



Appendix K

Sequoia and Kings
Canyon National
Parks Trail
Management Plan

ON THE PREVIOUS PAGE

Wilderness in Sequoia and Kings Canyon National Parks

NPS Photo

APPENDIX K:
**DRAFT TRAIL MANAGEMENT PLAN FOR SEQUOIA AND
KINGS CANYON NATIONAL PARK**

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DRAFT TRAIL MANAGEMENT PLAN FOR SEQUOIA AND KINGS CANYON NATIONAL PARK

PURPOSE AND NEED FOR THE TRAIL MANAGEMENT PLAN

INTRODUCTION AND HISTORY

The trail system of Sequoia and Kings Canyon National Parks (the parks) has a history as long as human use of the area. American Indians lived and traveled in what are now park lands. Besides traveling the foothills and mid-ranges for subsistence, American Indians established routes over many Sierra Crest passes to trade back and forth between the Owens and San Joaquin Valleys. In the 19th century, European-American explorers, shepherds, miners, loggers, and cattle ranchers entered the mountains and began to establish trails and routes for stock travel (often following American Indian routes over passes). In the late 19th century and into the mid-20th century, private recreationists, explorers, and others began to explore the area and establish stock trails. After over 20 years of discussion and exploration, construction began on John Muir Trail in 1915. With the establishment of Sequoia National Park, more formal trail construction and maintenance efforts came into play, notably early trail construction by the military and the construction of the High Sierra Trail in the 1920s. Many Sequoia National Park trails benefited from Civilian Conservation Corps work in the 1930s. After the creation of Kings Canyon National Park in 1940, trail work in the north end of the parks began to include regular clearing and rerouting into switchbacks, and all of the parks' trails became dedicated to recreational rather than extractive uses. In the 1960s resource management concerns were evident as many park trails were rerouted out of meadows by volunteer and agency crews, and trail work since then has focused on the dual goals of protecting park and wilderness resources while providing for recreational and administrative access. The Pacific Crest Trail was one of the two original National Scenic Trails established in 1968.

Each generation of trail builders and users had goals, techniques, and resources that they brought to bear on establishing their trails. As goals have changed, trails have been established, rerouted, reconstructed, and maintained or abandoned. The current trail system reflects this varied history, which continues into the present with changing visitor desires and management goals.

The purpose of this Trail Management Plan is to explain the guiding principles of trail management at Sequoia and Kings Canyon National Parks, to describe desired conditions for the trail system, to describe programmatic methods used in trail management, and to identify actions that will need to be taken in order to achieve the desired conditions of the Wilderness Stewardship Plan (WSP).

RELATED LAWS, POLICIES, AND PLANS

The WSP provides detailed information on the legislative and policy context that requires planning in wilderness. Several citations particularly relevant to trail management planning are repeated here:

ORGANIC ACT

The NPS *Organic Act* of 1916 directs the U.S. Department of the Interior and the National Park Service (NPS) to manage units of the national park system “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (16 USC 1).

SEQUOIA AND KINGS CANYON ENABLING LEGISLATION

Sequoia Enabling Act of 1890: Preamble: "...dedicated .and set apart as a public park, or pleasure ground for the benefit and enjoyment of the people..." and to "...provide for the preservation from injury of all timber, mineral deposits, natural curiosities or wonders within said park, and their retention in their natural condition" (Sec. 2).

Kings Canyon Enabling Act of 1940: Sec. 3. "That the National Park Service shall... administer for public recreational purposes the lands withdrawn." and "to insure (sic) the permanent preservation of the wilderness character of the Kings Canyon National Park."

WILDERNESS ACT

The *Wilderness Act* of 1964 states: "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use."

NATIONAL TRAIL SYSTEM ACT AND PACIFIC CREST TRAIL MANAGEMENT PLAN

National Trails System Act of 1968: Sec. 7(c): "National scenic or national historic trails may contain campsites, shelters, and related-public-use facilities. Other uses along the trail, which will not substantially interfere with the nature and purposes of the trail, may be permitted by the Secretary charged with the administration of the trail. Reasonable efforts shall be made to provide sufficient access opportunities to such trails and, to the extent practicable, efforts shall be made to avoid activities incompatible with the purposes for which such trails were established."

Comprehensive Management Plan for the Pacific Crest Trail (1982): Appendix C: Criteria for Location, Design, Signing, and User Facilities, p12, General Design Criteria: "The design of the Pacific Crest Trail should be in keeping with the nature and purpose of the trail. As a National Scenic Trail, it should exhibit high quality, permanence, and minimize disturbance to the environment. It should be designed, on a segment-by-segment basis, to accommodate, in a safe and enjoyable manner, the volume and types of traffic planned."

NPS MANAGEMENT POLICIES 2006

NPS Management Policies 2006 provides interpretation and policy guidance relative to laws, proclamations, executive orders, regulations, and special directives. Examples of the management policies that provide direction to this trails plan are listed below.

8.2. *Visitor Use*. Enjoyment of park resources and values is part of the fundamental purpose of all parks. To provide for enjoyment of parks, the NPS will encourage visitor activities that:

- are appropriate to the purpose for which the park was established
- are inspirational, educational, or healthful, and otherwise appropriate to the park environment
- will foster an understanding of, and appreciation for, park resources and values, or will promote enjoyment through a direction of, interaction with, or relation to park resources

- can be sustained without causing unacceptable impacts on park resources or values.

8.2.5.1. *Visitor Safety.* While recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees.

9.2. *Transportation Systems.* The location, type, and design of transportation systems and their components (e.g., roads, bridges, trails, and parking areas) all strongly influence the quality of the visitor experience. These systems also affect, to a great degree, how and where park resources will be impacted. Before a decision is made to design, construct, expand, or upgrade access to or within a park, nonconstruction alternatives — such as distributing visitors to alternative locations — must be fully explored. If nonconstruction alternatives will not achieve satisfactory results, then a development solution may be pursued if the project:

- is appropriate and necessary to meet park management needs or to provide for visitor use and enjoyment
- is designed with extreme care and sensitivity to the landscape through which it passes
- will not cause unacceptable adverse impacts on natural and cultural resources, and will minimize or mitigate those that cannot be avoided
- will not cause use in the areas it serves to exceed the areas' visitor carrying capacity
- will incorporate universal design principles to provide for accessibility for all people, including those with disabilities
- will take maximum advantage of interpretive opportunities and scenic values
- is based on a comprehensive and multidisciplinary approach that is fully consistent with the parks' General Management Plan (GMP).

9.2.2 *Trails and Walks* - Trails and walks provide the only means of access into many areas within parks. These facilities will be planned and developed as integral parts of each park's transportation system and incorporate principles of universal design. Trails and walks will serve as management tools to help control the distribution and intensity of use. All trails and walks will be carefully situated, designed, and managed to:

- reduce conflicts with automobiles and incompatible uses;
- allow for a satisfying park experience;
- allow accessibility by the greatest number of people; and
- protect park resources.

9.2.2.2. *Hiking Trails.* Trail design will vary to accommodate a wide range of users and will be appropriate to user patterns and site conditions.

9.2.2.3. *Equestrian Trails.* Equestrian trails and related support facilities may be provided when they are consistent with park objectives and when site conditions are suitable.

6.1. *Wilderness Preservation and Management.* The NPS will manage wilderness areas for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness. 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.

6.3.10.2 Trails in Wilderness. Trails will be permitted within wilderness when they are determined to be necessary for resource protection and/or for providing for visitor use for the purposes of wilderness. ... Trail maintenance structures (such as water bars, gabions) may be provided, under minimum requirement protocols, where they are essential for resource preservation or where significant safety hazards exist during normal use periods. Historic and/or prehistoric trails will be administered in keeping with approved cultural resource and wilderness management plan requirements.

6.4.1 General Policy. Park visitors need to accept wilderness on its own unique terms. ... The National Park Service will not modify the wilderness area to eliminate risks that are normally associated with wilderness, but it will strive to provide users with general information concerning possible risks, (and) any recommended precautions ...

GENERAL MANAGEMENT PLAN AND DESIRED CONDITIONS:

Desired Conditions for Class 3 Trails (identified in GMP as “Major Trails”):

Desired Natural Resource Conditions – Natural resources are mostly undisturbed. Impacts are restricted to trails and campsites, facilities, and attractions near the trails. Impacts are reversible, but it may take many years for natural resource regeneration. The goal is to restore disturbed areas, including visitor-created or widened trails.

Desired Visitor Experience –While day hikers may use trails closer to trailheads, most users are overnight visitors. On the more popular trails there is a moderate to high probability of encountering others, particularly at campsites and attractions. Visitors have opportunities for a wide range of experiences, with some opportunities for solitude and isolation from the sights, sounds, or evidence of other users. Travel is generally along remote but regularly maintained trails that require a moderate degree of outdoor skills and self-reliance. Party sizes may be larger than those allowed on secondary trails or in cross-country areas. Visitors may have to use designated, established campsites in some popular areas.

Desired Conditions for Class 1 and 2 Trails (identified in GMP as “Secondary Trails”):

Desired Natural Resource Conditions –Natural resources are mostly undisturbed. Impacts are generally confined to the immediate area of trails. Damaged areas and unplanned impacts (such as trails created by visitors) are restored or left to regenerate naturally.

Desired Visitor Experience –Visitors are generally overnight users. Use is lower than on major trails, and there is less probability of visitors encountering others while hiking and camping. Party sizes may be smaller than along major trail corridors. Visitors need self-reliance and outdoor skills. Food canisters may be required.

Desired Conditions for Off-trail Areas (identified in the GMP as “Cross-country Areas”):

Desired Natural Resource Conditions –Natural resources are largely undisturbed, with wild and naturally functioning ecosystems. Evidence of past use may be actively removed to reduce resource damage (e.g., restoring previously disturbed areas, or eliminating visitor-created trails and campsites) or left to regenerate naturally.

Desired Visitor Experience –Visitors are generally overnight users, and most need to commit a minimum of two nights to use these areas. Visitation is very low, with a low probability of encounters with other users while hiking and camping. Party sizes are generally small. Visitors may experience challenges and must be self-reliant. Food canisters may be required. Visitors need a high degree of backcountry skills, including map reading and orienteering.

GUIDING PRINCIPLES OF TRAIL MANAGEMENT AT SEQUOIA AND KINGS CANYON NATIONAL PARKS

Based on the desired conditions established by the parks' GMP, the overall desired condition is for the trail system to provide access and support to a wide range of wilderness recreational opportunities, including opportunities for stock and hiker use, a range of levels of user experience levels, and the opportunity for different visitors to seek their desired level of challenge and solitude at different times and places in wilderness. These opportunities should be provided in a way that minimizes impacts on wilderness character, particularly to the wilderness' natural and undeveloped qualities, and maximizes the effectiveness of resources spent on trail management activities.

The goals of trail management at the parks therefore are to protect wilderness character, provide for visitor access and a diversity of primitive recreational experiences, and to conduct trail management activities efficiently and effectively. The following provides a summary of each goal:

PROTECT WILDERNESS CHARACTER

Trails and trail management activities have effects on all the qualities of wilderness character. Below, the interactions of trails and trail management activities are discussed for each of the qualities, along with some principles of how to manage effects.

Natural Quality

The presence of a trail can affect the natural quality of wilderness character by altering the composition, ecosystem structure, and ecological functionality of the soil, aquatic systems, and native plant and animal communities through which the trail runs. Effects of the trails as a landscape feature include vegetation loss and creation of bare ground, soil compaction and erosion, diversion or concentration of water flows, increased water turbidity and sedimentation, travel barriers to very small wildlife (e.g. insects in meadows), and travel corridors for larger animals (e.g. bears). Wilderness users may introduce non-native plants, animals, or pathogens, displace or startle wildlife (e.g. bighorn sheep), step on wildlife (e.g. amphibians), and deposit urine and feces (stock and hiker), and these effects are concentrated along trails. The overall effects of these changes can alter local plant and animal habitats along trails, sometimes in a way that facilitates the establishment of non-native plants. River and creek banks, wetlands, meadows, and steep terrain are particularly vulnerable to visitor-induced impacts, and increasing visitor use can increase the width and severity of trail impacts. On the positive side, trails can concentrate visitor use on a hardened pathway, preventing more dispersed and randomized impacts to vegetation and other natural resources, and reducing impacts overall.

Materials for trail maintenance and construction may be scavenged locally from the trail area, disturbing the vegetation and soil. Trail crew camps have localized impacts on vegetation and wildlife, particularly any camps that are made on recently undisturbed land or where the crew has campfires. Trail crew members' effects on wildlife are similar to those of visitors, and trail crews also deposit urine and feces in wilderness. Helicopters supporting trail crews create noise that can influence wildlife, and livestock

supporting trail crews can impact the natural quality by trampling, grazing, and depositing urine and manure in wilderness.

Informal and abandoned trails are often on alignments that are particularly prone to erosion (steep, low slope-angle trails), and often lack tread-hardening structures to prevent erosion. Because of these things, informal and abandoned trails have many of the same effects on vegetation and wildlife as maintained trails do, but ongoing natural resources damage can be worse. The various effects of active trail management activities on informal and abandoned trails are essentially absent compared to maintained trails.

Principles to manage impacts – Trail management will focus on creating and maintaining trails on sustainable alignments where trail widening and tread erosion are minimized and natural water flow patterns are preserved. Disturbed lands along trail corridors that are not necessary for the trail system will be targeted for restoration. Trail management crews will be exemplary in using “Leave No Trace” principles to camp and travel in wilderness. Trail management crews will work to minimize helicopter and livestock impacts. Where informal or abandoned trails are creating unacceptable impacts on the natural quality, they may be restored to natural-functioning conditions or adopted into the maintained trail system (with appropriate compliance per Attachment 2, the Trails Maintenance Programmatic Exemption).

Untrammelled Quality:

Interactions – As trails are intended to provide access to wilderness, they do not constitute a trammeling action, and do not affect the untrammelled quality. Several trail management activities, however, contribute to trammeling of wilderness. The most obvious of these is landscape restoration on informal or abandoned trail segments, which seeks to alter the natural processes of erosion and succession. Installation of water bars and erosion control structures on trails could be construed as trammeling actions seeking to alter the natural processes of hydrology and erosion. Occasionally in the past, logjams have been removed to keep watercourses flowing under bridges.

Principles to manage effects – Landscape restoration on informal or abandoned trail segments will typically be done as the result of a Minimum Requirements Analysis showing a long-term benefit to wilderness character from a short-term trammeling action. Installing water bars and erosion control structures will normally be considered a net benefit to wilderness character because of the protection given to the natural quality.

