitation times.

Construction activities would be planned to minimize or eliminate any procedure that might displace normal visitor access or impact on their wilderness experience.

Construction would be done only between 8:00 a.m. and 5:00 p.m.

During construction periods, wilderness visitors would be informed of construction activities. This would occur through the permit issuance process, wilderness rangers on the trail, and other educational contacts. Where possible, visitors would be told of alternative routes and times to avoid these noise intrusions.

Construction and staging areas would be identified and limited to previously impacted areas. Workers would be instructed to confine activity to those defined areas.

Construction debris removed (e.g., demolition debris from old station, excess mixed cement, sawdust and chips from treated wood, packaging materials) would be disposed of at appropriate areas outside the parks or stockpiled at approved locations within the parks to be used in future projects.

The material removed as a result of digging a foundation trench is expected to be no more than 15 cubic yards for any of the proposed stations. Excess fill would be distributed evenly to blend into the natural downwash of the slope or used nearby as trail fill if appropriate and needed.

Concrete and mortar would be mixed by electric mixer at least 100 feet from surface water. Tools and equipment would be cleaned away from surface water. Excess construction water would be disposed of inside the foundation wall.

Standard erosion-control measures such as silt fences and/or sandbags would be used to minimize any potential soil erosion.

All disturbed areas would be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed.

Any cut trees would be flush cut and camouflaged to reduce visibility.

All gas-powered tools would be inspected for leaks (fuel, oil, hydraulic fluid, etc.) and all necessary repairs would be made before the commencement of work.

Unless unacceptable impacts are found to occur as a result (as is the case with Le Conte), the new stations would be placed in the same footprint and impact zone as the previous stations.

Where possible, building design would take advantage of naturally occurring site conditions, such as sunlight, shade, ventilation, views, drainage, and existing vegetation. Products used would not be rare or endangered. Where possible, recycled products would be used. Nontoxic products would be used and design would strive for a high level of energy efficiency.

Sustainable design principles would be used that meet all applicable Uniform Building Codes, National Fire Protection Association codes, and Occupational Safety and Health Administration requirements.

The proposed buildings and structures would comply with applicable regulations concerning fire safety and lighting. The new stations would use all-natural log siding and materials to comply with the parks' *Architectural Character Guidelines* for rustic structures.

Stations would be aesthetically matched with the surrounding environment and would generally not be visible from normal visitor-use corridors.

All log materials from off site used in construction would be inspected by park staff for insect pests, pathogens, or disease prior to delivery to the wilderness construction site to mitigate introduction of non-native organisms. Logs would be cleaned for pathogen and noxious weed control. Prior to wilderness delivery, the logs would be stored on asphalt and covered whenever possible and the storage site(s) would be recorded and monitored for 1 to 3 years after the logs are removed to check for non-native species.

Where bedrock or boulders prevent digging, holes would be drilled in the rock with a gas-powered drill and anchors inserted for the foundation. Cement walls would be faced with native rock mortared into place. Stone from excavation would be reused in wall facings where available.

Excess materials from station repair or removal would be cut up for complete removal to a disposal site or, where possible, a materials recycling facility.

The logs used for the structure would be flown in several at a time, depending on the lifting capacity of the helicopter. Depending on site constraints, materials may have to be staged up to 150 feet from the work site and a high line rigged to take logs and other heavy material to the construction site. If this is done, the trees used to anchor the high line would be padded to protect the bark.

All lumber and logs for the project would be pre-cut and drilled in the frontcountry for later assembly on site. However, some use of hand power drills and chainsaws would be necessary for final fitting.

Vegetation

Incidental native vegetation threatened with disturbance from construction would be removed from project areas for later reuse during restoration activities. Herbaceous perennials would be transplanted before trenching for the foundation.

If a species of concern is found during the final survey, appropriate mitigation measures would be taken, which could include transplanting the vegetation, collecting seed, or flagging areas to protect the species from construction activities.

Construction materials would be inspected for soil and plant parts. Dirty materials would be cleaned by pressure washing or other means. Construction materials that could acquire seeds from surrounding areas would be covered.

In the frontcountry, construction materials would be staged and sling-loaded from asphalt, rather than on vegetated edges of helispots, whenever possible.

A list and/or map of staging areas would be maintained so that sites can subsequently be surveyed for invasive non-native plants. All staging and construction sites would be surveyed for invasive non-native plants 1 to 3 years after project completion.

Construction crews would inspect their shoes, clothing, and equipment for seeds and soil before leaving the frontcountry. Seeds and soil would be removed and placed in bagged garbage.

Packstock (fur and hooves) and equipment would be inspected and cleaned of seeds and dirt, as necessary, before leaving the frontcountry.

California certified weed-free cubes, grain, or weed-free hay would be fed to stock at frontcountry pack stations.

Water Quality

Construction and materials would be located at least 100 feet from open water to reduce the likelihood of construction-related debris or sediment entering surface water.

Storing of hazardous materials and fueling of all power tools would be restricted to park-approved equipment staging areas.

Spilled hazardous materials would be cleaned up immediately and would not be allowed to seep into the soil or reach open water sources.

Dirty construction water would be poured inside the foundation wall of the station at least 100 feet from surface water.

Sawdust and chips from treated wood would be packed out as trash and most of the cutting and drilling would be done in the frontcountry before lumber is brought in.

Construction crews would use appropriate methods for human waste treatment (e.g., pit toilet or “Johnny-pot” for removal).

Soundscapes

To minimize visitors’ exposure to unnatural sounds, construction would occur only from 8:00 a.m. to 5:00 p.m. and may be delayed until visitors leave their camps in the morning. Visitors camping in the area would be contacted before motorized tools are turned on in the morning.

An ultra-quiet generator would be used and turned off when it is not in use.

To reduce the need for power tools on site, most of the cutting and drilling of the structure would be done in the frontcountry prior to transport to the project sites. On-site use of power tools would be kept to a minimum and used only where hand tools cannot achieve the same result in a minimum amount of time.

Cultural Resources

Maintenance supervisors would instruct work crews of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Construction workers and supervisors would be advised of the laws and guidelines and special sensitivity to ensure protection of cultural resources.

Should any unknown cultural resources be encountered during construction at any of the three ranger station locations all ground disturbance will be immediately stopped. The parks' archeologist or a qualified representative will examine the area as soon as possible and will follow the requirements of the *National Historic Preservation Act* (NHPA), and any other applicable cultural resource laws, as needed.

Due to the presence of archeological resources at the Le Conte Ranger Station, the station location under the preferred alternative would be moved 100 feet to a new site outside the area of potential effect.

Any level of repair conducted at Le Conte would comply with the following mitigations:

- All current impacts (e.g., pathways, firewood piles, stock use) would be kept to existing areas.

- No digging or ground disturbance would occur within a 100-foot radius of the existing station.

- The parks' archeologist would be consulted if any ground disturbance is proposed.

- Employees assigned to the station would receive a briefing from the parks' archeologist regarding the known limits of the site, the need to prevent impacts on the site, and the associated cultural resource management regulations.

- Paths would be identified and marked by the parks' archeologist to minimize disturbance to archeological resources. Patrol rangers and work crews would be instructed to remain within these paths while working.

- In the event that previously unknown cultural resources are encountered, a qualified archeologist will be contacted immediately for advice.

For the Le Conte Ranger Station alternatives 3 and 4, in addition to the above mitigation measures, a memorandum of agreement (MOA) would be established between the NPS and the SHPO. The MOA would establish a data recovery plan in consultation with the SHPO. The data recovery plan would include the following:

- Archeological excavation of the potentially significant archeological site would occur prior to any ground-disturbing activities.

- All ground-disturbing activities associated with demolition of the existing station, restoration of the existing site, and construction of the new station would be monitored by the parks' archeologist.

Proper supervision of construction and compliance with mitigation measures established by this EA would require that the parks' maintenance supervisor, archeologist, and the plant ecologist or their designees visit the sites during construction.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED ANALYSIS

RELOCATING THE RAE LAKES RANGER STATION 150 FEET UPHILL

A location about 150 feet upslope from the current ranger station site was carefully examined for suitability as a station site. It is a mostly flat site with good access to water. Although there is some sign of previous human activity there, the site does not show significant evidence of recent human disturbance. According to the parks' plant ecologist, the temporary camp is substantially recovered from the human disturbance it seems to have received more than 70 years ago. This site was considered due to its operational advantages over the existing site, including easier access for stock, better access to water, and more space available for emergency operations. It was determined that those advantages do not outweigh the additional environmental impacts that would occur as a result of moving the station to a new location. Therefore, this alternative was dismissed from further consideration.

REPLACING STATIONS WITH YURTS

Yurts are commercially made tent-like structures made of canvas that fit over a metal or wooden frame. They are set up on a wooden platform. They are able to support minor snow loads (under a foot) and would be structurally adequate for use as a ranger station from June through mid-October. In the winter, the canvas/tent is removed from the platform, reducing visual intrusion on wilderness. In winter, there is no evidence of a station at all. In 1999, a yurt was built to replace the canvas and wood tent-frame cabin at Little Five Lakes. This yurt is usable only during the summer months and is used as temporary quarters only.