Undeveloped Quality:

Interactions –According to Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System, the trail as a whole should be treated as affecting primarily the “Opportunities for Solitude and Primitive or Unconfined Recreation,” and not as a “Development.” However, the amount and kind of structures on a trail can have a large effect on trail users’ perception of development. Causeways, steps, bridges, large rock or log structures, and signs are all typically recognizable as built structures, and trails where structures are less frequent feel less developed and wilder.

Trail management crews also sometimes use motorized tools or mechanized transport to perform work, diminishing the Undeveloped Quality. Some trail management activities involve placement of temporary installations such as signs, camps, tool caches and the like.

Informal or abandoned trails can impact visitors' sense of solitude, and the presence of abandoned trails and associated structures can impact the Undeveloped Quality.

Principles to manage effects – The trail classes adapted from the U.S. Forest Service (USFS) trail management framework provide a summary measure of overall development of a trail, including trail width, signage, bridges, and amount of other trail structures. The Undeveloped Quality will be preserved at these parks by maintaining trails to the appropriate trail class for the levels of use and recreational experience desired. Trail crews will perform the far greater part of trail management activities using primitive tools, with motorized equipment, mechanized transport, and temporary installations only being done as the result of a Minimum Requirements Analysis showing a net benefit to wilderness character.

Opportunities for Solitude or Primitive and Unconfined Recreation Quality (O-SPUR):

Interactions – The formal trail system in the parks predates wilderness designation. This trail system has a dual effect on O-SPUR: it facilitates opportunities for primitive recreation for many user groups by providing access to wilderness; however, trails tend to channel and concentrate use, which typically diminishes opportunities for solitude available along the trail.

A consequence of the fact that most wilderness users choose to travel on trail is that opportunities for solitude off-trail are enhanced over what they would be in a trail-less wilderness.

The fact that stock are generally permitted on trails and generally prohibited off trails means that trail-corridor based recreation is significantly more unconfined (has fewer rules) than off-trail recreation.

As discussed in greater detail under “Trail Classification,” the development class of a trail has a strong effect on O-SPUR. Class 3 trails require the least self-reliance, and provide opportunities for primitive recreation to people needing or seeking less challenging travel in wilderness. Class 2 trails are typically more challenging to travel and provide access to less-visited areas of the park, providing opportunities for primitive recreation to people who are seeking more challenge and/or solitude. Class 1 trails provide another step in increasing challenge and solitude. Trail-less areas of the park are typically the most challenging and provide the greatest opportunities for solitude and the most self-reliant type of recreation (although some popularized off-trail areas provide less opportunity for solitude than most of the Class 1 and Class 2 trails do). Abandoned trails have effects on solitude similar to Class 1 trails, although since they do not generally appear on maps and tend to see less travel, there may be greater opportunities for solitude. Informal trails are similar to abandoned trails, although areas with a dense network of informal trails suffer a diminished sense of solitude.

Recent trends in wilderness use show overnight recreation concentrating on “destination trails” such as the Pacific Crest, John Muir (with feeder trails), High Sierra, Rae Lakes Loop, and North Lake/South Lake Loop, leaving much of the rest of the trail system less-visited than in past decades. Similarly, day use is concentrated on a few “destination” trails like Mist Falls, Lakes, and Monarch Lake trails.

Principles to manage effects – Since the above-described range of trail-based primitive recreational opportunities were available when the parks' wildernesses were designated, trail management efforts will seek to preserve this diversity through conscious management of different trails for varied opportunities. Each trail is assigned a development class, and trail management will be appropriate to the trail class – Class 1 and 2 trails will not be reconstructed to achieve Class 3 conditions (although some trail management actions to protect the natural quality of wilderness character may have a side effect of making a Class 1 or Class 2 trail less challenging in spots). Any decision made to change the development class of a trail in order to protect other aspects of wilderness character will typically require separate National Environmental Policy Act (NEPA) compliance.

In addition to trail class, trails will typically be maintained for the allowed use requiring the most construction. For example, trails where stock is allowed will have maintenance guided by the Design Parameters for Stock Trails and trails with only hiker use allowed will have maintained guided by the Design Parameters for Hiker Trails.

Other Features of Value:

Interactions – The parks’ wilderness possesses a rich history of human use, including American Indian tribes, explorers, military, prospectors, sheepherders, scientists, educators, and recreationists. Trails have two potential effects on the historic legacy: they are reminders of the past, and relics themselves, and they have the potential to affect cultural resources located within and adjacent to the trail corridors.

Although all of the trails in the parks’ wilderness have some historic context, very few of them have been formally evaluated under the National Historic Preservation Act (NHPA). Many currently abandoned trails were originally constructed and maintained by explorers, prospectors, sheepherders, loggers, and the military. Most existing maintained trails have been modified by maintenance and other management actions in pursuit of continued recreational access and to protect the natural quality of wilderness character. For both abandoned and maintained trails, it is unknown whether the historic features of any given trail are intact enough to warrant protection under the NHPA.

In places, trails cross historic and prehistoric sites, and trail-associated soil erosion can threaten those cultural resources. Cultural sites with trail access can also be more vulnerable to intentional or unintentional damage from visitors and trail maintenance activities.

Depending on their location and level of construction, trails may have a negative effect on the scenic features of wilderness.

The trail system does not have a known effect on other Features of Value other than providing access to visitors who wish to experience wilderness resources.

Principles to manage effects – As resources become available, a formal evaluation of the historic value of each trail segment in the parks should be conducted. In the interim, a first-round survey of trail segments by knowledgeable park staff has been done to identify trails with particularly compelling historic context or whose historic character is largely intact, and trails have been prioritized for evaluation and preservation of possibly historic features. For all trails, trail management actions will minimize adverse effects on trail features that could contribute to the historic value of a trail segment, such as: unique or large rock walls and distinctive alignments. Particular effort will be made to preserve features of trails with compelling context or intact character.

Where trails cause impacts to cultural sites, trail management actions to preserve sites will be given equal priority to actions preserving the natural quality of wilderness character.

Any actions taken to erase abandoned trails will require appropriate NEPA and NHPA analysis.

PROVIDE FOR VISITOR ACCESS

The parks’ trail system primarily serves the public purpose of recreation under the Wilderness Act by providing recreational access to wilderness areas of the parks. (The purposes of conservation, science, and education are also served, as the trail system also provides access for administration, research, and learning.) As discussed previously, and in the trail classification section later, the maintained trail system provides for a diverse range of opportunities for solitude and self-reliance. The maintained trail system

also provides access to a diversity of destinations (canyons, peaks, rivers, lakes, meadows, scenic features and vistas), environments (foothill shrub lands and woodlands, lower and upper mixed-conifer forests, subalpine areas, and alpine tundra), and for a diversity of activities (stock use, boating, foot travel and climbing). Much of the parks' wilderness would be impossible for stock users to access without trails, due to the difficulty of the terrain.

ACHIEVE OPERATIONAL EFFICIENCY AND EFFECTIVENESS

The parks' wilderness provides many logistical challenges for trail management and maintenance, from winter snowfall and timing of spring snowmelt to multi-day travel times to access project sites. Because of these challenges, trail crew operations must make efficient use of resources to keep the trails open for access and to protect wilderness character. Efficiency also supports opportunities for solitude by reducing administrative crew time in wilderness.

Some ways to achieve efficiency and effectiveness include building to the trail class and design use (and not beyond), working on trails seasonally (typically May-September), starting at low elevations and working higher elevation trails later, using work itineraries that minimize travel time, carefully considering use of 4(c) generally prohibited methods (such as helicopter and mechanized tools), coordinating logistics with other wilderness operations, and prioritizing work based on the trail class and designed use, with resources allocated to more heavily traveled trails, and to trails where negative impacts on wilderness character are ongoing and rapid.

SPECIFICS OF TRAIL MANAGEMENT

TRAIL CLASSIFICATION AND TERMINOLOGY

The Sequoia and Kings Canyon National Parks trail system will be managed to provide a range of diverse recreational experiences to wilderness visitors. The USFS Trails Management Handbook (Forest Service Handbook 2309.18 "USFS Trails Handbook") describes how this can be achieved through trail planning and development. Three of the organizing concepts of the USFS Trails Handbook are "Trail Type", "Trail Design Use", and "Trail Development Class" (trail class), which together lead to a set of design parameters for trail construction and maintenance. Trail management at the parks will use an adapted version of trail class to guide trail management decisions, and will be informed by the "Design Parameters for Hiker and Stock Use" trails.

Trail type describes if a trail is on soil (motorized or non-motorized terra trails), water, or snow. SEKI wilderness trails will be non-motorized terra or snow trails.

Trail design use incorporates construction and maintenance requirements of a trail based on the allowed uses of the trail. This ensures that the trail is suitable for the kinds of traffic that are allowed. SEKI wilderness trails will be designed, constructed, and maintained to be suitable for foot travel or various stock use types.

Trail class is a general description of the level of development on a given trail, graded on a continuum from Class 1 (minimally developed) through Class 5 (fully developed). Trail classes 4 and 5 would often be located near developed areas in the frontcountry, or in urban settings. These trails have wide, smooth tread surface - often composed of gravel or pavement. There could be many signs, railings, and interpretive displays, and they often include trailside amenities like benches or picnic tables. These two classes will not be used in these parks' wilderness. Trail classes 1, 2 and 3 describe appropriate development levels for the parks' wilderness trails and are described below.

Class 1 (Minimally Developed) – These trails are as much routes as trails. The trail is indistinct and difficult to find in places, and may require route-finding skills to follow. The trail surfaces may be very rough and rocky, and logs, brush and limbs may only infrequently be cleared. Structures such as walls and water bars are essentially absent, and there are no bridges. Signing is typically only at junctions, and route markers are typically no more than old blazes in locations where the trail is not otherwise evident. Examples of existing trails in the parks in this class include Kennedy Canyon, Blue Canyon, and Milestone Basin. Although the USFS Trails Handbook indicates that Class 1 trails are not typically hardened adequately to accept unrestricted stock use, some Class 1 trails at Sequoia and Kings Canyon National Parks that traverse suitable landscapes will continue to be open to low levels of stock use.

Class 2 (Moderately Developed) – These trails are constructed and maintained so that the tread is continuously visible and can typically be followed without needing route-finding skills. Trail surfaces may be rough and include substantial obstacles. Logs and fallen rocks are cleared periodically. Structures like walls, water bars, and causeways are of limited size, scale, and quantity, and water crossings do not typically have bridges. Junctions are typically signed; regulatory and resource protection signing may be present, but is uncommon. Examples of existing trails in the parks that are in this class include the Middle Fork of the Kings, State Lakes Loop and the south side of Colby Pass.

Class 3 (Developed) – These trails are constructed and maintained so that the tread is continuously obvious. The trail surface is natural, with no substantial obstacles. Logs, fallen rocks, and encroaching vegetation are cleared regularly. Structures like walls, water bars, and causeways are common to protect the parks' resources from damage and to provide for appropriate access. Bridges are present where needed to protect resources or provide appropriate access. Junctions are signed; regulatory and resource protection signing may be common. Examples of existing trails in the parks that meet the standards for this class include the Pacific Crest Trail, Paradise Valley Trail, and the High Sierra Trail.

The maintained system of formal trails in SEKI wilderness will include Class 1, 2, o3 3 hiker or stock use trails, and Class 2 snowshoe trails.

Besides the formal trail system, there are other trail-like features in wilderness. Some of these features are remains of trails that were once constructed and maintained; others were never formally maintained and are the result of wilderness users traveling across the landscape in high densities. Also, specific off-trail travel routes have been popular at different times in the parks' wilderness. For clarity of communication, the following terminology is used throughout this plan:

- *Formal Trail* – Designated and regularly maintained trail. These can be Class 1, Class 2, Class 3, Class 4, or Class 5 (Class 4 and 5 are not in wilderness).
- *Abandoned Trail* – A trail that was once a formal, maintained trail, but maintenance has been discontinued.
- *Informal Trail* – A landscape impact created by users that looks like a segment of trail.
- *Route* – A travel corridor of social value with no designated trail. Traffic may create informal trails in parts of a route.
- *Restored Trail* – A trail that was at one point a formal or informal trail that has had restoration work done attempting to restore the landscape to its natural condition.

TRAIL MAINTENANCE FUNDING AND PRIORITIES

Attachment 2 is a list of projects that are needed to transition current conditions of the trail system to the desired conditions described in the preferred alternative of the Wilderness Stewardship Plan. The desired

conditions will be realized only as funding becomes available to perform the compliance, construction, and maintenance work necessary. Similarly, annual maintenance of formal trails will be prioritized within the constraints of funding and may therefore deviate from the ideal conditions described below.

There are two primary types of funding: base appropriated NPS funds and specialized project funds. Base-funded trail operations typically include the salaries of permanent staff, vehicle costs, supplies and materials, and a small seasonal trail-clearing crew. The initial trail clearing and basic drainage maintenance is the priority for these funds.

Project fund sources include cyclic maintenance, repair / rehabilitation, Federal Lands Recreation Enhancement Act (FLREA), and donations used to perform more extensive maintenance and reconstruction, such as:

- *Cyclic Maintenance* – Clearing vegetation from the trail corridor, replacing trail structures and repairing tread as needed on a cyclic basis (every 3-5 years on a given trail segment).
- *Major Trail Reconstruction* – Reconstructing trail segments when resource or trail conditions have deteriorated due to inadequate annual or cyclic maintenance. This work could include major tread repair, replacement and construction of trail structures, and minor reroutes.
- *Trail Rerouting* – Moving a trail segment to a more sustainable alignment, and performing landscape restoration work on the abandoned trail segment.
- *Abandoned Trail Restoration* – performing landscape restoration work on an abandoned trail segment, or on areas with multiple parallel trail treads.