The proposal to replace any or all of the ranger stations under consideration with yurts was dismissed for a number of reasons. The useful lifespan of a yurt in summer at project site altitudes is about 15 years; the costs are excessive for the relatively short time it would be usable and maintenance requirements are high. Associated costs for a new or rehabilitated natural log structure are only slightly more than for a yurt. The life span of the log structure is 40 – 50 years. In addition, although some may consider yurts more aesthetically pleasing than canvas tents, yurts do not comply with the parks' *Architectural Character Guidelines* for rustic structures. They do not use traditional materials in construction, and their shape and color generally do not blend with forest and granite surroundings as well as natural log construction does. Yurts would not be available to snow survey and ranger personnel on winter patrols or SARs because they are not able to withstand heavy snow loads and are removed in the winter. Finally, yurts do not provide an adequate barrier to entry by bears, other wildlife, or people. Yurts cannot be sealed to keep out wildlife. For these reasons, yurts were dismissed from consideration as an alternative replacement station for the wilderness ranger stations.

REBUILDING THE STATIONS WITH ONLY NATIVE MATERIALS

Park staff considered using native materials from the project area to construct the ranger stations. Field reviews determined that there are not enough suitable trees and rocks on site to meet needs. There would be increased impacts on natural resources if native materials were used for project work. Park staff considered using trees from other areas of the park for the construction of the structures. This would involve cutting trees from within the park and/or using hazard trees, transporting them (by helicopter or truck) to a milling location to make them suitable for use in construction, then transporting them by helicopter to the project sites. Again, using park materials could result in an unacceptable number of cut trees and adverse impacts on natural resources. In addition, there would be a longer time required on site for project work—to find, cut, prepare, and custom fit the materials to construct the structures. This would

involve additional disturbance to park visitors and wilderness resources due to the presence of work crews for extended periods of time. Finally, some materials would still have to be brought into the project sites, including concrete for the foundations, materials to furnish the station, and internal fixtures. Therefore, this alternative was not considered feasible and was dismissed from further evaluation.

REBUILDING THE STATIONS USING ONLY NON-MECHANIZED TOOLS AND EQUIPMENT

It is not possible to transport all supplies solely by stock due to the weight and bulk of some materials. Some helicopter use is required. In addition, through the minimum requirement / minimum tool analysis process, the park determined that limited use of mechanized tools was necessary to meet project objectives and to construct a sustainable ranger station. Though some construction could occur in the frontcountry areas of the park, including cutting and drilling on the structure, there would be some work that would be necessary on site, such as preparing the cement for the foundation wall, which requires a cement mixer, and final fitting of the logs, which would require minimal use of motorized hand drills, power nailers, staplers, and a compressor. Also, a chainsaw would be needed when it is impractical for safety to use a hand saw, such as for larger-diameter trees (8–12 inches diameter at breast height [dbh]) and for additional notching that may be required on the logs for final fitting. Therefore, it was determined that minimal mechanized tools and equipment would be needed to meet project objectives and this alternative was ruled out from further analysis.

USING A MEDIUM OR HEAVY LIFT HELICOPTER TO REDUCE NUMBER OF FLIGHTS

The helicopter normally based at Sequoia and Kings Canyon National Parks is classified as a light helicopter (Type 3). As such, it is limited to loads of about 600 pounds per flight. A medium helicopter (Type 2) can carry loads of about 1,800 pounds per flight. A heavy lift helicopter (Type 1) can carry upwards of 2,000 pounds per flight. The ability to carry heavier loads per flight would result in fewer flights per project. The use of a medium or heavy lift helicopter was evaluated but rejected as a feasible alternative. These types of helicopters would have to be specifically requested and contracted. During the summer and fall seasons, availability would be an issue due to priority work on fires. Logistically, it would be more difficult to stage, fuel, and support a heavy lift helicopter. In addition, the costs associated with a heavy lift helicopter increase the overall costs of the project exponentially (more than \$250,000 for helicopter use per site). Therefore, this alternative was ruled out.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The CEQ defines the environmentally preferred alternative as “the alternative that will promote the national environmental policy as expressed in the National Environmental Policy Act (NEPA) § 101.”

[Section 101 states that] it is the continuing responsibility of the Federal Government to:

Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The identification of the environmentally preferred alternative was based on an analysis that balances factors such as physical impacts on various aspects of the environment, mitigation measures to deal with impacts, and other factors, including the statutory mission of the NPS and the purposes for the project. (For a comparison of the alternatives and the potential environmental effects under each alternative, see Table 3 and Table 4. A full discussion of impacts is presented later in this document.)

Alternative 1, No Action, is not the environmentally preferred alternative for the following reasons: (1) it would continue to demand patrol ranger time for structural fixes, which would mean less time for improved wilderness stewardship, visitor education, and emergency services in the Le Conte, Rae Lakes, and Crabtree areas; (2) the deteriorating structures would continue to have adverse impacts on the parks' natural and cultural resources and wilderness values; (3) the stations would continue to be inadequate for ranger operations; (4) safety hazards to personnel under winter conditions would continue to be a problem; (5) the structures would continue to deteriorate until they were unusable and would continue to impact wilderness surroundings; and (6) the structures would continue to be out of compliance with the *Architectural Character Guidelines* for rustic structures in wilderness. Thus, alternative 1 would not meet any of the six goals under NEPA section 101.

Alternative 2, Repair the Existing Stations, is not the environmentally preferred alternative for the following reasons: (1) while it would improve the condition of two of the ranger stations, it would not provide optimal wilderness stewardship, visitor education, and emergency services capabilities; (2) the alternative would result in improved facilities but would not provide fully safe, structurally sound, and aesthetically pleasing ranger stations; and (3) there would continue to be impacts on cultural resources from the presence of a ranger station at the Le Conte site. Therefore, NEPA goals 2, 3, and 4 would not be met under this alternative.

Alternative 3, Replace Ranger Stations with New Structures, is not the environmentally preferred alternative because structures would remain in wilderness and there would be impacts associated with the reconstruction work; however, this alternative would meet several of the goals under NEPA section 101. It would enhance wilderness opportunities for a variety of users, as on-site rangers would be able to more effectively meet wilderness stewardship and resource-protection mandates by providing visitor education, emergency services, and resource monitoring. It would result in the protection to cultural resources at Le Conte. It would provide stations that meet the parks' *Architectural Character Guideline*. It would reduce safety hazards to personnel and cooperators. However, because this alternative would not result in the least harm to cultural and natural resources when compared with the other alternatives, it is not the environmentally preferred alternative.

Alternative 4, Remove the Stations and Rehabilitate the Sites, would remove structures from the wilderness and would be considered the environmentally preferred alternative because it would achieve the restoration of naturalness to the wilderness setting at these locations. This alternative would result in the restoration of wilderness at these sites, and would result, in the long-term, in the least harm to cultural and natural resources. This alternative surpasses the other alternatives in realizing the full range of national environmental policy goals as stated in section 101 of NEPA.

Table 3. Alternatives Comparison

Project Objectives	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
	This alternative provides a baseline from which action alternatives can be compared. The park would keep existing ranger stations and perform minimal periodic maintenance to keep the structures usable. It is likely that Rae Lakes would not be usable regardless of repair work. No major construction work would occur at any of the sites.	Repair Crabtree station, complying with architectural character appropriate for rustic structures in wilderness setting. The Rae Lakes tent frame would be replaced. Due to cultural resource concerns, Le Conte would not be improved and would continue to be minimally maintained.	Crabtree, Rae Lakes, and Le Conte stations would be replaced with log ranger stations. The stations would be compatible with a wilderness setting and would be structurally engineered for snow load and weather.	All three ranger stations would be dismantled and removed. The sites would be rehabilitated to restore the natural conditions.
Wilderness aesthetics	All stations: Station would not have an architectural character appropriate for rustic structures in wilderness setting. Wilderness aesthetics would likely degrade in the patrol area due to reduced patrol times as stations deteriorate or become unusable.	Crabtree: Station would have an architectural character appropriate for rustic structures in wilderness setting. Wilderness aesthetics would be improved locally. Le Conte and Rae Lakes: Station would not have an architectural character appropriate for rustic structures in wilderness setting. All stations: Wilderness aesthetics would be improved locally at Crabtree and would continue to be maintained in the patrol areas due to frequent patrols.	All stations: Architectural character would be appropriate for rustic structures in wilderness setting. Wilderness aesthetics would be improved locally and would continue to be maintained in the patrol areas due to frequent patrols.	All stations: Removal of the stations would improve wilderness aesthetic and naturalness qualities of the project areas. Wilderness aesthetics would likely degrade in the patrol area due to reduced patrol times.
Meets need for structural soundness for winter operations	All stations: Would not fully support winter operations.	All stations: Would not fully support winter operations.	All stations: All would fully support winter operations.	All stations: Would not support winter operations.

Project Objectives	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Meets operational efficiency needs (with historic staffing levels of one ranger per patrol area)	All stations: Operational efficiencies for maintenance and patrol function would decrease over time because of increased maintenance needs and the closure of Rae Lakes Ranger Station.	Rae Lakes and Crabtree: Somewhat reduced station maintenance time. Operational efficiencies for patrol functions would be increased. Le Conte: Station would not be fully rehabilitated. Operational efficiencies would be the same as for the no-action alternative.	All stations: Reduced station maintenance time. Operational efficiencies for patrol function would be increased.	All stations: No station maintenance needs. Operational efficiencies for patrol function would be decreased because of greater time to reach primary patrol areas.
Supports wilderness stewardship mandate (resource monitoring and protection—with historic staffing levels of one ranger per patrol area)	All stations: Patrol days for carrying out wilderness stewardship goals: Le Conte: 88 days. Rae Lakes: 80 days. Crabtree: 102 days. Construction periods of 1–2 weeks per year per station. Does not fully achieve the goal of effectively carrying out the parks' mandate for wilderness stewardship, resource protection, visitor protection, and education. Does not fully meet objective of enhancing visitor enjoyment and protecting wilderness resources. Rangers' ability to effectively monitor and conduct wilderness stewardship activities would be adversely affected by increased time needed to maintain stations.	All stations: Patrol days for carrying out wilderness stewardship goals: Le Conte: 88 days. Rae Lakes: 85 days. Crabtree: 105 days. Crabtree: Construction period of 10–12 weeks. Rae Lakes: Construction period of 1 month. Le Conte: Construction periods of 1 to 2 weeks per year. Rae Lakes and Crabtree: Achieves the goal of effectively carrying out the parks' mandate for wilderness stewardship, resource protection, visitor protection, and education. Meets the objective of enhancing visitor enjoyment and protecting wilderness resources. Rangers' ability to effectively monitor and conduct wilderness stewardship activities would be improved by increased time available for patrol. Le Conte: Le Conte would continue to limit wilderness stewardship due to time needed for station maintenance.	All stations: Patrol days for carrying out wilderness stewardship goals: Le Conte: 91 days. Rae Lakes: 91 days. Crabtree: 105 days. Construction period of 7–9 weeks per station. Rangers' ability to effectively monitor and maintain park resources and provide appropriate visitor services would be improved by increased time available for patrol. Meets the objective of effectively carrying out the parks' mandate for wilderness stewardship, resource protection, visitor protection, and education. Meets the objective of enhancing visitor enjoyment and protecting wilderness resources.	All stations: Patrol days for carrying out wilderness stewardship goals: Le Conte: 41 days. Rae Lakes: 41 days. Crabtree: 41 days. Demolition period of 4–5 weeks per station. Archeological study period of 6 weeks. The ability of rangers to effectively monitor and conduct wilderness stewardship activities would be adversely affected. Does not meet the goal of effectively carrying out the parks' mandate for wilderness stewardship, resource protection, visitor protection, and education. Does not meet the objective of enhancing visitor enjoyment and protecting wilderness resources.

Project Objectives	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Supports visitor health and safety (with historic staffing levels of one ranger per patrol area)	All stations: Rangers spending increasing time on maintenance tasks would not be available to effectively patrol trails and educate visitors about safety hazards.	Rae Lakes and Crabtree: Rangers would have more time to patrol trails and educate visitors about safety hazards. Le Conte: Station would not be fully rehabilitated. Health and safety impacts would be the same as for the no-action alternative.	All stations: Rangers would have more time to more effectively patrol trails and educate visitors about safety hazards.	All stations: Rangers would have less time to effectively patrol trails and educate visitors about safety hazards.
Supports employee health and safety	Crabtree and Le Conte: No emergency exit in winter; stations would continue to be hazardous for personnel in winter. Rae Lakes: Station would continue to be hazardous to personnel performing routine maintenance on tent frame.	Crabtree and Le Conte: No emergency exit in winter; stations would continue to be hazardous for personnel in winter. Rae Lakes: Station would continue to pose risks to personnel performing routine maintenance on tent frame.	All stations: Stations designed and engineered for use in winter would have emergency exits designed for winter use.	All stations: Rangers and snow surveyors on winter patrol or data collection would not have safe shelter in winter, creating hazardous conditions for personnel. Rangers would only have tents to use as shelters during severe weather conditions (in all seasons), which could create a hazardous situation.
Supports appropriate visitor services (education, information, emergency services—with historic staffing levels of one ranger per patrol area)	All stations: Rangers would continue to provide education, information, and emergency services to visitors. Effectiveness would be slightly compromised by need to spend time on maintenance tasks.	Rae Lakes and Crabtree: Rangers continue to provide education, information, and emergency services to visitors. Effectiveness would be improved by less time required for maintenance. Le Conte: Station would not be fully rehabilitated. Visitor service impacts would be the same as for the no-action alternative.	All stations: Rangers would continue to provide education, information, and emergency services to visitors. Effectiveness would be improved by less time spent on building maintenance.	All stations: Rangers would spend less time in patrol area. Effectiveness in providing education, information, and emergency services to visitors would be reduced.

Project Objectives	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Protects water quality (with historic staffing levels of one ranger per patrol area)	<p>All stations: Station gray water would continue to be poured into sump (gravel-lined ground hole). As station maintenance needs increase, less patrol time would be spent educating visitors about the need for minimum-impact camping practices that protect water quality.</p>	<p>Rae Lakes and Crabtree: Station gray water would drain into designed treatment box. Rangers would be able to spend more time on patrol educating visitors about the need for minimum-impact camping practices that protect water quality. Le Conte: Station would not be fully rehabilitated. Water quality impacts would be the same as for the no-action alternative.</p>	<p>All stations: Station gray water would drain into designed treatment box. Rangers would be able to spend more time on patrol educating visitors about the need for minimum-impact camping practices that protect water quality.</p>	<p>All stations: Any gray water generated from ranger camping would be poured into sump. Rangers would be able to spend less time on patrol educating visitors about the need for minimum-impact camping practices that protect water quality.</p>
Prevents wildlife (bears and rodents) from obtaining human food (with historic staffing levels of one ranger per patrol area)	<p>All stations: Stations would continue to be vulnerable to bears and rodents gaining entry. As rangers spend more time on maintenance tasks, they would be less effective about enforcing food-storage regulations and educating the public about proper food-storage techniques. Rae Lakes: Rae Lakes tent station would continue to be vulnerable to bears and rodents gaining entry.</p>	<p>Crabtree: Stations would be structurally resistant to bears and rodents gaining entry. Rae Lakes: Station would continue to be vulnerable to bears and rodents gaining entry. Le Conte: Station would not be fully rehabilitated. Wildlife food impacts would be the same as for the no-action alternative. Rae Lakes and Crabtree: As rangers spend less time on station maintenance tasks, they would be more effective about enforcing food-storage regulations and educating the public about proper food-storage techniques.</p>	<p>All stations: Stations would be structurally resistant to bears and rodents gaining entry. As rangers spend less time on station maintenance tasks, they would be more effective in enforcing food-storage regulations and educating the public about proper food-storage techniques.</p>	<p>All stations: There would be no station vulnerable to bear or rodent entry. Rangers would be required to use portable animal-resistant containers and existing food-storage lockers while on patrol. Rangers would have less time to enforce regulations and effectively educate the public about proper food-storage techniques.</p>

Table 4: Impact Summary

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Vegetation	<p>There would be no direct impacts on vegetation from this alternative, and indirect effects from the increased use of stock are negligible to minor. There would be no cumulative effects on vegetation from this alternative. Because there would be no major adverse or unacceptable impacts on vegetation, there would be no impairment of park resources or values under this alternative.</p>	<p>Overall, this alternative would result in negligible to minor adverse effects on vegetation at the Crabtree and Rae Lakes project sites, and negligible to minor adverse effects on vegetation at the Le Conte site with increased stock use to support the maintenance and operation of that facility. There would be no cumulative effects.</p> <p>Because there would be no major adverse or unacceptable impacts on vegetation, there would be no impairment of park resources or values under this alternative.</p>	<p>Implementing this alternative would result in short- and long-term adverse effects on vegetation at the project sites from trampling and increased stock use, and the potential for the introduction of non-native plant species. Disturbance of native vegetation at the Le Conte site would occur from relocating the station and trail, resulting in the permanent removal of 705 sq ft of vegetation. Restoration of the former Le Conte site would offset this new disturbance and result in beneficial effects on vegetation. Vegetation is expected to recover at Crabtree and Rae Lakes in the construction zone within a year or two after project completion.</p> <p>This alternative may affect the abundance or distribution of individual plants in a localized area, but would not affect the viability of local or regional populations or communities. Overall, this alternative would result in negligible to minor adverse effects on vegetation at the project sites, and no cumulative effects.</p> <p>Because there would be no major adverse or unacceptable impacts on vegetation, there would be no impairment of park resources or values under this alternative.</p>	<p>The removal of the ranger stations and rehabilitation efforts would result in short-term minor adverse effects on vegetation at the project sites. However, as native plants become established, and the area is restored, this alternative would result in long-term minor beneficial effects on vegetation at the project sites. There would be long-term moderate adverse cumulative effects on vegetation at the meadows in the ranger station patrol areas due to lack of ranger presence and meadow monitoring.</p> <p>Because there would be no major adverse or unacceptable impacts on vegetation, there would be no impairment of park resources or values under this alternative.</p>