As funding allows, the different trail classes will receive the following levels of regular maintenance:

- Class 1 trails will receive maintenance semiannually to every few years. Most trails in this class are remote and receive little use by hikers and little to no use by stock. Work is primarily to protect the natural quality of wilderness along with ensuring the trail remains appropriately apparent on the landscape. The goal of project work is to control negative impacts on the natural quality of wilderness character and to establish sustainable alignments.
- Class 2 trails have a higher priority and will typically be cleared and drainages maintained annually. These trails are more frequently used by both hikers and stock and more frequent maintenance is important early in the use season to ensure access and to better protect the natural quality of wilderness character. The goal of the project work is to control negative impacts on the natural quality of wilderness character and to establish sustainable alignments.
- Class 3 trails will be the highest priority to clear and repair in a timely manner, since impacts to the natural quality can occur rapidly on these heavily used trails if action is not taken. These trails may be cleared several times in a year to keep them open and to protect the adjacent landscape from trampling. This trail class will receive the priority for project funding. Work typically includes controlling negative impacts on the natural quality of wilderness character, establishing sustainable alignments, and maintaining the desired visitor access.
- Class 4 and 5 trails do not occur within wilderness.
- Abandoned or informal trails may be adopted into the formal trail system (per this plan or with additional compliance) and appropriate construction work undertaken to achieve the desired trail class. If not adopted into the formal trail system, these trails will be analyzed under the NHPA and considered for landscape restoration.

- Changing the development class of a trail, or abandoning a formal trail is an action that would require additional compliance and public input.

TRAIL CONDITION MONITORING AND RESPONSE OPTIONS

Formal Trails – A comprehensive condition assessment will be performed at least every five years on each Class 1, 2 and 3 trail segment. This condition assessment will look at the condition of the trail tread and trail structures to identify deficiencies relative to the desired conditions for that trail class. Deficiencies could include: tread erosion, multiple parallel tread development, failed trail structures (e.g. bridges, water bars, retainer bars, walls, and cribbing), washouts or rockfalls, encroaching vegetation, and informal trail development. The deficiencies will be documented in the Facilities Management Software System (FMSS), cost estimates prepared, and funding requests prioritized according to current procedures. Trail maintenance funding requests may be for primarily facility-based deficiencies, or for repairing trail-related natural resource impacts.

Solutions to formal trail deficiencies will be designed to match the relevant trail development class, while minimizing constructed features to the extent possible. For Class 1 and Class 2 trails, the solution to tread erosion and other natural resource impact problems will favor rerouting to a sustainable alignment over construction of structures that would alter the development level of a trail. Class 3 trails, with their higher existing level of development and landscape impact, may require solutions that involve additional trail structures on the existing alignment. Constructing a new Class 3 trail segment involves more landscape impact than needed for a new Class 1 or Class 2 trail segment, and restoring the greater landscape impacts likely present on a problematic Class 3 trail would require extensive work. Despite these general rules, balancing short- and long-term impacts will result in reroutes or trail development solutions being recommended for Class 1, 2, and 3 trails in different situations.

Trails – Systematic monitoring of informal trail impacts over the entire parks' landscape is not possible at current or expected staffing levels. An interdivisional team will meet annually to revise and update a list of routes and destinations of concern for monitoring. A first-year list and map of routes and destinations of concern is in Attachment 5. Observations by wilderness staff will be used to detect undesirable changes over time where corrective actions are needed.

Suggested levels of monitoring and examples of possible management responses to informal trail development are as follows:

Level of Informal Trail Impacts

- Level 1 Impacts: Trail distinguishable; slight loss of vegetation cover and /or minimal disturbance of organic litter.
- Level 2 Impacts: Trail obvious; vegetation cover lost and/or organic litter pulverized in primary use areas. Rocks/gravel disturbed on barren ground.
- Level 3 Impacts: Vegetation and organic litter lost across the majority of the tread. Rocks/gravel displaced from tread on barren ground.
- Level 4 Impacts: Soil erosion in the tread beginning in some places.
- Level 5 Impacts: Soil erosion is common along the tread. Trail braiding exists where parallel informal trails are easily visible from each other.

Monitoring Informal Trails Along Routes – Traffic along a route can create visible trail impacts on sensitive ground such as slopes, wetlands, and areas with fragile vegetation. Monitoring will consist of traveling identified routes once per season (near the end of the season when possible), and recording locations of Level 2 or greater impact with braiding and any Level 4 or Level 5 impacts. Minimal recording would include a brief narrative of the condition, GPS readings, and digital photos of the problem spots.

Monitoring Informal Trails at a Destination – Examples of informal trails at a destination include informal trails used by anglers, campsite trails (to water and between sites), shore-side trample zones, rock climbing access trails, and trails in and around alpine basins. Monitoring will focus on specific, known high-use areas identified by the interdivisional team. Monitoring will involve a survey of current conditions repeated every five years as funding allows. The survey will record a GPS line feature and Impact Level for each segment in the informal trail network. Representative photos may be taken and referenced to each informal trail segment.

Monitoring Results Analysis and Management Options – Results of monitoring will be presented and reviewed annually by the interdivisional team. If recommended at that meeting, a subgroup will be assigned to develop options for management intervention to prevent or mitigate unacceptable informal-trail impacts. Some options include:

- Visitor education
- Blocking a trail and doing local site restoration
- Destination permitting requirements and quotas.
- Area closure (e.g. no camping in area, such as at Bullfrog Lake and Timberline Lake)
- Lower trailhead permit quotas.
- Travel type restrictions (for example, prohibiting off-trail stock travel, or off-trail travel of any type).
- Appropriate NEPA compliance to adopt the informal trail into the formal trail system and funding requests to perform any construction needed to ensure environmental sustainability of the new trail.

REFERENCES

Agate, E

- 1996 Footpaths: a Practical Handbook. British Trust for Conservation Volunteers. The Eastern Press Ltd, London

Bayfield, N.G.

- 1986 Penetration of the Cairngorm Mountains, Scotland, by vehicle tracks and footpaths: impacts and recovery. In R.C. Lucas (Comp.), Proceedings-National Wilderness Research Conference: Current Research (pp. 121-128). Ogden, UT: USDA Forest Service, Intermountain Research Station.

Birkby, R.C.

- 1996 Lightly on the Land: the SCA Trail-Building and Maintenance Manual. Student Conservation Association, Inc. The Mountaineers, Seattle, Washington, DC

Bright, J.A.

- 1986 Hiker impact on herbaceous vegetation along trails in an evergreen woodland of central Texas. *Biological Conservation*, 36, 53-69.

Bryan, R.B.

- 1977 The influence of soil properties on degradation of mountain hiking trails at Grovelsjon. *Geografiska Annaler*, 59A(1-2), 49-65.

Cole, D.N.

- 1983 Assessing and monitoring backcountry trail conditions (Research Paper INT-303). Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station.
- 1991 Changes on trails in the Selway-Bitterroot Wilderness, Montana, 1978-1989 (Research Paper INT-212). Ogden, UT: USDA Forest Service, Intermountain Research Station.

Cole, D.N. and D.R. Spildie

- 1998 Hiker, horse, and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management*, 53, 61-71.

Dale, D. and T. Weaver

- 1974 Trampling effects on vegetation of the trail corridors of North Rocky Mountain forests. *Journal of Applied Ecology* 11: 767-772.

DeLuca, T.H., W. A.I. Patterson, W.A., Freimund, and D.N.

- 1998 Influence of llamas, horses, and hikers on soil erosion from established recreation trails in western Montana, USA. *Environmental Management*, 22, 255-262.

Fritz, J.D.

- 1993 Effects of trail-induced sediment loads on Great Smoky Mountains National Park high gradient trout streams. M.S. Thesis. Cookeville, TN: Tennessee Technological University.

Hall, C.N. and F.R. Kuss

- 1989 Vegetation alteration along trails in Shenandoah National Park, Virginia. *Biological Conservation*, 48, 211-227.

Hammit, W.E. and D.N.

- 1998 Wildland recreation: ecology and management. New York: John Wiley and sons.

Hartley, E.

- 1976 Visitor impact on subalpine meadow vegetation in Glacier National Park, Montana. In R.M. Linn (Ed.), *Proceedings of the 1st Conference on Scientific Research in National Parks* (pp. 1279-1286). American Institute of Biological Sciences and USDI National Park Service.

Kasworm, W.F. and T.L. Monley

- 1990 Road and trail influences on grizzly bears and black bears in northwest Montana. In L.M. Darling, & W.R. Archibald (Eds.), *Bears: Their biology and management: Proceedings of the 8th International Conference* (pp. 79-84). Victoria, BC: International Association for Bear Research and Management.

Lance, A.N., I.D. Baugh, and J.A. Love

- 1989 Continued footpath widening in the Cairngorm mountains, Scotland. *Biological Conservation*, 49, 201-214.

Landres, P., S. Boutcher, L. Dean, T. Hall, T. Blett, T. Carlson, A. Mebane, C. Hardy, S. Rinehart, L. Merigliano, D.N. Cole, A. Leach, P. Wright, and D. Bumpus

- 2009 Technical Guide for Monitoring Selected Conditions Related to Wilderness Character. United States Department of Agriculture Forest Service General Technical Report WO-80 June 2009.

Landres P., C. Barns, J. G. Dennis, T. Devine, P. Geissler, C. S. McCasland, L. Merigliano, J. Seastrand, and R. Swain

- 2008 Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System. General Technical Report RMRS-GTR-212. Rep. General Technical Report RMRS-GTR-212, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Leung, Y.F. and J.L. Marion

- 1996 Trail degradation as influenced by environmental factors: A state-of-knowledge review. *Journal of Soil and Water Conservation*, 51(2), 130-136.
- 1999 Assessing trail conditions in protected areas: An application of a problem-assessment method in Great Smoky Mountains National Park, USA. *Environmental Conservation*, 26, 270-279.
- 2000 Recreation impacts and management in wilderness: A state-of-knowledge review. In D.N. Cole, S.F. McCool, W.T. Borrie, & J. O'Loughlin (Comps.), *Wilderness Science in a Time of Change Conference - Volume 5: Wilderness Ecosystems, Threats, and Management (Proceedings RMRSP-15-VOL5)* (pp. 23-48). Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

Liddle, M.J.

- 1997 Recreation ecology: the ecological impact of outdoor recreation and ecotourism. London: Chapman and Hall.

Marion, J.L.

- 1994 An assessment of trail conditions in Great Smoky Mountains National Park (Research/Resources Management Report). Atlanta, GA: USDI National Park Service, Southeast Region.

Marion, J.L. and Y.F. Leung

- 2001 Trail resource impacts and an examination of alternative assessment techniques. *Journal of Park and Recreation Administration* 19 (3) (Special issue on trails and greenways).
- 2004 Environmentally sustainable trail management. *Environmental Impacts of Ecotourism*. Patuxent Wildlife Research Center. CABI Publishing, Cambridge, MA. Buckley, Ralf (editor)

Marion, Jeffrey L., Jeremy Wimpey

- 2011 Formal and Informal Trail Monitoring Protocols and Baseline Conditions: Great Falls Park and Potomac Gorge. Virginia Tech, College of Natural Resources, Department of Forest Resources & Environmental Conservation. Research Report. January.

Marion, Jeffrey L., Jeremy Wimpey, and Logan Park

- 2009 Informal and Formal Trail Monitoring Protocols and Baseline Conditions: Acadia National Park. Virginia Tech, College of Natural Resources, Department of Forest Resources & Environmental Conservation. Research Report. September.

Monz, C.A., T. Pokorny, J. Freilich, S. Kehoe, and D. Ayers-Baumeister

- 1996 The consequences of trampling disturbance in two vegetation types at the Wyoming Nature Conservancy's Sweetwater River Project Area. In: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. 2000. *Wilderness science in a time of change conference—Volume 5: Wilderness ecosystems, threats, and management; 1999 May 23–27; Missoula, MT. Proceedings RMRS-P-15-VOL-5*. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

National Park Service (NPS)

- 2006a *Management Policies 2006*. U.S. Government Printing Office, Washington, DC.
- 2007a Final General Management Plan and Comprehensive River Management Plan/Environmental Impact Statement. Sequoia and Kings Canyon National Parks, Three Rivers, CA. 657 pp.
- 2009 NPS Asset Management, Asset Management Handbook: Trail, Trail Bridge, Trail Tunnel. Park Facility Management Division. NPS Trails Working Group. April.

Newsome, D., S.A. Moore, and R.K. Dowling

- 2013 *Natural area tourism: ecology, impacts and management*. 2nd edition. Channel View Publications, Bristol, UK.

Newsome, D., D.N. Cole, and J.L. Marion

- 2004 Environmental impacts associated with recreational horse riding. In R. Buckley (ed.) *The Environmental Impacts of Tourism* (pp.61-82). Wallingford: CABI Publishing.

Newsome, D., R. Dowling, and S. Moore

- 2005 *Wildlife tourism*. Clevedon: Channel View Publications.

Newsome, D., A. Smith, and S. Moore

- 2008 Horse riding in protected areas: A critical review and implications for research and management. *Current Issues in Tourism* 11 (20, 144-166.

Noss, R.F. and A.Y. Cooperrider

- 1994 *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Island Press, Washington, D.C.

Park, Logan O., Robert E. Manning, Jeffery L. Marion, Steven R. Lawson, Charles Jacobi

- 2008 Managing Visitor Impacts in Parks: A Multi-Method Study of the Effectiveness of Alternative Management Practices. *Journal of Park and Recreation Administration*. Volume 26, Number 1 pp. 97-121 Spring 2008.

Pickering, C.M., W. Hill, D. Newsome, and Y-F. Leung

- 2010 Comparing hiking, mountain biking and horse riding impacts on vegetation and soils in Australia and the United States of America. *Journal of Environmental Management* 91, 551-562.

Prideaux, B.

- 2009 *Resort destinations: evolution, management and development*. Oxford: Butterworth-Heinemann.

Tyser, R.W. and C.A. Worley

- 1992 Alien flora in grasslands adjacent to road and trail corridors in Glacier National Park, Montana (USA). *Conservation Biology*, 6, 253-262.

U.S. Department of Agriculture Forest Service (USDA)

- 1982 *Comprehensive Management Plan for the Pacific Crest National Scenic Trail*. January.
2008 *Forest Service Handbook FSH 2309.18 - Trails Management Handbook*.

Wilson, J.P. And J.P. Seney

- 1994 Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails of Montana. *Mountain Research and Development*, 14, 77-88.

Wimpey, Jeremy F. and Jeffrey L. Marion

- 2010 The influence of use, environmental and managerial factors on the width of recreational trails. *Journal of Environmental Management* 91 (2010) 2028e2037.
2011 A spatial exploration of informal trail networks within Great Falls Park, VA. *Journal of Environmental Management* 92 (2011) 1012e1022.

Wischmeier, W. H. and D.D. Smith

- 1978 *Predicting rainfall erosion losses—a guide to conservation planning*. U.S. Department of Agriculture.