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Wildlife	Continued use of the ranger stations would result in long-term minor adverse effects on wildlife. Some wildlife, such as bears, could be destroyed if they become a nuisance (particularly at Rae Lakes, where they have access to the interior of the tent frame), resulting in long-term moderate adverse effects on individuals. There would be no cumulative effects on wildlife. Because there would be no major adverse or unacceptable impacts on wildlife, there would be no impairment of park resources or values under this alternative.	Continued use of the ranger stations would result in long-term minor adverse effects on wildlife. Some wildlife, such as bears, could be protected by the rehabilitation of the stations at Rae Lakes and Crabtree because they no longer would have access to human food, resulting in long-term beneficial effects. There would be no cumulative effects on wildlife. Because there would be no major adverse or unacceptable impacts on wildlife, there would be no impairment of park resources or values under this alternative.	Continued use of the ranger stations would result in long-term minor adverse effects on wildlife. Wildlife, such as bears, could be protected by the rehabilitation of the stations at Le Conte, Rae Lakes, and Crabtree because they no longer would have access to human food, resulting in long-term beneficial effects. There would be no cumulative effects on wildlife. Because there would be no major adverse or unacceptable impacts on wildlife, there would be no impairment of park resources or values under this alternative.	The ranger stations would be removed and habitat in the area would be restored, resulting in beneficial effects on area wildlife. However, due to the lack of ranger presence in the area to educate visitors about food storage and enforce regulations, some wildlife, such as bears, could be relocated or destroyed if they become a nuisance, resulting in long-term moderate adverse effects on individuals. There would be no cumulative effects on wildlife. Because there would be no major adverse or unacceptable impacts on wildlife, there would be no impairment of park resources or values under this alternative.
Special-status species— bighorn sheep at Rae Lakes	There would be no effect on sensitive species or critical habitat under this alternative. There would be no cumulative effects. Because there would be no major adverse or unacceptable impacts on sensitive species, there would be no impairment of park resources or values under this alternative.	This alternative would result in localized short-term minor adverse effects, long-term beneficial effects resulting from less maintenance, and a determination under the ESA (section 7) of <i>may affect, but would not likely adversely affect</i> . There would be no change to critical habitat, and thus no effect. There would be no cumulative effects. Because there would be no major adverse or unacceptable impacts on sensitive species, there would be no impairment of park resources or values under this alternative.	This alternative would result in localized short-term minor adverse effects from construction activities, long-term beneficial effects resulting from less maintenance at the Rae Lakes site, and a determination under the ESA (section 7) of <i>may affect, but would not likely adversely affect</i> . There would be no effects on critical habitat. There would be no cumulative effects. Because there would be no major adverse or unacceptable impacts on sensitive species, there would be no impairment of park resources or values under this alternative.	This alternative would result in localized short-term minor adverse effects from demolition activities, long-term beneficial effects on bighorn sheep resulting from the removal of the ranger station at the Rae Lakes site, and a determination under the ESA (section 7) of <i>may affect, but would not likely adversely affect</i> . A structure would be removed from critical habitat, resulting in a slight beneficial effect. There would be no measurable cumulative effects. Because there would be no major adverse or unacceptable impacts on sensitive species, there would be no impairment of park resources or values under this alternative.

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Water quality	<p>This alternative would result in localized long-term negligible to minor adverse effects from continued gray-water disposal and human waste management. Cumulative effects would be short term and long term, minor, and adverse at Rae Lakes. This alternative would not measurably contribute to the adverse cumulative effects at Le Conte and Crabtree. Because there would be no major adverse or unacceptable impacts on water quality, there would be no impairment of park resources or values under this alternative.</p>	<p>This alternative would result in localized long-term negligible to minor adverse effects from continued gray-water disposal and human waste management at Le Conte and Rae Lakes. At Crabtree there would be improved gray-water disposal, resulting in beneficial effects. Cumulative effects would be short term and long term, minor, and adverse. Because there would be no major adverse or unacceptable impacts on water quality, there would be no impairment of park resources or values under this alternative.</p>	<p>This alternative would result in localized long-term beneficial effects from improved gray-water disposal practices, and continued localized long-term negligible to minor adverse effects from human waste management. This alternative would not measurably contribute to adverse cumulative effects. Because there would be no major adverse or unacceptable impacts on water quality, there would be no impairment of park resources or values under this alternative.</p>	<p>This alternative would result in localized long-term beneficial effects from removing gray water and outhouses from the three ranger station sites. Continued visitor use and reduced visitor education in the area would result in short- and long-term negligible to minor adverse effects on water quality. This alternative would not measurably contribute to adverse cumulative effects. Because there would be no major adverse or unacceptable impacts on water quality, there would be no impairment of park resources or values under this alternative.</p>

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Wilderness and wilderness operations	<p>As stations deteriorate, a few more helicopter flights per year would occur, and stock use would continue for maintenance and repair work. These activities would result in slightly detectable human-caused impacts in limited areas of the wilderness and would have a minor short- and long-term adverse effect on wilderness character from the project work and from the presence of structures in wilderness, and a minor to moderate long-term adverse effect on wilderness operations. This alternative would contribute slightly to the overall moderate adverse cumulative effects from ongoing park activities and existing structures in wilderness.</p> <p>Because there would be no major or unacceptable impacts on wilderness resources, there would be no impairment of park resources and wilderness values under this alternative.</p>	<p>Under this alternative, there would be helicopter and stock use to rehabilitate the ranger station at Crabtree and to reconstruct the tent frame at Rae Lakes. There would be no change at Le Conte, so in the long term, continued and infrequent helicopter support would likely be necessary to maintain this facility. This work would result in readily apparent human-caused impacts in limited areas of the wilderness, and would have a short-term minor to moderate adverse effect on wilderness character during the project duration, and minor to moderate long-term adverse effect on wilderness character from the continued presence of structures in wilderness. This alternative would contribute slightly to the overall moderate adverse cumulative effects from ongoing park activities and existing structures in wilderness.</p> <p>Compared to the no-action alternative, there would be less repair and maintenance needed for Crabtree Ranger Station, but the same time would be spent maintaining the Rae Lakes and Le Conte stations. Such actions would have long-term and negligible to minor beneficial and adverse effects on the parks' ability to carry out their mandate for wilderness stewardship.</p> <p>Because there would be no major or unacceptable impacts on wilderness resources, there would be no impairment of park resources and wilderness values under this alternative.</p>	<p>Under this alternative, there would be helicopter and stock use to replace the ranger stations at Le Conte, Rae Lakes, and Crabtree. This work would result in readily apparent human-caused impacts in limited areas of the wilderness, and would have a minor to moderate short-term adverse effect on wilderness character during the project duration, and minor to moderate long-term adverse effects on wilderness character from the continued presence of structures in wilderness. This alternative would contribute to the overall moderate adverse cumulative effects from ongoing park activities and existing structures in wilderness.</p> <p>Compared to the no-action alternative, there would be fewer repairs needed on the three ranger stations and more time devoted to wilderness administration and protection. Such actions would have a long-term and beneficial effect on the parks' ability to carry out their mandate for wilderness stewardship.</p> <p>Because there would be no major or unacceptable impacts on wilderness resources, there would be no impairment of park resources and wilderness values under this alternative.</p>	<p>During project activities, there would be impacts on wilderness from the use of helicopters and mechanized tools, stock, and the presence of work crews. After the stations are removed, there would be beneficial effects on the wilderness character from the removal of structures from the wilderness. However, the reduced amount of patrol time would result in long-term moderate adverse effects on wilderness character and natural resources due to reduced visitor education, monitoring, and rehabilitation efforts. This would result in a moderate and long-term adverse effect on the parks' ability to preserve wilderness resources around the Le Conte, Crabtree, and Rae Lakes patrol areas. There are no cumulative effects.</p> <p>Because there would be no major or unacceptable impacts on wilderness resources, there would be no impairment of park resources and wilderness values under this alternative.</p>

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Scenic resources	There would be no change to the existing scenic resources. Ranger stations would continue to be present at Le Conte, Rae Lakes, and Crabtree, resulting in long-term minor to moderate adverse effects on scenic resources. There would be no cumulative effects. There would be no impairment of or unacceptable impacts on the parks' scenic resources or values under this alternative.	There would be minimal change to the existing scenic resources related to a slight improvement to the aesthetic qualities of the Crabtree Ranger Station. Ranger stations would continue to be present at Le Conte, Rae Lakes, and Crabtree, resulting in long-term minor to moderate adverse effects on scenic resources. There would be no cumulative effects. There would be no impairment of or unacceptable impacts on the parks' scenic resources or values under this alternative.	There would be minimal change to the existing scenic resources related to a slight improvement to the aesthetic qualities of the three ranger stations. Ranger stations would continue to be present at Le Conte, Rae Lakes, and Crabtree, resulting in long-term minor to moderate adverse effects on scenic resources. There would be no cumulative effects. There would be no impairment of or unacceptable impacts on the parks' scenic resources or values under this alternative.	There would be long-term beneficial effects on the existing scenic resources related to the removal of the three ranger stations and site restoration. There would be no cumulative effects. There would be no impairment of or unacceptable impacts on the parks' scenic resources or values under this alternative.