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Attachment 1: Trail System Description/Inventory

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Table K-1: Trail System Description / Inventory

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
East Fork Kaweah Drainage				
Aspen Flat	0.40	Crystal Creek	Aspen Flat	3 / Day
Atwell-Hockett	9.74	Atwell Campground	Hockett Meadow	3 / Open
Cahoon Rock	2.58	Hockett Meadow Junction	Cahoon Rock	1,2 / Open
Eagle Lake	1.41	Eagle-Mosquito Junction	Eagle Lake	2 / Mixed
Eagle-Mosquito Lakes	0.93	White Chief Jct	Eagle-Mosquito Junction	2 / Mixed
Evelyn Lake	1.05	Cahoon Rock Jct	Evelyn Lake	2 / Open
Farewell Gap	2.65	Franklin Pass Jct	Farewell Gap	3 / Open
Farewell/Franklin Lakes	2.65	Aspen Flat Junction	Franklin Pass Junction	3 / Day
Franklin Pass - Franklin Lakes	4.78	Franklin Pass Junction	Franklin Pass	3 / Open
Hockett-Sand Meadow	0.85	Hockett Mdw	Sand Meadow Junction	2 / Open
Mineral King Valley	0.41	Disney Prkg-Road end Trailhead	Aspen Flat Junction	3 / Day
Monarch Lakes	3.33	Timber Gap Jct	Lower Monarch Lake	2 / Closed
Mosquito Lakes	1.58	Eagle-Mosquito Junction	Mosquito Lakes	2 / Day
Paradise Ridge	3.31	Atwell Mill CG Trailhead	Top of Paradise Ridge	2 / Day
Sawtooth Pass West	1.51	Monarch Lakes	Sawtooth Pass	1 / Closed
Tar Gap	6.95	Trailhead Cold Springs CG	Atwell Hockett trail	2 / Mixed
Timber Gap	1.02	Sawtooth Prkg Trailhead	Timber Gap	2 / Day
White Chief	2.41	Disney Prkg-Road end Trailhead	White Chief	2 / Mixed
Total	47.54			
Kern River Drainage				
Big Five-Little Five Lakes	4.38	Lost Canyon	Little Five Lakes	2 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Bighorn Plateau	4.14	Tyndall Creek	Wallace Creek	3 / Open
Blackrock Pass - Little Five Lakes	1.58	Little Five Lakes	Blackrock Pass	2 / Open
Chagoopa Plateau	11.00	Big Arroyo Patrol Cabin	Upper Funston Mdw	3 / Open
Cottonwood Pass	5.00	Rock Creek Junction	Park Boundary	2 / Open
Coyote Lake	2.22	Coyote Pass/Coyote Lakes Junction	Park Boundary	2 / Open
Coyote Pass	5.31	Kern Station	Coyote Pass	2 / Open
Crabtree - Rock Creek	3.30	Lower Crabtree Mdw	Rock Creek	3 / Open
Crabtree Lakes	1.78	Lower Crabtree Mdw	Crabtree Lakes	1 / Open
Crabtree Sand Flats	0.80	Crabtree Sand Flats	Crabtree Ranger Station Jct	3 / Open
Forester Pass South	5.02	Forester Pass	Tyndall Creek	3 / Open
Franklin Pass - Upper Rattlesnake	2.44	Forester Lake Junction	Franklin Pass	2 / Open
John Dean Cutoff	2.54	Upper Kern	Tyndall Ranger Station	1 / Open
Kern Canyon	9.37	Upper Funston	Junction Meadow (Kern)	3 / Open
Kern Kaweah	7.82	Junction Meadow (Kern)	Colby Pass	2 / Open
Lake South America	5.34	Tyndall Cutoff	Upper Kern Canyon	1 / Open
Little Five - Big Arroyo	2.64	Little Five Lakes	Big Arroyo Patrol Cabin	2 / Open
Lost Canyon	5.12	Soda Creek	Columbine Lake	2 / Open
Lower Big Arroyo	6.14	Big Arroyo Patrol Cabin and HST jct	Soda Creek/Willow Meadow Jct	1 / Closed
Lower Crabtree	0.67	Crabtree Sand Flats	Lower Crabtree Meadow	3 / Open
Lower Kern	8.52	South Boundary of Kern Station	HST at Upper Funston Meadow	3 / Open
Lower Kern Bridge	0.26	Lower Kern RS	Kern Bridge	3 / Open
Lower Rattlesnake	7.77	Jct of Kern Trail	Forester Lake Junction	2 / Open
Lower to Upper Crabtree Meadows	1.09	Crabtree Ranger Station	Lower Crabtree Mdw	3 / Open
Lower Whitney Creek Use	0.75	Lower Crabtree Mdw	Lower Whitney Creek	2 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Moraine Lake	3.68	Sky Parlor Meadow	Upper Chagoopa Plateau	2 / Open
Mount Langley	1.45	Army Pass Junction	Summit Mount Langley	1 / Closed
Mount Whitney	7.05	Crabtree Station	Mt Whitney Summit	3 / Mixed
New Army Pass	2.64	Upper Rock Creek	New Army Pass	2 / Open
Rattlesnake - Soda Creek	2.92	Forester Lake Junction	Soda Creek	2 / Open
Rock Creek	3.54	Rock Creek	Cottonwood Pass Jct	3 / Open
Rock Creek Lake	3.12	From Cottonwood Pass Jct	Soldier Lake	2 / Open
Sandy Meadow	3.34	Wallace Ck	Crabtree Sand Flats	3 / Open
Sawtooth Pass East	1.04	Columbine Lake	Sawtooth Pass	1/ Closed
Shepherd Pass	3.38	JMT-PCT Tyndall Creek	Shepherd Pass	2 / Open
Shotgun Pass	1.81	Shotgun/Upper Rattlesnake Jct	Shotgun Pass	1 / Open
Siberian Pass	0.70	Siberian Junction	Siberian Pass	2 / Open
Soda Creek	4.29	Lower Big Arroyo	Upper Soda Creek	2 / Open
Soldier Lake	0.26	Upper Rock Creek	Soldier Lake	2 / Open
Trail Crest	0.15	Trail Crest Trail	Park Boundary	3 / Closed
Tyndall Ranger Station	0.59	Pacific Crest Trail	Tyndall Ranger Station	3 / Open
Upper Big Arroyo	3.38	Kaweah Gap	Big Arroyo Patrol Cabin	3 / Open
Upper Big Five Lakes	1.66	Lower Big Five Lake	Upper Big Five Lake	2 / Open
Upper Crabtree Meadow	0.19	JMT-PCT Junction	Crabtree Ranger Station	3 / Open
Upper Kern Canyon	4.44	HST Wallace Ck	Tyndall Cut-off	2 / Open
Upper Kern -Tyndall Cutoff	2.93	Upper Kern	JMT-PCT Tyndall Ck	2 / Open
Upper Rock Creek	1.73	Soldier Lake	Junction with PCT	2 / Open
Upper Soldier Lake	2.00	Soldier Lake	Junction with Mt Langley Trail	1 / Closed
Wallace Creek	4.11	Junction Meadow (Kern)	JMT-PCT Wallace Ck Jct	3 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Wallace Lakes	2.53	PCT Junction	Wallace Lakes	1 / Mixed
Willow Meadow Cut-off	4.69	Soda Creek	Rattlesnake Creek	1 / Open
Wright Lakes	1.90	PCT Junction	Wright Lakes	1 / Mixed
Total	174.49			
Marble Fork Kaweah Drainage		18.74		
Admiration Point	0.70	Colony Mill Road	Admiration point overlook	2 / Closed
Hump	0.73	Lakes Trail Jct	Heather Lake	2 / Day
JO Pass	1.79	Jct off Twin Lk Trail	JO Pass	2 / Open
Lakes	2.94	Wolverton Prkg Trailhead	Pear Lake	3 / Mixed
Little Baldy	0.20	Baldy Saddle Gen Hwy	Little Baldy Dome	2 / Closed
Marble Falls	2.73	Potwisha CG	Marble Fall, Marble Fork	2 / Closed
Old Colony Mill Road	2.48	North Fork road	Crystal cave road	2 / Day
Pear Lake Ranger Station	0.34	Pear Lake Trail	Pear Lake Ranger Station	3 / Day
Silliman Pass South	2.61	JO Pass/Twin Lakes jct	Silliman Pass	3 / Open
Sunset Rock	0.35	Museum area	Sunset Rock	3 / Day
Tokopah Falls	0.36	Lodgepole CG trailhead	Tokopah Falls	3 / Closed
Twin Lakes	3.51	Trailhead Lodgepole CG	JO/Twin Lakes Junction	3 / Mixed
Total	18.74			
Middle Fork Kaweah Drainage		78.01		
Alta - Panther Gap	1.94	Giant Forest	Alta Meadow/Peak Jct	2 / Day
Alta Meadow	1.70	Panther Gap Junction	Alta Meadow	2 / Day
Alta Peak	1.81	Alta Meadow Junction	Alta Peak Summit	2 / Day
Alta-High Sierra Cut-off	1.99	Cut-off between Alta & HST	Cut-off between Alta and HST	2 / Day
Bearpaw Cut-off	1.55	Middle Fork Kaweah	Little Bearpaw Meadow	2 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Bearpaw Meadow	0.34	HST	Redwood/Bearpaw Trail	3 / Open
Blackrock Pass - Pinto Lake	7.76	Timber Gap Jct	Blackrock Pass	2 / Open
Bobcat Point	0.20	High Sierra Trail	Sugar Pine Trail	3 / Closed
Cliff Creek	3.25	Redwood Mdw	Blackrock Pass Junction	2 / Open
Crescent Mdw-Bearpaw	10.40	Crescent Meadow Trailhead	Bearpaw	3 / Open
Elizabeth Pass South	3.72	Over the Hill Junction	Elizabeth Pass	2 / Open
Hamilton Lakes	3.81	Bearpaw	Hamilton Lakes	3 / Open
Kaweah Gap	4.06	Hamilton Lakes	Kaweah Gap	3 / Open
Kaweah Middle Fork Cut-off	0.91	Redwood Mdw-Bearpaw Trail	Middle Fork Kaweah Bridge	2 / Open
Lone Pine Creek	1.92	Elizabeth Pass Junction	Tamarack Lake	2 / Open
Middle Fork Kaweah	11.32	Moro Creek	Middle Fork Bridge	2 / Mixed
Over the Hill	1.47	High Sierra Trail	Elizabeth Pass South Trail	2 / Open
Paradise Creek	2.02	Buckeye Flat CG	2 miles up from Middle Fork	2 / Closed
Paradise Ridge-Redwood Mdw	5.94	Redwood Mdw	Paradise Gap	2 / Open
Potwisha-Hospital Rock	1.52	Potwisha Dump station	Hospital Rock Picnic Area	3 / Day
Redwood Mdw Cut-off	0.89	Middle Fork Kaweah	Redwood Mdw	2 / Open
Redwood Mdw-Bearpaw	4.64	Bearpaw	Redwood Mdw	2 / Open
Timber Gap Cliff Creek	2.91	Cliff Creek	Timber Gap	2 / Mixed
Twenty-Seven Switchback Cut-off	0.91	High Sierra Trail	Over the Hill Trail	2 / Open
Wolverton Cutoff	1.04	Alta Trail	High Sierra Trail	3 / Day
Total	78.01			
Middle Fork Kings Drainage				
Blue Canyon	6.19	Kettle Ridge Entrance	Blue Canyon Meadow	1 / Open
Dusy Basin	3.49	Lip of Dusy Basin	Bishop Pass	3 / Day

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Dusy Switchbacks	2.77	Dusy Switchbacks/PCT Junction	Lip of Dusy Basin	3 / Open
Granite Pass North	5.21	Northern State Lakes Loop Junction	Granite Pass	2 / Open
Horseshoe Lakes	0.95	Spur Trail	Horseshoe Lakes	1 / Open
Kennedy Canyon	8.12	Outlet of Volcanic Lakes Crossing	Kennedy Pass	1 / Open
Lower LeConte Canyon	3.48	Palisade Creek Crossing	Dusy Switchbacks/PCT Junction	3 / Open
Lower Middle Fork Kings	10.82	Crown Creek Crossing	Simpson Junction	2 / Open
Palisade Creek	6.11	Palisade Creek Crossing	Outlet of Palisade Lakes	3 / Open
Palisade Lakes	3.69	Outlet of Palisade Lakes	Mather Pass	3 / Open
State Lakes Loop	4.23	North State Lakes Junction	South State Lakes Junction	2 / Open
Tehipite Switchbacks	4.59	Gnat Meadow Entrance	Crown Creek Crossing	2 / Open
The Bitch	5.93	Simpson Meadow Junction	Northern State Lakes Loop Junction	2 / Open
Upper Blue Canyon	1.00	Blue Canyon Meadow	Blue Canyon Lakes	1 / Day
Upper LeConte Canyon	7.34	Dusy Switchbacks/PCT Junction	Muir Pass	3 / Open
Upper Middle Fork Kings	8.09	Simpson Junction	Palisade Creek Junction	2 / Open
Volcanic Lakes	1.90	Granite Pass North Trail	Outlet of Volcanic Lakes Crossing	1 / Open
Total	83.91			
North Fork Kaweah Drainage				
Big Baldy	2.06	Big Baldy Trailhead	Top of Big Baldy	3 / Day
Buena Vista	0.86	Buena Vista Trailhead	Top of Buena Vista Peak	3 / Day
Dorst/Lost Grove	2.06	Muir Grove Trail/Lost Grove Trail Junction	Lost Grove	1 / Closed
Hidden Springs	13.87	North Fork Kaweah Trailhead	Hidden Spring	2 / Open
Little Baldy	1.35	Baldy Saddle Gen Hwy	Little Baldy Dome	2 / Closed
Muir Grove	2.53	Dorst CG Trailhead	Muir Grove	2 / Closed