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Natural soundscapes	<p>Under this alternative, natural soundscapes would continue to be adversely affected by helicopter use and the use of mechanized tools at the ranger station. The infrequent use of helicopter and mechanized tools would result in minor short-term adverse impacts in and adjacent to the flight paths to the project sites, and in the areas around the ranger stations. Decreased visitor education could result in additional noise violations, resulting in long-term minor adverse cumulative effects. Overall, natural sounds would continue to prevail in the majority of the parks' wilderness and the no-action alternative would be of little consequence to park visitors or biological resources, resulting in short- and long-term negligible to minor adverse effects on the natural soundscape.</p> <p>Because the impacts would be minor and short term, there would be no impairment of or unacceptable impacts on the parks' resources or values.</p>	<p>There are short-term adverse minor impacts associated with construction noise and helicopter flights in the project area; natural sounds would continue to prevail throughout most of the parks' wilderness area.</p> <p>Because the impacts would be minor and short term, there would be no impairment of or unacceptable impacts on the parks' resources or values.</p>	<p>There are short-term adverse minor impacts associated with construction noise and helicopter flights in the project area; natural sounds would continue to prevail throughout most of the parks' wilderness area.</p> <p>Because the impacts would be minor and short term, there would be no impairment of or unacceptable impacts on the parks' resources or values.</p>	<p>Although there are short-term adverse minor impacts associated with construction noise and helicopter flights in the project area, the long-term beneficial effects from removing a source of human-generated noise would result in improved conditions. Natural sounds would continue to prevail throughout most of the parks' wilderness area.</p> <p>Because the impacts would be minor and short term, there would be no impairment of or unacceptable impacts on the parks' resources or values.</p>

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Cultural resources (Le Conte only)	The no-action alternative would result in long-term minor adverse effects. The NHPA section 106 determination would be <i>no adverse effect</i> . There would be no impairment of or unacceptable impacts on the parks' resources or values under this alternative.	This alternative would result in long-term minor adverse effects. The NHPA section 106 determination would be <i>no adverse effect</i> . There would be no impairment of or unacceptable impacts on the parks' resources or values under this alternative.	Removing the ranger station and public use from the cultural site at Le Conte would result in long-term beneficial effects. In the short term, during project work, this alternative would result in minor adverse effects. The NHPA section 106 determination would be <i>no adverse effect</i> . There would be no impairment of or unacceptable impacts on the parks' resources or values under this alternative.	Removing the ranger station and public use from the cultural site at Le Conte would result in long-term beneficial effects. In the short term, during project work, this alternative would result in minor adverse effects. The NHPA section 106 determination would be <i>no adverse effect</i> . There would be no impairment of or unacceptable impacts on the parks' resources or values under this alternative.

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Health and safety	The no-action alternative would result in short- and long-term moderate adverse effects on health and safety for park personnel and public safety at Rae Lakes. At Crabtree and Le Conte, there would continue to be short- and long-term minor adverse effects on park personnel and public safety.	<p>Le Conte: Under this alternative, conditions at Le Conte would remain the same and would continue to deteriorate over time, resulting in short- and long-term minor to moderate adverse effects on health and public safety within that patrol area.</p> <p>Rae Lakes and Crabtree: The safety of park personnel would be improved in summer and fall at Rae Lakes and Crabtree. In general, repairing the Rae Lakes and Crabtree stations would result in reduced time spent by rangers on ranger station maintenance and repairs, more effective ranger operations, and improved food storage. However, at Rae Lakes, rangers would continue to spend time each season mobilizing and demobilizing the tent structure, taking time away from their patrol duties. Rangers would generally be able to spend more time patrolling trails throughout the summer because of reduced maintenance needs at the stations, noting area hazards and educating the public about hazards, resulting in short- and long-term beneficial effects on health and safety in those patrol areas.</p>	Under this alternative, the safety of park personnel would be improved throughout the year due to improved conditions at the ranger stations. Overall, this alternative would result in long-term beneficial effects on the health and safety of park personnel and the public due to increased patrol times and education.	Under this alternative, the removal of ranger stations at the three locations would result in reduced patrol time, reduced ranger and emergency services, and less public education about risks in the patrol areas around the stations. In addition, there would be increased hazards associated with winter snow survey operations and the general patrol function related to increased distance and weight of patrols. This alternative would result in short- and long-term moderate adverse effects on park staff and public health and safety.

	Alternative 1: No Action	Alternative 2: Repair Existing Ranger Stations (Except Le Conte)	Alternative 3: Replace Ranger Stations with New Structures (Preferred Alternative)	Alternative 4: Remove Ranger Stations
Visitor experience and recreational opportunities	Under this alternative, the stations would continue to deteriorate, resulting in increased time spent by rangers for maintenance and repairs and decreased time spent on patrol and resource-management activities, resulting in minor long-term adverse effects on visitor recreational experience and opportunities. There would be no cumulative effects.	This alternative would result in short-term moderate adverse effects on visitor experience and recreational opportunities during the rehabilitation project work at Rae Lakes and Crabtree ranger stations. There would be long-term minor adverse effects in the Le Conte patrol area, as additional repairs on the ranger station remove the rangers from their normal patrol functions. In the long term, at Rae Lakes and Crabtree, after the rehabilitation is completed normal patrol functions would resume, resulting in increased contact with visitors, improved resource protection, and an overall minor long-term beneficial effect on visitor experience and recreational opportunities. There would be no cumulative effects.	This alternative would result in short-term moderate adverse effects on visitor experience and recreation during the rehabilitation project work at Le Conte, Rae Lakes, and Crabtree ranger stations. In the long term, after the new stations are completed normal patrol functions would resume, resulting in increased contact with visitors, improved resource protection, and an overall minor long-term beneficial effect on visitor experience and recreation. There would be no cumulative effects.	Depending on visitors' expectations and needs, the removal of the three ranger stations would result in long-term minor to moderate adverse and beneficial effects on park visitor experiences and recreational opportunities. There would be no cumulative effects.

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AFFECTED ENVIRONMENT

This section provides a summary of the resources associated with the alternatives and the environmental consequences of the alternatives. It is organized by impact and resource topics that were derived from internal park and external public scoping, and is limited to those topics that may be affected by the alternatives. More detailed information on resources in Sequoia and Kings Canyon National Parks can be found in the FGMP/FEIS (NPS 2007).

LOCATION AND GENERAL DESCRIPTION

Sequoia and Kings Canyon National Parks are located in the eastern part of central California (Figure 7). Although established by separate acts of Congress, the two parks are contiguous and managed jointly. Both parks occupy the western slope of the Sierra Nevada. Combined acreage of the two parks is 865,257. All three of the stations being considered are in designated wilderness. They are all located in open forest vegetation dominated by lodgepole pine (*Pinus contorta*) with a sparse herbaceous understory dominated by Ross's and shorthair sedges (*Carex rossii* and *C. filifolia* var. *erostrata*). All are within 100 feet of a maintained trail and within 100 feet of a water source.

The Crabtree Ranger Station is located 14 miles (by trail) west of Whitney Portal Trailhead near Lone Pine, California. It is 8 miles west of the summit of Mount Whitney along the John Muir Trail. The station is at 10,400 feet above mean sea level. There is a spring about 100 feet north of the station. Mount Whitney is an extremely popular destination for as many as 4,000 backpackers per season in the park, most of whom stay at least 1 night within 2 miles of the Crabtree Ranger Station. There is a heavily used camping area about 200 feet west of the station near Whitney Creek. The station is used in winter by the California Cooperative Snow Surveys.



Photo 2. Crabtree Ranger Station

**Sequoia and Kings Canyon National Parks are located in the eastern part of central California
(Figure 7)**

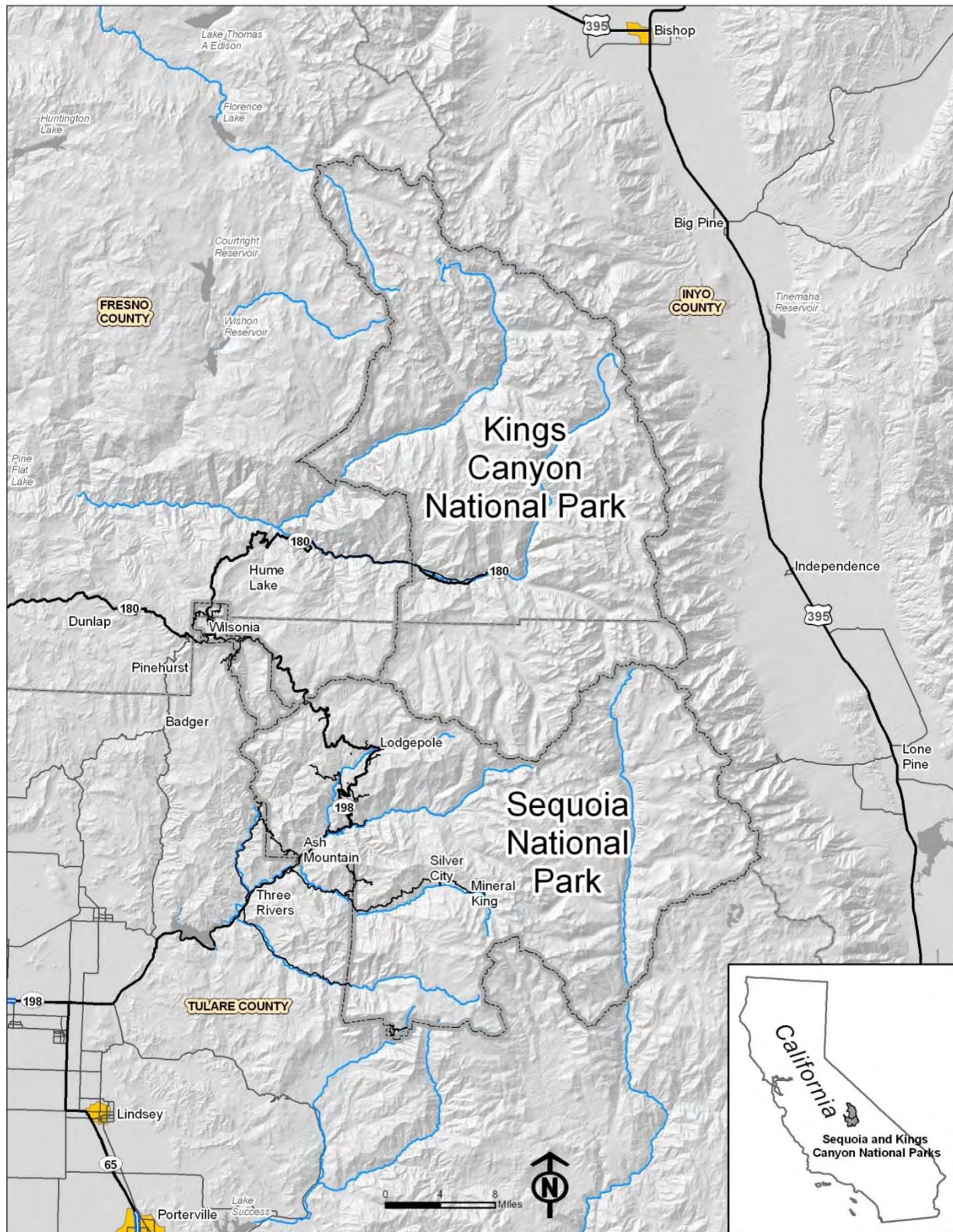




Photo 3. Rae Lakes Ranger Station



Photo 4. Le Conte Ranger Station

The Rae Lakes Ranger Station is located in Rae Lakes Basin about 20 miles (by trail) east of Road's End in Kings Canyon, California. At 10,660 feet above mean sea level, Rae Lakes Basin is one of the classic, glacially carved Sierran lake basins of the region and is a popular destination for wilderness users in the park. The station is on a rocky, southeast-facing slope above the northeast shore of the middle lake. There is a small spring about 50 feet east of the station and a creek about 150 feet west of it. The John Muir/Pacific Crest Trail (JMT/PCT) passes within 80 feet of the station.

The Le Conte Ranger Station sits in a glaciated, U-shaped valley. The Middle Fork Kings River runs through the canyon. The canyon floor is approximately 5 miles long and ranges in elevation from 8,000 to 9,250 feet above mean sea level. The valley is oriented in a north-south direction, and its sides rise 3,000 feet above the canyon floor. The JMT/PCT runs the length of the canyon. The station is 14 miles (by trail) west of the South Lake Trailhead near Bishop California. It is about 150 feet west of the junction of the PCT and the Bishop Pass Trail at 8,800 feet. There is a small wet area, dominated by tall grasses and sedges, about 20 feet east of the station. Obsidian tools and debris are visible on the ground surface immediately adjacent to the current station. Given preliminary subsurface testing data, the park archeologist has determined that the immediate area under and around the Le Conte Ranger Station is a potentially significant prehistoric site. The Middle Fork of the Kings River, a wild and scenic river, is located about 120 feet to the west of the ranger station.

These stations are important in furthering the parks' wilderness stewardship mandate of providing wilderness character, resource protection, and appropriate visitor services. Visitor services include information, education, emergency medical services, and SAR. The ranger stations under consideration have been critical contact points for visitors seeking help in an emergency or needing safety information about environmental conditions. Historically, the presence of these ranger stations has allowed faster response and timely delivery of safety information to the public. Based on park statistics, the existence of Le Conte, Rae Lakes, and Crabtree ranger stations and the linked presence of rangers save at least one to three lives per year.

VEGETATION

Extreme topographic differences and a striking elevation gradient (ranging from 1,360 feet in the foothills to 14,497 feet along the Sierra crest) create a rich tapestry of environments in the two parks, from the hot, dry lowlands along the western boundary to the stark, snow-covered alpine high country. This topographic and environmental diversity supports over 1,500 vascular plant taxa, including subspecies and varieties, which make up dozens of unique plant communities. These vegetation types can be categorized into six broad vegetation zones: oak woodland, chaparral shrubland, lower montane, upper montane, subalpine, and alpine.

The proposed project sites occur in the upper montane (Le Conte) and the subalpine (Rae Lakes and Crabtree) vegetation zones. All are in coniferous forests dominated by lodgepole pine and characterized by a relatively open understory. Lodgepole pines grow with red and white fir (*Abies magnifica* and *A. concolor*) in moist lowlands and with foxtail pine (*Pinus balfouriana*) and whitebark pine (*Pinus albicaulis*) in drier sites on benches and ridges.

The wilderness of Sequoia and Kings Canyon National Parks is also notable for being mostly free of non-native plant species. Thorough surveys of the vascular plants in the vicinity of the Rae Lakes and Crabtree ranger stations were conducted during the 2005 field season and a preliminary survey was conducted at the Le Conte station in late September of 2005. Based on the results of these surveys and records of known populations, we conclude that there are no known populations of rare, endangered, threatened, or other special-status plant species near the project sites (NPS 2006b).

The Crabtree Ranger Station is located in an open, dry stand of lodgepole pine characterized by a sparse understory of perennial herbs including shorthair sedge, Sierra beardtongue (*Penstemon heterodoxus*), western needlegrass (*Achnatherum occidentale*), Parry's rush (*Juncus parryi*), Brewer's lupine (*Lupinus breweri*), pinewoods lousewort (*Pedicularis semibarbata*), and squirreltail (*Elymus elymoides*).

Vegetation surrounding the Rae Lakes Ranger Station is dominated by lodgepole and whitebark pine, with occasional red fir and foxtail pine intermixing on adjacent benches. Openings in the forest are

dominated by shorthair sedge and a diverse mix of herbaceous species typical of subalpine rock outcrops and benches, including naked buckwheat (*Eriogonum nudum*), Sierra beardtongue, western needlegrass, and mountain wild mint (*Monardella odoratissima*).

The Le Conte Ranger Station is located within the deep canyon of the Middle Fork of the Kings River. The cabin and outhouse were built on boulder and sandy soils east of the riparian corridor formed by the river. There are small granite bedrock outcrops to south, and a small stream and seep system to the north and east that roughly parallels the Kings River.

The vegetation at Le Conte Ranger Station is dominated by lodgepole pine and red fir with a sparse understory characterized by Ross's sedge. About 20 feet east of the station is a small, intermittent watercourse that is dominated by tall grasses, sedges, and bracken fern (*Pteridium aquilinum*) with a few scattered willows (*Salix* spp.). Along the river corridor, 120 feet west of the station, tree diversity increases to include white fir, aspen (*Populus tremuloides*), and cottonwood (*Populus* spp.). Nearby granite outcroppings are vegetated with shrubs including chinquapin (*Castanopsis* spp.), manzanita (*Arctostaphylos* spp.), and currant (*Ribes* spp.). The area east and north of the ranger station is densely vegetated and has the highest species diversity of the plant assemblages observed due to the wet soils in the area.

The site appears to have had a long history of disturbance associated with the construction, maintenance, and use of the ranger station. Traffic has created and maintained a sparsely vegetated buffer around the cabin and outhouse and the soils are somewhat hardened. However, 89 taxa were observed within the immediate surroundings (NPS 2006b).

WILDLIFE

The ranger station project sites would support wildlife typical of a southern Sierra subalpine forest/upper montane. Characteristic mammals that may occur at the sites include Douglas squirrel (*Tamiasciurus douglasii*), golden mantled ground squirrel (*Spermophilus lateralis*), lodgepole chipmunk (*Tamias speciosus*), yellow-bellied marmot (*Marmota flaviventris*), mountain pocket gopher (*Thomomys monticola*), deer mouse (*Peromyscus* spp.), mule deer (*Odocoileus hemionus*), pine marten, pika (*Ochotona princeps*), and coyote (*Canis latrans*). Characteristic birds include blue grouse (*Dendragapus obscurus*), Steller's jay (*Cyanocitta stelleri*), common raven (*Corvus corax*), Clark's nutcracker (*Nucifraga columbiana*), northern flicker (*Colaptes auratus*), mountain chickadee (*Poecile gambeli*), American dipper, red-breasted nuthatch (*Sitta canadensis*), American robin (*Turdus migratorius*), brown creeper (*Certhia americana*), yellow-rumped warbler (*Dendroica coronate*), northern goshawk (*Accipiter gentilis*), red-tailed hawk (*Buteo jamaicensis*), and golden eagle (*Aquila chrysaetos*). Characteristic reptiles include western fence lizard (*Sceloporus occidentalis*) and the terrestrial garter snake (*Thamnophis ordinoides*). Pacific treefrog (*Hyla regilla*) is the most common amphibian present. This area also includes habitat for the mountain yellow-legged frog. Because of the elevation, no fish occur in the area naturally. However, waters in the vicinity are occupied by introduced trout.