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Old Colony Mill Road	7.28	North Fork road	Crystal cave road	2 / Day
Redwood Canyon	2.14	Trailhead	Hart Tree Junction on Redwood Crk	3 / Day
Redwood Canyon Big Springs	3.62	Redwood Canyon/Hart Tree Junction	Big Springs	2 / Day
Redwood Canyon Hart Tree	4.76	Upper Hart Junction	Lower Hart Junction	3 / Day
Redwood Canyon Sugar Bowl	4.42	Trailhead	Sugarbowl Junction along ridge	3 / Day
Total	44.97			
San Joaquin Drainage (total) 42.56				
Evolution Basin	6.44	Lamarck Col/PCT Junction	Muir Pass	3 / Open
Evolution Valley	7.43	Goddard Canyon Junction	Lamarck Col Junction	3 / Open
Goddard Canyon	5.08	Goddard Canyon Junction	Hell for Sure/Martha Lake Junction	2 / Open
Hell for Sure Pass	3.70	Hell for Sure/Martha Lake Junction	Hell for Sure Pass	1 / Open
Lake 11,106	1.56	McClure Meadow	Lake 11106	1 / Day
Lamarck Col	3.29	Lamarck Col/PCT Junction	Lamarck Col	1 / Closed
Lower Goddard Canyon	3.54	Piute Creek Entrance	Goddard Canyon Junction	3 / Open
Martha Lake	2.8	Hell for Sure/Martha Lake Junction	Martha Lake	1 / Day
Total	42.56			
Soda Springs Creek Drainage				
Farewell Gap	0.42	Quinn Mdw	North Boundary	2 / Open
South Fork Meadows	1.08	Sand Mdw-Hockett Lakes Jct	Windy Gap Jct	2 / Open
Windy Gap	1.99	Blossom Lk Jct	Quinn Mdw (RS)	2 / Open
Windy Ridge	0.86	Tuohy Gap	Blossom Lake Jct	2 / Open
Total	4.36			
South Fork Kaweah Drainage				
Blossom Lake	2.71	Hunter Creek Junction	Blossom Lk	2 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Cyclone Meadow	1.73	Windy Ridge/Cyclone Meadow Jct	Windy Ridge	2 / Open
Hockett Lakes	0.72	South Fork Crossing	Hockett Lakes Junction	2 / Open
Hockett-Sand Meadow	0.29	Hockett Mdw	Sand Meadow Junction	2 / Open
Hockett-South Fork Crossing Cutoff	0.98	Sand Meadow Junction	Hockett Lakes Junction	2 / Open
Hockett-South Fork Meadow	0.89	Sand Meadow Junction	South Fork Meadows	2 / Open
Ladybug	1.73	So Fork CG Trailhead	Whiskey Log Junction	2 / Day
South Fork Kaweah	9.73	South Fork Campground TH	South Fork Kaweah Crossing	2 / Mixed
South Fork Meadows	0.19	South Fork Meadows	South Fork Kaweah Trail	2 / Open
Touhy	1.94	South Fork Crossing	South Boundary	2 / Open
Tuohy Cutoff	1.92	South Fork Mdw	Tuohy Gap Jct	2 / Open
Wet Meadow	0.68	Quinn Mdw	Boundary at Wet Mdw	2 / Open
Whiskey Log	1.26	Ladybug	Cedar Creek	2 / Day
Windy Gap	2.17	Hunter Creek Junction	Quinn Meadow (RS)	2 / Open
Total	26.95			
South Fork Kings Drainage				
Avalanche Pass - Sphinx	5.00	Sphinx Junction	Avalanche Pass	2 / Open
Avalanche Pass Roaring River	5.80	Avalanche Pass/Cloud Canyon Junction	Avalanche Pass	2 / Open
Baxter Pass	4.57	Baxter Pass/PCT	Baxter Pass	1 / Closed
Bell Canyon - Comanche Cutoff	1.53	Seville Lake Junction	Comanche Junction	2 / Open
Bell Canyon Entrance	1.46	Bell Canyon Entrance	Seville Lake Junction	3 / Open
Bench Lake	2.00	Bench Lake/PCT Junction	Bench Lake	2 / Open
Beville Lake	0.07	Silliman Pass/Beville Lake Trail Junction	Beville Lake	3 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Bubbs Creek	6.20	Sphinx Junction	Junction Meadow (East Lake Jct)	3 / Open
Bubbs Creek Switchbacks	1.42	Bailey Bridge Junction (north side)	(blank)	3 / Open
Bullfrog Lake	2.29	Bullfrog/PCT Junction	Kearsarge Lakes/Bullfrog Junction	3 / Day
Cedar Grove Overlook	0.46	Cedar Grove Overlook/Hotel Creek Junction	Cedar Grove Overlook	3 / Day
Cedar Grove Sand Flats	1.73	Roads End	Bailey Bridge Jct	3 / Day
Charlotte Lake	1.64	Charlotte Lake/PCT Junction	Charlotte Creek Stock Camps	3 / Day
Cloud Canyon	6.17	Roaring River Ranger Station	Creek Crossing @ Grand Palace	3 / Open
Colby Pass North	4.05	Creek Crossing @ Grand Palace	Colby Pass	2 / Open
Deadman Canyon	5.81	Roaring River Ranger Station	Creek between Lower and Upper Ranger	3 / Open
Don Cecil	3.50	Cedar Grove Bike Path	Summit Mdw	2 / Mixed
East Lake	2.75	Junction Meadow	East Lake Drift Fence	2 / Open
Elizabeth Pass North	3.62	Creek between Upper and Lower Ranger	Elizabeth Pass	2 / Open
Frypan Entrance	0.40	Park Boundary @ Wildman Meadow	Kennedy Pass Trail	2 / Open
Glen Pass South	1.90	Kearsarge Pass/PCT Junction	Glen Pass	3 / Open
Granite Basin	3.18	Lip of Granite Basin (benchmark)	Granite Pass	3 / Open
Granite Lake	0.52	Granite Basin Trail	Granite Lake	1 / Open
Grouse Lake	0.63	Copper Creek Trail	Grouse Lake	1 / Open
Grizzly Lake	0.36	Park Boundary	Kennedy Pass Trail	2 / Open
Hotel-Creek	2.56	Hotel Creek Trailhead	Hotel/Lewis Junction	3 / Day
Junction Meadow Switchbacks - Bubbs	2.27	Junction Meadow on Bubbs	Vidette Meadow Junction	3 / Open
Kanawyers Gap	3.30	Kanawyers Gap	Comanche Junction	2 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
Kearsarge Lakes	0.57	Bullfrog Lake/Kearsarge Lakes Junction	Kearsarge Lakes	3 / Day
Kearsarge Pass	2.87	Kearsarge Pass/PCT Junction	Kearsarge Pass	3 / Day
Kennedy Pass South	3.75	Frypan Meadow	Kennedy Pass	2 / Open
Lake Reflection		East Lake Drift Fence	Lake Reflection	1 / Day
Lost Lake	0.70	Lost Lake Junction	Lost Lake	3 / Open
Lower Copper Creek Switchbacks	3.69	Roads End Cedar Grove	Lower Tent Mdw crossing	3 / Day
Lower Lewis Creek	0.91	Lewis Creek Trailhead	Hotel/Lewis Junction	3 / Day
Lower Sixty Lakes Basin	1.65	First Lake in Sixty Lakes Basin	Lower Sixty Lakes Basin	1 / Closed
Mist Falls	3.16	Bailey Bridge Jct	Lower Paradise Camping	3 / Day
Paradise Valley	3.30	Lower Paradise Valley Camping	South Fork Bridge @ Upper Paradise	3 / Open
Pinchot Pass North	3.83	South Fork Kings Crossing	Pinchot Pass	3 / Open
Pinchot Pass South	7.38	Woods Creek Crossing	Pinchot Pass	3 / Open
Rae Lakes	4.93	Dollar Lake Outlet	Glen Pass	3 / Day
Ranger Lake	0.14	Silliman Pass/Ranger Lake Junction	Ranger Lake	3 / Open
Sawmill Pass	3.22	Sawmill Pass/PCT Junction	Sawmill Pass	1 / Open
Seville Lake	1.14	Seville Junction	Seville Lake	3 / Open
Silliman Pass North	4.90	Seville Junction	Silliman Pass	3 / Open
South Side Cedar Grove Sand Flats	1.88	Bailey Bridge Jct	Red Bridge @ Roads End	3 / Day
Sugarloaf Entrance	2.22	Sugarloaf Entrance	Comanche Junction	3 / Open
Sugarloaf Valley	7.45	Comanche Junction	Roaring River Ranger Station Junction	3 / Open
Taboose Pass	2.36	Taboose Pass/PCT Junction	Taboose Pass	2 / Open
Upper Basin	5.74	South Fork Kings Crossing	Mather Pass	3 / Open
Upper Bubbs Creek - Forester Pass	4.95	Center Basin/PCT Junction	Forester Pass	3 / Open

Trail Name	Miles	Beginning	End	Trail Class / Stock Use
North				
Upper Copper Creek Switchbacks	3.26	Lower Tent Meadow crossing	Lip of Granite Basin (benchmark)	3 / Open
Upper Lewis Creek	4.06	Hotel/Lewis Junction	Frypan Meadow	2 / Mixed
Upper Sixty Lakes Basin	1.42	Sixty Lakes/PCT Junction	Outlet of first lake in Sixty Lakes Basin	2 / Day
Vidette Meadow	3.05	Vidette Meadow Junction	Center Basin/PCT Junction	3 / Open
Vidette Switchbacks	1.74	Vidette Meadow Junction	Kearsarge Pass/PCT Junction	3 / Open
Woods Creek	5.10	South Fork Kings Bridge	Woods Creek Crossing	3 / Open
Woods Creek Crossing - Dollar Lake	3.96	Woods Creek Crossing	Dollar Lake Outlet	3 / Open
Total	168.56			
Tule Drainage				
Summit Lake	0.39	Windy Ridge	Summit Lake	2 / Open
Touhy	1.05	South Fork Crossing	South Boundry	2 / Open
Windy Ridge	1.45	Tuohy Gap	Blossom Lk Jct	2 / Open
Total	2.89			

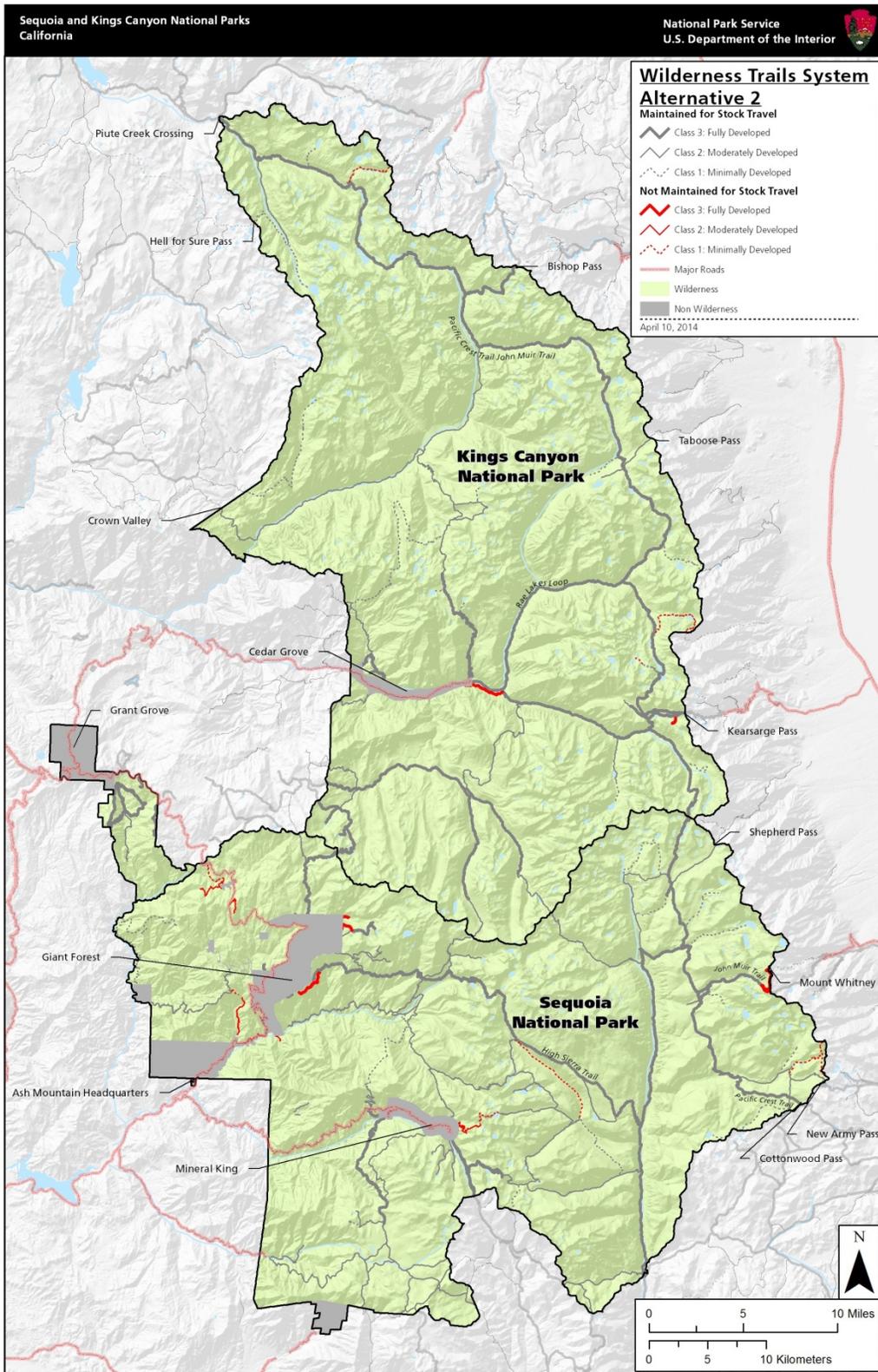


Figure K-1: Wilderness Trails System - Trail Segments and Planned Class and Design Use under the Preferred Alternative

**Attachment 2: “Major Project” List to Bring Trail System to
Desired Class and Design Use from Current Conditions**

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MAJOR PROJECT LIST TO BRING TRAIL SYSTEM TO DESIRED CLASS AND DESIGN USE FOR CURRENT CONDITIONS

The Trail Management Plan outlines desired conditions for the trail system of Sequoia and Kings Canyon National Parks that are different from current conditions in many places. In some locations, trails have been abandoned and restoration work may be needed on the abandoned trail segments. In other locations, new trails are called for, or current trail development is more than or less than called for in the plan. Much of the work needed to realize the desired conditions can be done within the constraints of the Programmatic Categorical Exemption (attachment 3). The more extensive work needed in other places may require additional site-specific compliance under NEPA or NHPA. This attachment contains a listing and map of those projects where more extensive work is needed.