SPECIAL-STATUS SPECIES

One federally listed species occurs in the project areas. The endangered Sierra Nevada bighorn sheep occurs in the immediate vicinity of the Rae Lakes site, and populations have been located within about 6 miles of the Crabtree site and 14 miles (and one historic record of about 3.5 miles) from the Le Conte site. In the last 30 years, rangers have reported a dozen sightings of rams in the immediate vicinity of the Rae Lakes Ranger Station. All were in September and October and on a flat about 300 feet above the current station location. None have been seen in that area since a population decline in the early 90s.

However, populations are recovering and sightings are once more occurring at their pre-1990s level, though none have been seen near the ranger station.

Critical habitat for the Sierra Nevada bighorn sheep was designated within the park effective September 2008 (Designation of Critical Habitat for the Sierra Nevada Bighorn Sheep and Taxonomic Revision, 73 FR 151, 45533–45604, USFWS 2008). The Rae Lakes Ranger Station is located within critical habitat (Mount Baker Unit 7) (Figure 8

The USFWS provided a list of special-status species that may be within the project area or depend on it for critical habitat (appendix F). This list was reviewed by park staff and updated in June 2009 (USFWS 2009). Pursuant to the ESA, the USFWS reviewed the preferred alternative to determine possible impacts on the endangered Sierra Nevada bighorn sheep and the bald eagle (since delisted). There would be no effect on bald eagles. The USFWS has issued a concurrence letter for the parks' determination that the preferred alternative is not likely to adversely affect bighorn sheep (appendix F).

WATER QUALITY

Water in the Kings River and Kern River watersheds within Sequoia and Kings Canyon National Parks is of excellent quality and consistently tests above state and federal standards (Derlet and Carlson 2006). The State of California considers the surface water quality of these rivers to be beneficial for wildlife and as freshwater habitat, contact and non-contact recreation, freshwater replenishment, and municipal and domestic water supply as indicated in the California Water Quality Control Board's Central Valley Regional *Water Quality Control Plan for the Tulare Lake Basin* (1995).

Current evidence suggests that one of the biggest threats to the parks' water is air pollution. Air pollution adds acidic deposition, nutrients, and other contaminants to the parks' waters. Originating in granite, Sierra waters are naturally low in nutrients. The addition of airborne nitrates and ammonia may be causing some level of change to the natural system. The drift of pesticides and other contaminants from upwind agricultural areas is one of the most serious concerns. Measurable amounts of pesticides fall on the park, and pesticide residues have been found in the tissues of aquatic fauna.

Recreational activities such as horseback riding, swimming, and hiking can lead to the introduction of organic, physical, and chemical pollutants into aquatic systems. Water quality in the parks is affected by human and animal waste and may contain parasites such as *Giardia lamblia* and *Cryptosporidium*. The presence of coliform bacteria indicates a watershed risk for harboring microbes capable of causing human disease. Both stock (horses, mules, burros, and llamas) and people are sources of coliform in surface water.

Each ranger station has an outhouse about 75 feet away from the structure and one hundred to several hundred feet from open water. Gray water from the ranger stations is disposed of through a sink draining into a box buried in the ground (Le Conte and Crabtree) or to a rock-lined hole behind the station (Rae Lakes). These sumps are not specifically engineered for the treatment of gray water.

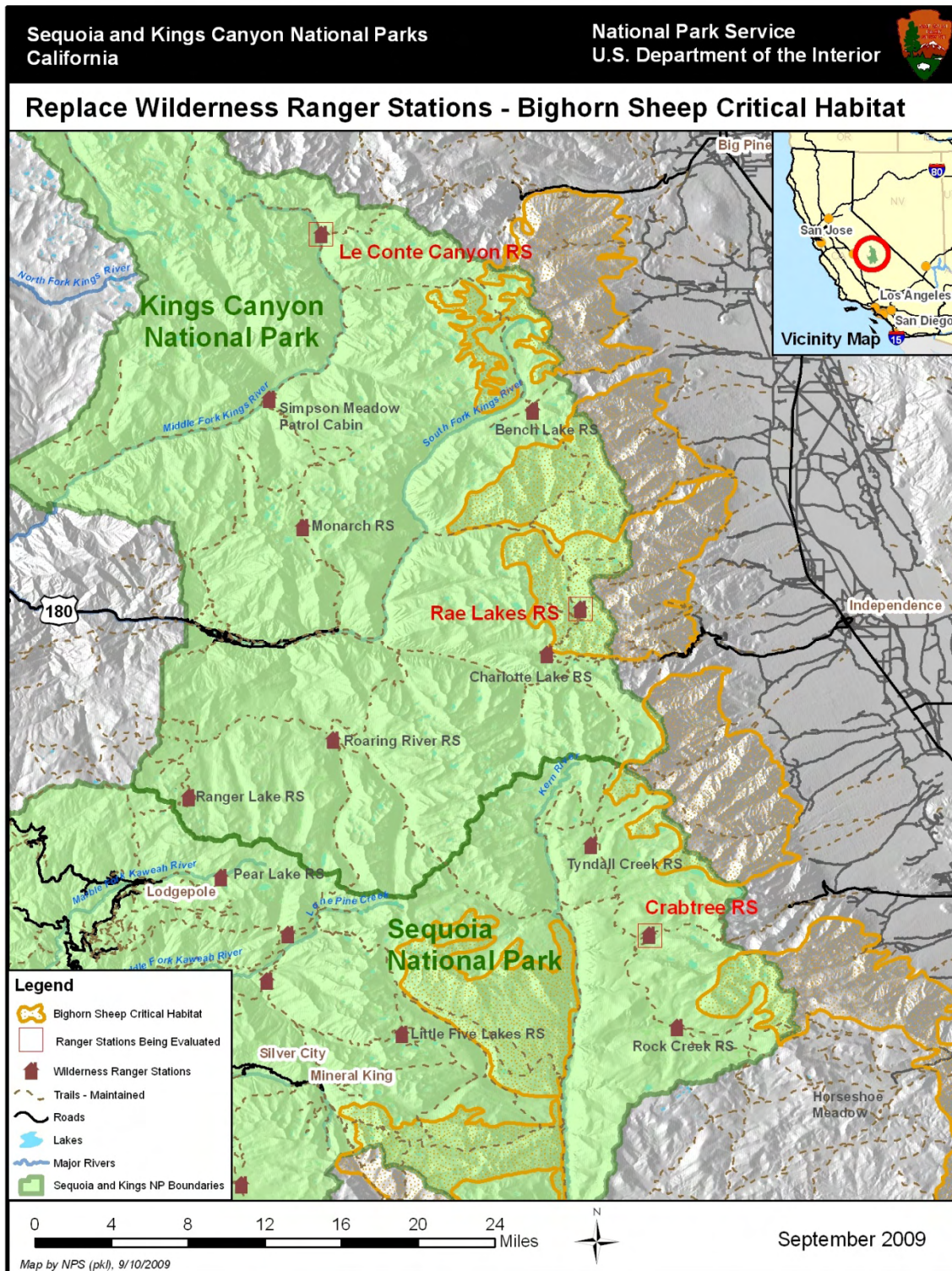


Figure 7. Bighorn Sheep Critical Habitat at Rae Lakes

WILDERNESS RESOURCES

Sequoia and Kings Canyon National Parks' total designated wilderness is 807,962 acres—approximately 93.4% of the parks' total acreage of 865,257. In addition, there is approximately 30,000 acres of proposed wilderness that is managed as wilderness in accordance with NPS policy. Sequoia and Kings Canyon National Parks' original wilderness designation occurred under the *California Wilderness Act of 1984* (PL 98-425, 98 Stat. 1619); additional acreage was designated as wilderness by the *Omnibus Public Land Management Act of 2009*.

Wilderness is managed to preserve its natural condition and is a place for a primitive type of recreation. It is characterized by its outstanding opportunities for solitude, where humans are visitors who do not remain. Wilderness has a primeval character and is generally without permanent improvements or human habitation, and appears to be affected primarily by the forces of nature, where man's imprint is substantially unnoticeable.

Management of wilderness must preserve its wilderness character and allow for visitor enjoyment. There are six specified purposes of wilderness: recreational, scenic, scientific, educational, conservation, and historical use. Land managers can approve and implement activities in wilderness provided that the activities further one or more of the purposes of wilderness without degrading wilderness character. Before an action can be implemented in wilderness, the action must be analyzed following a protocol called the minimum requirement / minimum tool decision analysis. The proposed ranger station project would occur in a designated wilderness; therefore, a minimum requirement / minimum tool analysis was completed for this project (appendix B).