Table K-2: Large Project List to Bring Trail System to Desired Class and Design Use for the Preferred Alternative

Project Map Number	Project Name	Description	Wilderness Qualities	Access	Sustainability
1	Lamarck Col Trail Establishment	Numerous informal trails have developed from hiker and mountaineer use in the Lamarck Col and Darwin Bench area. This project would establish a Class 1 hiker only trail to channel use onto one route, and would do landscape restoration on the rest of the informal trails.	Nat UnD Sol	Yes	Yes
2	Hell For Sure Pass Trail Reroute	Near the top of Hell for Sure Pass, the trail ascends straight up a wet hillside meadow. This project would reroute the trail out of the meadow onto dry, stable slopes and do landscape restoration on the abandoned section of trail.	Nat		Yes
3	Martha Lake Trail Alignment	The Martha Lake Trail traverses several wet meadows below Martha Lake. These meadows are known habitat for the Yosemite Toad. Under the WSP this trail will be a Class 1 trail open to stock travel. This project would relocate the trail from ground that is not suitable for a Class 1 stock use trail, including impacts to wet meadows and possible impacts to Yosemite Toad populations. Landscape restoration would be done on the abandoned trail sections.	Nat UnD Sol	Yes	Yes
4	Dusy Basin Trail Reroute	Near the west end of Dusy Basin, the trail drops steeply down mixed meadow and bedrock benches where the trail is heavily braided and eroded. After reaching the level of the lakes, the trail crosses level meadow areas where traffic has established multiple routes. This project would establish a Class 3 stock use trail on a sustainable alignment, and would do landscape restoration on the abandoned sections of trail.	Nat UnD Sol		Yes

Project Map Number	Project Name	Description	Wilderness Qualities	Access	Sustainability
5	Cartridge Pass Trail Restoration	Cartridge Pass was the original route for the John Muir Trail. Since construction of the Golden Staircase and Mather Pass Trail as the current JMT, Cartridge Pass has seen little maintenance, and under the WSP this trail will no longer be a stock travel route or a maintained trail. Portions of the trail near Triple Falls, through the meadows of Lake Basin, over the pass, and down to the Muro Blanco Trail are still evident as abandoned trail segments, and in places cause active erosion. This project would assess the Cartridge Pass Trail under NHPA, then perform landscape restoration or historic preservation as appropriate.	Nat UnD Sol		
6	Kennedy Canyon Trail Alignment	The Kennedy Pass Trail traverses several wet meadows in Kennedy Canyon. In addition, the trail is indistinct in many spots and even light levels of use are creating informal trails to dead ends. Under the WSP this trail will be a Class 1 trail open to stock travel. This project would relocate the trail from ground that is not suitable for a Class 1 stock use trail, including impacts to wet meadows and replacing dead end informal trails with trails that allow through stock traffic. Landscape restoration would be done on the abandoned trail sections.	Nat UnD Sol	Yes	Yes
7	Pinchot Pass North Trail Reroute	Between Marjorie Lake and Pinchot Pass, the John Muir/Pacific Crest Trail climbs steeply up several vegetated benches. Past efforts to stabilize the trail with structures have failed, as the trail is too steep for sustained use. This project would construct a series of reroutes to put the trail on a sustainable alignment by lowering the grade. Landscape restoration would be performed on the abandoned sections of trail.	Nat	Yes	Yes
8	Pinchot Pass South Deferred Restoration	During the summers of 1982-1985, over a mile of the John Muir/Pacific Crest Trail was rerouted from wet meadows and steep alignments onto more stable ground and lower trail grades. The abandoned trail through the wet meadows never had landscape restoration work done, and is still an apparent and eroding scar. This project would perform landscape restoration work on the trail section abandoned in 1982-1985.	Nat UnD Sol		
9	Sawmill Pass Trail Alignment	The Sawmill Pass Trail traverses several wet sidehill meadows between Woods Lake and Sawmill Pass. In addition, near the pass the trail has a fall-line alignment where erosion has created features several feet deep and a dozen feet wide. This project would relocate the trail from ground that is not suitable for a Class 1 stock use trail, and would address the ongoing erosion near Sawmill Pass.	Nat UnD Sol	Yes	Yes

Project Map Number	Project Name	Description	Wilderness Qualities	Access	Sustainability
10	Gardiner Pass Trail Restoration	The Gardiner Pass Trail will no longer be a stock travel route or a maintained trail under the WSP. Portions of the trail near in Charlotte Creek, over Gardiner Pass, and into Gardiner Basin are still evident on the landscape, and in places cause active erosion. This project would assess the Gardiner Pass Trail under NHPA, then perform landscape restoration or historic preservation as appropriate.	Nat UnD Sol		
11	Dragon Lake Trail Restoration	The Dragon Lake Trail will no longer be a stock travel route or a maintained trail under the WSP. Portions of the trail evident on the landscape and in places cause active erosion. This project would assess the Dragon Lake Trail under NHPA, then perform landscape restoration or historic preservation as appropriate.	Nat UnD Sol		
12	Junction Pass Restoration	The Junction Pass Trail will no longer be a stock travel route or a maintained trail under the WSP. Portions of the trail evident on the landscape and in places cause active erosion. This project would assess the Junction Pass Trail under NHPA, then perform landscape restoration or historic preservation as appropriate.	Nat UnD Sol		
13	Milestone Basin Restoration	The Milestone Basin Trail will no longer be a stock travel route or a maintained trail under the WSP. Portions of the trail evident on the landscape and in places cause active erosion. This project would assess the Milestone Basin Trail under NHPA, then perform landscape restoration or historic preservation as appropriate.	Nat UnD Sol		
14	JMT-PCT Tyndall Reroute	This Class 2 trail is on a hillside meadow and the trail is deeply rutted by a stream crossing. This project would reroute the trail to higher, more stable ground and perform landscape restoration on the abandoned trail segments.	Nat		Yes
15	Elizabeth Pass South Reroute	Existing trail alignment is not sustainable for a Class 2 trail due to steep terrain, meadows, and wetlands. Tread erosion is severe in places and ongoing. Establish a sustainable alignment and restore abandoned trail sections.	Nat Sol	Yes	Yes
16	Coppermine Pass Trail Restoration	Coppermine Pass Trail connects upper Cloud Canyon and upper Deadman Canyon over Coppermine Pass. The trail was originally constructed to access copper deposits in those areas. Under the WSP, this trail will not be maintained. Portions of the trail are still evident on the landscape and in places cause active erosion. This project would assess the Coppermine Pass Trail under NHPA, then perform landscape restoration or historic preservation as appropriate.	Nat UnD Sol		

Project Map Number	Project Name	Description	Wilderness Qualities	Access	Sustainability
17	Upper Wallace Creek Alignment	The Upper Wallace Creek Trail is being established in the WSP as a Class 1 trail open to stock use. There is a meadow between the High Sierra Trail and Waterfall Meadow where the existing "designated unmaintained route" cannot sustainably carry stock traffic. This project This project would relocate the trail from ground that is not suitable for a Class 1 stock use trail. Landscape restoration would be done on the abandoned trail sections.	Nat UnD Sol	Yes	Yes
18	Kern Bridge "Maze" restoration	During the 1990's, this trail was rerouted onto stable ground. The abandoned trail near the river never had landscape restoration work done. This project would perform landscape restoration work on the trail section abandoned in 1982-1985.	Nat UnD Sol		
19	Lower Kern Reroute	The Kern river has moved to the west and seasonally floods many sections of the trail. This project would reroute the trail to higher ground in two locations totaling about 2000 LF and perform landscape restoration on the abandoned trail segments	Nat	Yes	Yes

Nat = Natural
 Und = Undeveloped
 UnT = Untrammeled
 Sol = Solitude
 Oth = Other

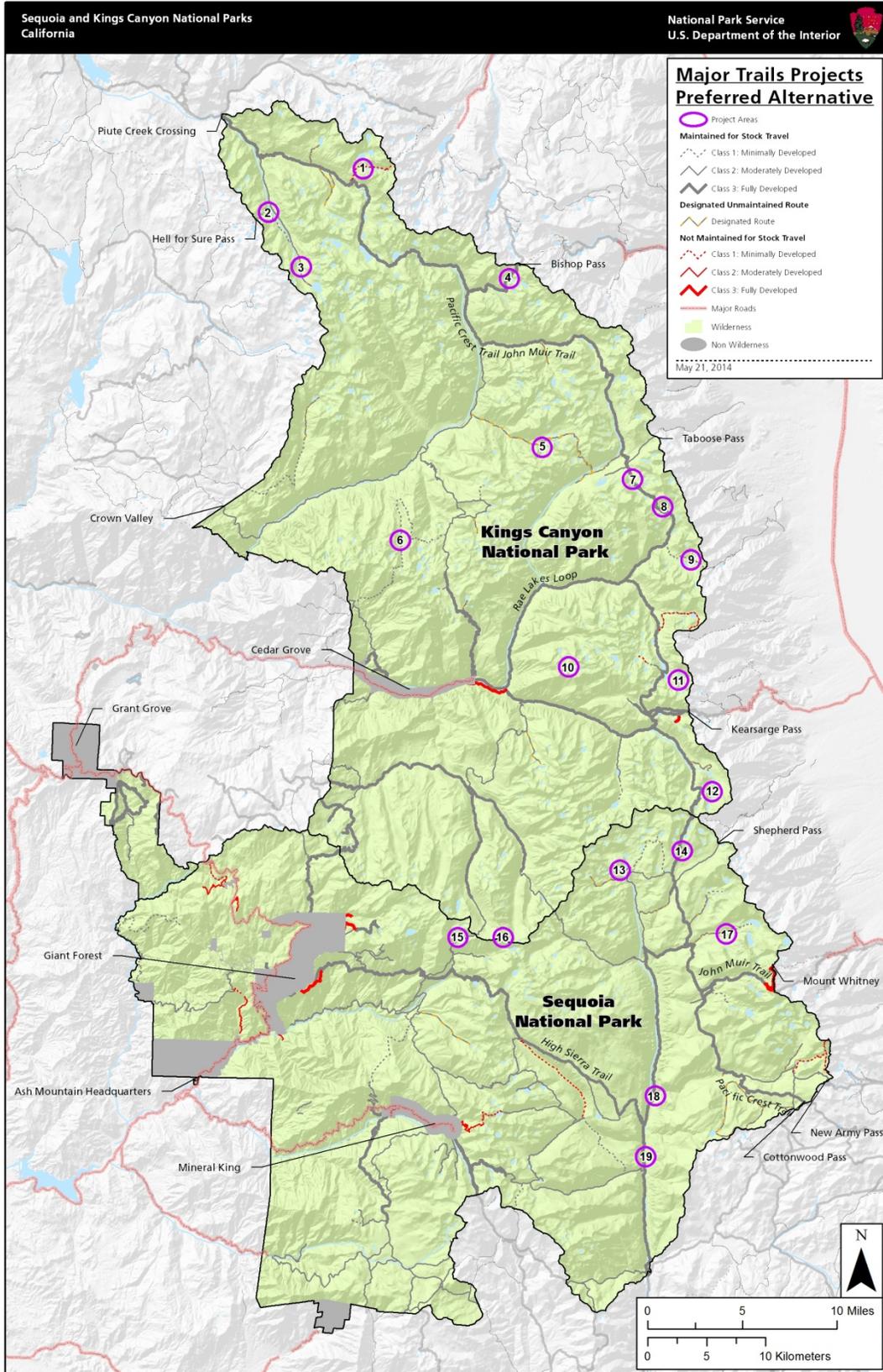


Figure K-2: Major Trail Projects for the Preferred Alternative

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Attachment 3: Programmatic Categorical Exclusion

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PROGRAMMATIC CATEGORICAL EXCLUSION

The Programmatic Categorical Exclusion (PCE) for Routine Maintenance and Repairs to Trails for the Preferred Alternative. This PCE will be updated annually to identify significant new work projects covered, reflect any changes in best management practices, and to ensure it remains compliant with law, regulation, and policy.

Since the trail maintenance programs at Sequoia and Kings Canyon National Parks are also expected to perform maintenance on non-wilderness trails, drift fences, and wilderness camps, those topics are also included in the PCE.

Other Sequoia and Kings Canyon National Parks documents referenced in this PCE include:

- Management Directive 009 - Wilderness Stock Use and Group Size Management (MD-9)
- Management Directive 049 - Minimum Requirement Analysis – Determination (MD-49)

TRAILS AND TRAIL BRIDGE MANAGEMENT PROJECT DESCRIPTION – PROGRAMMATIC CATEGORICAL EXCLUSION FOR ROUTINE MAINTENANCE AND REPAIRS TO TRAILS, SEQUOIA AND KINGS CANYON NATIONAL PARKS

The purpose of the trail maintenance program at Sequoia and Kings Canyon National Parks is to provide for visitor access and a diversity of recreational experiences, to ensure visitor safety and enjoyment, and to promote resource protection by encouraging trail use. The purpose of wilderness trails is to protect wilderness character and provide outstanding opportunities for primitive and unconfined wilderness recreation and visitor enjoyment.

This categorical exclusion document (CE) will serve as a formal record for routine trail operation and maintenance activities for the years 2010-2014. The Council on Environmental Quality (CEQ) directs agencies to use CEs for actions “which do not individually or cumulatively have a significant effect on the human environment and which are therefore exempt from requirements to prepare an environmental impact statement” (40 CFR §1500-1508). This project is categorically exempt under NPS Director’s Order #12, Action 3.4 C. 3: *Routine maintenance and repairs to non-historic structures, facilities, utilities, grounds, and trails.*

The National Park Service (NPS) maintains a trail system of approximately 800 miles of foot and horse routes in the wilderness and frontcountry areas of the parks.

Activities covered under this programmatic document include: maintaining, repairing, and rebuilding damaged/deteriorated walls, trail tread, drainage structures, signs, and other structural elements; rebuilding and repairing trail bridges including decking, railings, approaches, abutments, and stringers; removing fallen trees and rocks and debris from the trail corridor; repairing sections where erosion and other landscape processes have compromised trail integrity; creating barriers to discourage trail shortcutting, trail widening, and use of informal trails; restoring landscape damage from abandoned trail segments; and maintaining/repairing asphalt paths and multi-use trails. This project also covers the maintenance and repairs to stairs, railings, and other trail features; repair and replacement of benches; repair, maintenance, and replacement of drift fences; and repair and replacement of signs, kiosks, and wayside exhibits located along park trails.

It is also the intention of this CE to cover trail crew camps.

This CE can cover minor trail reroutes as long as they are evaluated in accordance with the guidance provided by D0-12, Section 3.4 C. 11. Examples include, but are not limited to: reconstructing trails around or through landslides and similar events that render the existing trail impassable, rerouting trails where erosion and ongoing trail or resource damage cannot be controlled through hardening in the existing alignment, taking preventative measures to ensure further erosion impact is alleviated or controlled, and relocating a small section of a trail for resource or visitor protection. Additional analysis would be necessary when there is potential for more than minor resource damage to occur or for major trail reroutes. Consultation with the Environmental Review Team (ERT) and subject matter experts (SMEs) is warranted to determine the level of impact from more than minor trail reroutes.

This CE is not intended to cover major off-trail drainage redirection, new trail construction, bridge abutment relocation, and new bridge construction.

COMPLIANCE PROCEDURES

This programmatic CE will be reviewed by the project leaders (Roads and Trail Supervisor and Trail Supervisors) and the Environmental Protection Specialist yearly to ensure consistency and to determine if conditions have changed. Work performed under this CE must apply the techniques, protocols, and methodologies described below. Work must also occur without significant changes in technology, location, capacity, or appearance.

If new techniques or significant changes in the scope of work are proposed, the project lead will consult with the Environmental Protection Specialist to request an amendment to the CE to cover the proposed changes. The proposed changes would be reviewed by the parks ERT and subject matter experts as warranted, to assure the changes are within the scope of this programmatic CE. The standard for determining a significant change is based on the potential for increasing environmental impacts, as determined by the Environmental Screening Form (ESF).

An annual workplan for work to be performed under this programmatic CE will be submitted each year to the Environmental Compliance Office and posted on the internal Planning, Environment, and Public Comment (PEPC) website. Any non-routine projects proposed under this programmatic document will be reviewed by the Environmental Protection Specialist to determine if these non-routine projects fall within the scope of the programmatic CE. If non-routine project work is added to the programmatic CE, this information will be updated in PEPC and provided to the parks' ERT and subject matter experts for review.

Other documentation, such as Section 106 compliance and a wilderness minimum tool/minimum requirement analysis may be necessary for project work authorized under this programmatic CE.

FRONTCOUNTRY TRAILS ROUTINE MAINTENANCE AND REPAIRS/REHABILITATION

There is a total of approximately 147 miles of frontcountry trails, of which approximately 77 miles of trail are in Sequoia National Park (SEQU) and 70 miles of trail are in Kings Canyon National Park (KICA) (trails located outside of wilderness areas in these parks). There are approximately 36 SEQU bridges/boardwalks on frontcountry trails and 25 in KICA. These trails are usually in or adjacent to developed areas, and some may connect to wilderness. These trails may be constructed of earth, rock, gravel, and logs, and sometimes portions are asphalt or concrete. Constructed features such as bridges, boardwalks, stairs, benches, walls, signs, interpretive displays, and overlooks are made of an assortment of manufactured materials such as steel, aluminum, mortared stone, and milled lumber.

Frontcountry trail maintenance activities are usually conducted by trail crews based in the developed area of the parks. Frontcountry trails generally receive similar maintenance and repairs as wilderness trails, although they typically include more constructed features that need maintenance. The major exception to this is maintenance of asphalt paved trails and winter snow and ice removal.

Asphalt Paths and Multi-Use Trail Maintenance and Repair/Rehabilitation: The routine maintenance and repair of asphalt paved tread with premix asphalt on trails and walks to provide a safe and durable travel surface. Standard asphalt maintenance procedures are as follows:

- Fog sealing: a sealing coat is applied to the trail to prevent water intrusion.
- Crack Sealing: Cracks are sealed with flexible rubberized asphalt that bonds to the crack walls and moves with the pavement to prevent water intrusion.
- Asphalt Patching: Damaged materials are removed, new aggregate road base is installed and compacted, tack oil is applied, and new asphalt material is installed and compacted.
- Asphalt Overlays: Deteriorated sections of asphalt surface are repaired and overlaid with 1 to 3 inch lifts of new compacted asphalt material.
- Shoulder Maintenance and Repair: As road shoulders deteriorate, they are repaired by replacing compacted aggregate road base or other fill material up to the grade of the asphalt surface to provide edge protection and minimize grade change.
- Asphalt Replacement-in-kind: In locations where existing asphalt is extensively deteriorated, the old asphalt may be removed and recycled into the base course or removed from the park prior to installation of new asphalt.

Equipment – Mid-sized trucks and loaders, 4WD utility vehicle, pavers and compactors, motorized and non-motorized hand tools, welders, generators.

Impacts of Not Performing Activity – Trail surface deteriorates and becomes hazardous to users, and promotes the establishment of off-trail parallel alignments, drainage, erosion, and sedimentation impacts, and vegetative and other possible resource impacts.

Winter Snow and Ice Control. Removal of snow and ice from the Grant Tree Trail and the lower portion of the Sherman Tree Trail and sanding of the trails for footing on bad icy spots. Snow removal takes place after each snowfall event, and road sand is applied as needed by hand on icy spots. In the spring any accumulated sand is swept from the trail.

Equipment – Mid-sized loader and with plow or rotary attachment, motorized and non-motorized hand tools, skid steer with rotary snow blower, walk behind (manually propelled) snow blower, small 4-wheel drive utility vehicle, walk-behind, or vehicle-mounted broom.

Impacts of Not Performing Activity – Loss of trail service to visitors in the winter. Risk of visitor injury from slips and falls.

WILDERNESS TRAILS ROUTINE MAINTENANCE AND REPAIRS/REHABILITATION

There are approximately 665 (395 SEQU, 270 KICA) miles of trail located within the designated or potential/proposed wilderness of the parks, which covers approximately 97% of the park. There are approximately 15 trail bridges in wilderness within Kings Canyon and 22 trail bridges in Sequoia. The goal of this program is to conduct maintenance as needed on all park trails each year. However, generally,

at least 85% of park trails receive some level of maintenance when conditions allow. Work can occur year round; work can be performed in the lower elevations during the fall, winter, and spring, and work can occur in the higher elevations during the summer as conditions allow. Summer is generally the peak season for trail work.

Wilderness trails are maintained and improved by trail work crews that are often based in wilderness, with subsequent logistical support facilities and actions. Trails in park wilderness areas are constructed primarily of available native materials including earth, rock, gravel, and logs. Causeways of timber, rock and earth may be constructed in wet areas. Trails are generally 2-3 feet wide, but may be wider in areas of heavy use or rough terrain, where additional space is required for appropriate uses (e.g. stock with pack boxes, or extreme exposures). The trail prism is generally defined as the corridor through which the trail passes, no greater than 8 feet either side of the centerline of the trail, and 12 feet high.

To support recreational use of these trail systems and to manage human impacts associated with use, in addition to the trails, the park also maintains the following trail-associated items:

- Trail crew camp facilities (food storage lockers, stock accoutrements) at existing wilderness camp sites
- Signing (directional)
- Footlogs and bridges
- Some locations have designated trailside camps with limited improvements (site markers, food storage lockers, campfire rings, hitching rails, and other stock amenities)

Trail maintenance includes clearing trails (brushing, limbing, downed tree removal, live tree removal, rock and debris removal, and scaling), maintaining drainages, walls, and other trail structures (cleaning drainage structures and replacement/repair/installation of rock and log trail structures), general trail maintenance (tread maintenance and repair, trail delineation, safety railing repairs, sign repair/replacement, drift fence and designated campsite maintenance, trail condition assessments), maintaining bridges (bridge maintenance and repairs), safety rail repairs, minor reroutes (minor reroutes and abandoned trail restoration), operational support (camping, livestock packing, helicopter use, staging areas, other operational support), and various tasks incidental to trail work (blasting, rock quarrying, winching and rigging, trail closures).

Specific activities that will always require additional consultation or approval include: generally prohibited acts in wilderness (minimum requirements analysis, or MRA is required), variances from the Superintendent's Compendium restrictions (including variances to groups size limits and campfire prohibitions), variances from the Stock Use and Meadow Management Plan, or work in known areas of sensitive resources. Also, it should be noted that although tool/equipment lists are provided under each activity below to give an idea of what is typically used for a given job, actual tools used may include any wilderness-appropriate tool that is appropriate for a listed activity.

CLEARING TRAILS

Trail clearing includes many of the trail maintenance activities described as follows:

Brushing: Brushing is the clearing and disposal of limbs and brush to provide adequate lateral and vertical clearance on the trail corridor. This is in addition to spring opening. Limbs and brush are disposed of off-trail, out of drainages, and out-of-sight. The width of the vegetation removal varies considerably, depending on elevation, aspect, vegetation type, and other factors. On brushy south-facing slopes where

annual growth can be in excess of three feet per year, the trail is cleared wider. In higher alpine areas where growth is slow, a narrower corridor is brushed. On Class 2 or Class 3 stock use trails, the standard applied is approximately 8' wide from centerline and 10' high. On Class 2 or Class 3 hiker trails, the standard applied is approximately 6' wide and 8' high. Class 1 trail brushing varies. The cuts are made to the ground or to nearest fork in a branch. All cuts are made cleanly, avoiding any shredding or tearing. Tree branches are cut flush with the trunk. Trees with the potential to encroach upon the trail corridor are removed. Young trees are also removed to preserve the integrity of the trail corridor. Stumps are flush-cut. Slash is stashed out of sight whenever possible for aesthetic reasons. It may also be used to block trail shortcuts.

Limbing: A limbing saw is used to cut low-hanging branches that intrude into the trail corridor. The standard is generally to cut anything that hangs down to within about 10 feet of the ground. Cuts are made cleanly and flush with the trunk. Slash is stashed out of sight of the trail whenever possible for aesthetic reasons. It may also be used to block trail shortcuts.

Downed Tree Removal: The clearing of downed/windfall trees that cross/block a trail to provide adequate lateral and vertical clearance on the trail corridor. This is performed as part of spring opening, and throughout the year as needed on trails that are open year round. Depending on the circumstance this involves simply moving the log or cutting an opening through it to provide adequate lateral clearance, or removing a larger portion of an overhanging tree. Downed trees are cut to a width which allows enough space for the user group of any given trail segment to pass easily and safely. Cut rounds are rolled off the trail. Worker safety is of primary concern in deciding the approach to take.

Live Tree Removal: Trees that interfere with the trail corridor are considered for removal. This includes leaners, and live trees that will interfere with the integrity of the trail corridor in the near future. Leaners may be of any size, but live trees removed will typically be under 12" diameter at breast height (dbh).

Rock and Debris Removal: In order to keep the trail corridor clear, the trails program uses a number of techniques to remove rocks and debris that have fallen in the trail:

- Move rocks or debris off the trail using muscle or hand tools.
- Move rocks to the side of the trail using hand winches (e.g. grip hoists) to drag the rocks out of the corridor.
- Blast rock or debris off the trail with surface charges.
- Drill rocks with gas or air powered rock drills and split the rocks with steel wedges (plugs and feathers) so that they are more manageable to move by hand or with grip hoists.
- Drill rocks and use explosives or other explosive-like products to break rocks into smaller pieces so that they are more manageable to move by hand or with grip hoists.

Scaling: Scaling involves the light use of a rake or shovel on the uphill side of the trail to bring down loose rocks and branches that are likely to wash, roll or fall down onto the trail within the following year. These materials are removed so they will not end up impeding the function of drainage structures or become obstacles to trail users. These materials are disposed of by being moved off the trail; or by being used in trail repair, shortcut blocking, back-filling, or some combination of these.

Equipment – Motorized and non-motorized hand tools, winching and rigging equipment, livestock and tow ropes, explosives.

Impacts of Not Performing Activity – Trails remain blocked by limbs, brush, windfall trees and rocks. Hikers and stock users establish alternate non-maintained routes around blocked trail segments causing multiple trails, erosion and drainage impacts, vegetative and other possible resource impacts. Drainage systems may fail resulting in impacts to the trail and off-trail resources.

MAINTAINING DRAINAGES, WALLS, AND OTHER TRAIL STRUCTURES

This includes annual clearing of drainage structures, as well as repair, replacement, and installation of various log and rock trail structures (drainage structures, retainer bars, trail tread riprap, retaining walls, and cribbing). Typically new structures are installed in the trail to slow trail tread erosion and provide for adequate footing for allowed trail users (foot or stock traffic, as appropriate).

Maintaining Drainages: This activity involves maintaining, restoring, or establishing trail drainage structures to proper depth and shape for optimum performance. Maintaining drainage structures and digging new ones are performed on the trail tread and the immediately adjacent uphill and downhill slopes. In some cases, off-trail drainages have been established to help keep the flow of water within the drainage structures. Maintenance of these structures is limited to digging out accumulated dirt, rock, and organic material, within the confines of the previously impacted area.

Replacement/repair/installation of Rock and Log Trail Structures: Repairs are made to damaged, non-functioning trail structures. Drainage, retaining, or tread structures are constructed within the trail prism to preserve the tread, prevent resource damage, maintain drainage, and provide for visitor safety. Trail structures are repaired/constructed using local, native materials, and traditional methods.

For stone structures, dry stone masonry techniques are typically used. Wet masonry is used in rare instances, essentially only for bridge abutments and frontcountry trails. Historic building techniques are replicated whenever possible.

Onsite stone used for these structures is (in order of preference): rocks that are loose and within the trail corridor; rocks close to the trail lying atop the ground; and rocks close to the trail that are partially buried. Any movement of rocks includes subsequent and immediate restoration of the area from which the rock is removed. Where no rock of the appropriate size and shape is available, rocks may be quarried (see Rock Quarrying) or in the case of frontcountry work, purchased or brought in from one of various rock caches within the park. Standard park procedures will be followed to ensure that all equipment and materials brought into the park are free of non-native, invasive plants and animals, and noxious weeds. All staff working on site shall be informed of and follow best management practices for preventing the introduction and spread of non-native, invasive species.

Structures are repaired in-kind, although log structures are often replaced with rock for longevity. Logs are sometimes used where no rock is available. The material comes from fallen, standing dead, or live trees (where felling will not have an adverse effect on the forest). All stumps are flush cut with the ground and disguised.

Where new raised causeways are required to prevent increasing trail-associated resource damage or to provide adequate trail footing, they will be constructed so as to minimize the effects on natural hydrologic processes. Where a raised causeway that might have an impact on natural hydrologic processes is seen as the only possible trailwork solution by the crewleader on site, then the Trails Supervisor and appropriate subject matter experts from the Division of Resources Management and Science will be consulted before proceeding.

Equipment – Motorized and non-motorized hand tools, grubbing tools, winching and rigging equipment, livestock, explosives.