WILDERNESS OPERATIONS

Sequoia and Kings Canyon National Parks' Management Directive 49 (NPS 2009) and the parks' BMP state that the presence of rangers based out of ranger stations in the remote areas of the parks allow the parks to effectively carry out its wilderness stewardship mandate of resource monitoring and protection, education of wilderness users, and appropriately providing for visitor safety.

Currently, rangers are stationed in the wilderness at or near their station for the entire visitor season. They generally do not leave the wilderness for the entire season. Each station's patrol area is about 50 to 80 square miles of rugged terrain. Each ranger is responsible for patrolling between 30 and 70 miles of maintained trails and also patrolling cross-country routes. Each season, wilderness rangers patrol a total of approximately 600 to 1,000 miles of trail in their primary patrol area.

Assuming historic staffing levels of one ranger per patrol area, using a ranger station as a base of operations allows a ranger to be present approximately 98 days of a total 98-day patrol season in their primary patrol area. Depending on the station, each ranger contacts and educates between 1,100 and 4,200 visitors per season. Trail patrols allow rangers to carry out the parks' wilderness stewardship mandate by contacting visitors, cleaning camps, and monitoring and reporting on resource and safety conditions.

Ranger stations serve as a contact point for visitors in the event of questions about weather or trail conditions, or if a visitor needs emergency assistance. From the center of each patrol area, visitors need to travel approximately 4–6 miles (2–3 hours) to reach the nearest ranger station.

Ranger stations are also used infrequently by other park staff for food or equipment storage, and staff may use the stations during the shoulder seasons for field reconnaissance or to conduct maintenance on the stations.

SCENIC RESOURCES

Sequoia and Kings Canyon National Parks were set aside as national parks and then as designated wilderness for their remote and mountainous terrain. Granite peaks rising in excess of 14,000 feet make up the parks' mountainous landscape. Lakes, rivers, glaciers, meadows, and wildlife all exist as they have for millennia, essentially undisturbed by humans.

National parks, especially the wilderness parks of the west, have traditionally been thought of as places where pristine views of the night sky abound. Yet, over the last three or four decades, this resource has been rapidly degraded in many parks by the widespread growth of light pollution—an unintended by-product of human population and land development. As light scatters in the atmosphere, it diminishes the view of the night sky—the stars and planets—an important and inspirational part of the national park experience. Although there is some light pollution in the wilderness of Sequoia and Kings Canyon, the night skies at Le Conte Ranger Station, Rae Lakes Ranger Station, and Crabtree Ranger Station remain relatively pristine. However, artificial lights from flashlights or interior gas or electric lighting can be considered a visual intrusion on wilderness scenic resources.

While there are no important or historic viewpoints located at or near any of the stations being considered in this proposal, there has been degradation of scenic resources around the existing ranger stations from the structures and use in the area.

NATURAL SOUNDSCAPES

Within the upper montane and subalpine zones, the natural soundscape is less dominated by wind than in the alpine zone, due to the presence of trees and tall shrubs that block and reduce wind speed. The dominant tree species in the subalpine coniferous forest acoustical zone is lodgepole pine, which grows with foxtail pine in some of the sites under consideration and with whitebark pine or redfir in other areas. Where they occur, willow and aspen play a large role in attenuating distant sounds.

Compared to the alpine zone, animal sounds are more frequently audible. A greater diversity of birds, insects, and mammals occupy this forest zone. Audible sounds are usually generated by nearby natural sources rather than carried from distances. Woodland birds such as thrushes and warblers can be heard in many areas. Flowing water is developing into larger streams, having a greater influence on the nearby soundscape, which then dominates the acoustics in the riparian and surrounding areas like Le Conte Canyon.

Human-generated sounds originate from travel corridors near trails and campsites. Aircraft, both military and civilian, are often heard overhead throughout this zone and are a significant source of sound pollution, especially in the Crabtree area. In addition, the crest of the Sierra is subject to an atmospheric phenomenon called Barisal Guns (or mistpoeffers). On certain days, loud booms can be heard along the crest of the Sierra. These apparently occur when upper atmosphere conditions propagate sound waves from explosions which occur up to 100 miles away, such as at military bombing ranges, though sources can also be distant thunder.

CULTURAL RESOURCES (LE CONTE RANGER STATION ONLY)

Le Conte Ranger Station is located on a sandy flat about 150 feet long and 30 feet wide. It is about 300 feet from the confluence of Dusy Creek and the middle fork of the Kings River. The route over Bishop Pass to Dusy Creek shows evidence of having been a trading route for thousands of years between eastside and westside Indian groups. In more recent centuries, these groups included Eastern Mono

(Paiute) and Western Mono bands as well as Yokuts groups from the Great Central Valley and its eastern foothills. The sandy flat where the station is located exhibits a dense scatter of obsidian tools and debris that marks the locations of Indian campsites and use areas. Dark black, greasy midden soil has also been observed approximately 15 feet west of the station. A midden soil is an archeological soil that marks the location of repeated human use, especially including campfires and food preparation.

LE CONTE SITE SURVEY AND TESTING

In August of 2006, the site was visited by the park archeologist, who surveyed the area and found a dense lithic scatter of obsidian in front (west) of the ranger station and out to about 50 to 75 feet to both sides of the ranger station (K. Hamm, personal communication). Four 20-inch-diameter shovel test pits were excavated to a depth of about 16 inches. The dirt was then passed through a 1/4-inch mesh screen and examined for artifacts.

Based on the surveys, the park archeologist has determined that the area in and around the immediate location of the current Le Conte Ranger Station represents a potentially significant Native American archeological site. The current evidence suggests that the site likely meets *National Register of Historic Places* (NRHP) eligibility criterion “d” (36 CFR 60.4). Any adverse impacts associated with ground disturbance, such as site preparation or excavation in advance of stabilizing or replacing the current ranger station, would be mitigated. Mitigation measures would include the establishment of a Memorandum of Understanding (MOU) with the SHPO. The MOU would establish a data recovery plan that would include a 1- to 2-week archeological excavation of the site prior to construction and monitoring by an archeologist of all ground-disturbing activity associated with the demolition, restoration, and construction of the new ranger station.

HEALTH AND SAFETY

The wilderness of these parks includes large areas with steep terrain, swift rivers, extreme weather, and high altitude. With 25,000 to 35,000 visitors entering the wilderness every year, a small but significant percentage of visitors get injured or lost. The wilderness rangers play an important role in helping these people. In 2007 there were 47 major incidents requiring response from wilderness rangers. These incidents included medical evacuations, SARs, and body recoveries in the wilderness of Sequoia and Kings Canyon National Parks. In addition, wilderness rangers treat approximately 100 minor medical problems per year.

The ranger stations under consideration have been critical contact points for visitors seeking help in an emergency or needing safety information about environmental conditions. Historically, the presence of these ranger stations has allowed faster response and timely delivery of safety information to the public. The existence of Le Conte, Rae Lakes, and Crabtree ranger stations and the linked presence of rangers saves at least one to three lives per year.

All wilderness rangers are qualified emergency medical technicians. They provide initial assessment and patient care and stabilization for medical incidents. They also determine if patients need to be evacuated immediately by helicopter, if they would be able to ride out by horse, or if they can be treated and released to walk out by themselves. Rangers participate in searches by providing in-depth knowledge of local terrain and acting as experienced ground-search personnel. In addition, one of their primary jobs is evaluating environmental conditions of trails, stream crossings, and mountain passes and advising and educating visitors and park managers on safe travel recommendations.

The current stations present varying degrees of health and safety hazards to personnel. All of the stations use flexible hose to deliver propane from an exterior tank to a cook stove. None of the tanks are anchored

or enclosed. This system does not comply with current health and safety standards. Personnel using Le Conte and Crabtree ranger stations in winter are exposed to health and safety hazards from the danger of structural collapse due to snow load. Neither station has a quick or safe exit if deep snow were to block the main door in the event of an emergency. The Rae Lakes station presents a safety hazard to personnel when putting up and taking down the canvas tent because the ranger must climb on the structurally unsound frame to do so.

VISITOR EXPERIENCE AND RECREATIONAL OPPORTUNITIES

The Sequoia and Kings Canyon wilderness offers opportunities to experience a spectrum of wilderness-related recreational activities away from the busy pace and noise of automobiles and modern technology. Activities range from sightseeing and picnics to multiple-night backpacking or packstock trips. All visitors can enjoy the solitude of nature, the sounds of water and wind, and the natural scenery. Recreational opportunities include photography, nature study, walking/hiking, stock use, swimming/wading, fishing, camping, rock climbing, cross-country skiing, and occasional whitewater river running.

The Rae Lakes Loop and Mount Whitney trails (Crabtree Ranger Station) are two of the most popular hikes in Sequoia and Kings Canyon National Parks, and perhaps in the entire Sierra. These trails have historically been maintained for the enjoyment of a wide range of wilderness users, including first-time backpackers.

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