Impacts of Not Performing Activity – Trails degrade beyond usability. Hikers and stock users establish alternate non-maintained routes around impassible trail segments causing multiple trails, erosion and drainage impacts, vegetative and other possible resource impacts. Uncorrected small trail structure failures become large problems. Drainage systems may fail resulting in impacts to the trail and off trail resources. Failing drainage structures lead to increased erosion and resource impact.

GENERAL TRAIL MAINTENANCE

Tread Maintenance and Repair: This activity involves repairing the trail surface by replacing material lost to natural processes. On sidehills, the trail bench is restored by “re-hinging” the trail: cutting slough out of the inside hinge and spreading it on the trail and pulling the outside berm back into the trail. At other locations where rock and soil fill need to be brought in to replace material lost to erosion, rock will be used as described above for constructing stone trail structures. Soil will be used (in order of preference): from any trailside berm or deposition at trail drainage outwashes, from the trail tread, from barren or freshly disturbed areas near the trail (e.g. avalanche debris, bases of uprooted trees), and from lightly vegetated areas. Any areas of soil “borrow” will be immediately restored. Soil will not be replaced on an eroded trail unless accompanied by trail construction to ensure it will not be lost again.

Trail Delineation: In areas where there are problems with trail visibility or where the trail width is a concern, trails may be delineated with border rocks, and/or border/barricade logs. Informal trails, shortcuts, and trail braids may be disguised using branches, duff, or rocks. Temporary signing may be installed in locations where shortcutting is a major resource damage concern. The temporary signing will be removed when the vegetation in the area has recovered.

Safety Railing Repairs and Replacement: This work involves the repair of existing safety railings and fencing of various types at a variety of frontcountry and wilderness locations. This work sometimes includes the drilling of new holes in rock to support replacement sections of railing.

Sign Repair/Replacement: Work involves replacing existing wilderness trail signs that have been lost or damaged and straightening or resetting existing signs. Only wilderness-type trail signs are covered by this CE.

Drift Fence and Designated Campsite Maintenance: Drift fences are installed in various locations in the parks to manage recreational livestock grazing and protect opportunities for solitude or primitive and unconfined recreation. Fences are typically constructed from native wood posts and imported fence wire and fasteners, although some locations have metal T-posts and other locations have “spookums” constructed from logs and rock. Maintenance to these fences consists of annual setting up and dropping the wire, replacing posts in-kind as they become unserviceable, and splicing wire. Drift fence locations will not be changed without following the procedures outlined in the WILDERNESS STEWARDSHIP PLAN and MD-9.

Designated campsites may have site markers, native stone fire pits, metal bear-proof food storage boxes, and stock hitchrails. Site markers are maintained similarly to other trail signs. Stone fire pits may be cleaned of ashes and the ashes scattered in hidden locations (typically in brush) after trash is removed. Otherwise stone firepits are maintained as are stone trail structures. Bear-proof food storage boxes have hinges oiled and latches replaced as needed, and dents pounded out. Any other repairs to food storage boxes typically require replacement, which requires ERT review. Stock hitchrails are freestanding native wooden rails fastened to native wood posts. They are replaced in-kind as rails or posts rot out.

Condition Assessments: Trails are generally assessed on a 5-year rotation for deferred maintenance. An aggregate inventory is also maintained of the existing trail structures. Global Positioning System (GPS) locations and photos are used where warranted as a means of documenting trail conditions for assessing work and recording completed work.

Equipment – Non-motorized and motorized hand tools, livestock, explosives, winching and rigging gear may all be utilized for general trail maintenance activities.

Impacts of Not Performing Activity – Trail alignment and surface deteriorates and becomes hazardous to users, and promotes the establishment of multiple trails, drainage, erosion, and sedimentation impacts, and vegetative and other possible resource impacts. Visitor safety may be at-risk from not conducting these activities. Desired primitive recreational opportunities are lost. Campers create new sites when existing ones are poorly maintained. Stock impacts increase due to inability to hold stock as required by MD-9.

Bridge maintenance, repairs, and replacement: Maintenance and replacement in-kind of all or parts of a bridge or footlog to ensure a safe and stable trail surface.

Equipment – pack stock, motorized and non-motorized hand tools; cement mixer, generator; helicopter transport of materials and equipment may be required

Note: Major bridge replacement will likely require a separate analysis and compliance.

Impacts of Not Performing Activity – If bridges, footlogs, or boardwalk segments are not repaired or replaced, extreme safety hazards for trail users may occur which could result in a loss of diversity in primitive recreational opportunities. Damage to riparian environments may occur as trail users search for alternative routes across rivers and drainages. Around wet segments of trail, alternate informal trails may be established resulting in: erosion and drainage impacts, vegetative and other possible resource impacts, and impacts to visitors' enjoyment of the scenic quality of wilderness.

MINOR REROUTES

Constructing reroutes: Reroutes are constructed so as to minimize resource damage and landscape and scenery impacts. Routes are selected that require the minimum of construction and trail-related structures, and construction is performed to match the character of the trail around it. All phases of construction are performed according to the relevant guidelines in this document.

Restoring abandoned trails: Restoration of abandoned trail segments will be completed immediately on completion of a new trail reroute, and may also be performed on long-abandoned trails that exist as landscape scars. Restoration efforts focus on restoring natural processes, ecological function, and scenery. Soil and rock fill needed to restore contour will be gathered as outlined in tread repair above. Local native vegetation will be used for plantings. "Borrow" sites for fill and vegetation will be restored to natural appearance and ecological function.

Equipment – Motorized and non-motorized hand tools, winching and rigging equipment, livestock, explosives.

Impacts of Not Performing Activity – Trails on unsustainable alignments continue to damage park resources and provide poor recreational opportunities. Hikers and stock users establish alternate informal trails around difficult trail segments causing erosion and drainage impacts, vegetative and other possible

resource impacts, and impacts to visitors' enjoyment of the scenic quality of wilderness. Abandoned trails continue to scar landscape and erosion continues unchecked.

OPERATIONAL SUPPORT:

Trail Camps: Trail crews will camp and use the wilderness in accordance with "Leave No Trace" techniques and park regulations for public camping in wilderness areas. Exceptions to this are that crews (and crew members on lieu days in wilderness) are exempt from permitting requirements and camp duration limits, and trail crew camps may require "hardening" before use and restoration afterwards. Large crew/long duration adaptations of "Leave No Trace" include digging latrines and sumps, establishing paths around camp and to water, digging holes to set up poles for rain flies. Prefabricated camp appurtenances are encouraged (e.g. tables, chairs, free standing tents). In some locations, core camp areas and in-camp trails will be hardened with skim or other fabric.

Where possible, crews use established stock camps, trail crew camps, and backpacker camps. When a project requires that a virgin site be used for crew camping, appropriate Resource Management & Science and Visitor, Fire, & Resource Protection SMEs will be consulted regarding camp selection. Paramount in selecting a new site will be ability to restore the site once the work project is completed and the camp is no longer needed. A typical camp for 4-6 workers for 2-6 weeks would include a 16'x20' rain fly over a communal cooking area with tables or benches, a fire pit, food storage boxes, a rain fly for tool storage, an open-air pit toilet, a greywater sump, and individual sleeping areas with tents.

Livestock Packing: Trail crews are often resupplied by NPS or commercial pack stock. All grazing and stock use is done within the constraints of the WILDERNESS STEWARDSHIP PLAN and MD-9, and using "Leave No Trace" stock techniques.

Helicopter Use: Helicopter support is used to resupply crews when a trail camp location is so remote that stock support is infeasible or would cause a greater impact to wilderness than helicopter support would, or when materials needed for work projects cannot be packed by stock. Helicopter support must be approved by the Superintendent on a project basis in accordance with MD-49, and requires the submission of a separate MRA.

Staging Areas: Staging areas may be needed to stockpile materials (primarily stone and aggregate base material), especially in frontcountry locations. Staging areas must be localized to job sites to prevent spread of non-native plants from one area of the parks to another. Pollution prevention measures and erosion control measures must be in effect, and natural features protected from scarring or damage while staging areas are in use. The only soil disturbance that may occur is on the surface. Upon project completion all areas must be restored back to their original condition.

Other Operational Support Functions: The trails program has various activities that would be classified as operational support including.

- Cleaning, maintaining tools – including repair to motorized and non-motorized tools such as chainsaws, rock drills, pumps, shovels, axes, and hammers.
- Transportation of equipment, food, supplies, stock and personnel in motor vehicles on roads.
- Fabrication work in support of trail work such as cutting of metal backcountry trail signs and fabricating camp gear or bridge parts.

TASKS INCIDENTAL TO TRAIL WORK

Blasting: All blasting activities will adhere to *NPS Director's Order 65. Explosives Use and Blasting Safety* (DO-65). In order to provide for public safety, trails will be closed by trail crews for the duration of blasting operations, with adequate site security and communication as determined by the Blaster In Charge. The crew will alert the parks' Dispatch Office at the beginning and the end of all blasting operations per DO-65 protocol.

Rock Quarrying: Where building material is unavailable, crews may have to quarry for building stone. In the backcountry, nearby rock sources are used. In the frontcountry, approved rockfall locations and previously stockpiled rock may also be used. Rocks are chosen that are the right size so that all of the rock can be used on the project and no cut rock faces are left behind.

Equipment – Gas- or air-powered rock drills for drilling freestanding rocks, steel wedges (plugs and feathers) or explosives to split rocks. Blasting equipment, motorized and non-motorized hand tools, stock, pack boxes, stoneboats.

Winching and Rigging: Rigging is used to move materials to where they are needed. Various powered and non-powered winches are used (e.g. comealong, Griphoist, chain hoist, chainsaw winch). Rocks and trees are used to provide anchors for rigging. Holes may be drilled in rock to support an anchor for rigging. As discreet a location as possible is chosen for this. Winching and rigging operations may require short-duration trail closures while objects are suspended above the trail.

Trail Closures: Trails have various levels of closure during repairs. If visitors can safely pass through the work zone while the work is going on, then the workers notify each other when visitors are coming and stop any activities that would have potential to hurt the visitors (hammer swinging or rock moving) until the visitors pass. Some situations are too dangerous to allow visitors to pass while work is going on (e.g., highline operation or moving stones on a switchback), in which case a trail worker will hold the visitors until work can be stopped and conditions allow safe passage. Popular trails may need to be completely closed during working hours to allow for visitor safety. If a trail is to be closed, the trailhead is signed and, where possible, an alternate route is established. The Wilderness Management Office, Public Information Office, Visitor Centers, and Gateway Partners are also notified. All seasonal and natural hazard (e.g., rockfall) closure decisions are made by the Division of Visitor, Fire, and Resource Protection in consultation with other park divisions as warranted.

STANDARD MITIGATIONS AND BEST MANAGEMENT PRACTICES FOR TRAILWORK

Protect Wilderness Character

- Appropriate actions should be taken to protect wilderness character. Any mechanized equipment use, installation, or other 4(c) prohibitions, shall be analyzed for compliance with the Wilderness Act.
- Prepare a minimum requirement analysis as soon as practicable, and submit to the Wilderness and Environmental Compliance offices allowing at least 3 weeks for review.
- Helicopter support must be approved by the Superintendent on a project basis in accordance with MD-49, and requires the submission of a separate supplemental MRA.
- Camp and travel in wilderness using Leave No Trace techniques.

Protect Health and Safety

- Tree hazards should be considered in selection/ maintenance of wilderness administrative camps.

Protect Cultural Resources

- The locations of trail camps, trail reroutes, and similar areas of potential impact may have to be surveyed on a case-by-case basis. Contact the parks' Cultural Resource Specialist for case-by-case guidance.
- Avoid work in areas where known cultural resources exist.

Protect Native Wildlife

- Trail realignments in bighorn sheep critical habitat require separate compliance and consultations with US Fish and Wildlife Service. See attached map in PEPC.
- Bear-proof food storage boxes have hinges oiled and latches replaced as needed, and dents pounded out. Any other repairs to food storage boxes typically require replacement, which requires Environmental Review Team review and Minimum Requirements Analysis under the WILDERNESS STEWARDSHIP PLAN and MD-9.
- Comply with food-storage and garbage disposal requirements at all times.

Protect Wild and Scenic Rivers

- Comply with the parks' General Management Plan-specified "river protection measures."

Protect Water Quality and Aquatic Ecosystems

- Avoid in-stream work.
- Where new raised causeways are required to prevent increasing trail-associated resource damage or to provide adequate trail footing, they will be constructed so as to minimize the effects on natural hydrologic processes. Where a raised causeway might have impacts on natural hydrologic processes and is seen as the only possible trailwork solution by the crewleader on site, the Trails Supervisor and the Branch Chief, Biodiversity and Ecological Resilience, Division of Resources Management and Science, will be consulted before proceeding.

Prevent Introduction and Spread of Non-Native Plants- Stock

- Prior to entering the parks for the season, the exterior of all stock vehicles and trailers will be pressure-washed or steam-cleaned to remove mud and plant material. Inspect and clean truck and trailer interiors; contain and dispose of sweepings.
- Before returning from winter pastures outside the parks, the hooves and hair of stock animals will be thoroughly cleaned to remove all mud and vegetative matter.
- Arrange with Invasive Plant Management staff to periodically inspect winter pastures for invasive plants before moving animals into the parks' pastures.
- Before leaving a pack station and entering wilderness, or prior to leaving a low-elevation pack station for a high-elevation pack station, animals will be inspected and cleaned of mud and

vegetative matter, particularly for pack stations that do not have regular weed control activities, such as Ash Mountain. Inspect and clean tack and equipment.

- Consult with Invasive Plant Management staff to control weeds at frontcountry pack stations.
- In the frontcountry, stock will be fed California certified weed-free feed. Any stock feed used in wilderness will be processed to eliminate viable seeds (e.g. steam-rolled grains, pellets, Chaffhay).
- As practical, for example when there is only one or two head of stock, feed stock on top of tarps rather than on bare ground. Pack out or burn residue or feed.
- Tie or hold stock in ways that minimize soil disturbance and avoid loss of desirable native vegetation.

Prevent Introduction and Spread of Non-Native Plants- Import Materials

- Use on-site fill materials whenever possible, without adverse impacts to local site. If import fill is necessary, consult with Invasive Plant Management staff prior to beginning procurement to ensure purchase of clean material. Do not move stockpiled earth materials from lower to higher elevations without consulting with Invasive Plant Management staff.

Prevent Introduction and Spread of Non-Native Plants- Equipment

- Before moving vehicles or equipment (such as Off Road Vehicles, backhoes, bobcats, etc.) to a new job site, particularly from lower to higher elevations, inspect and clean equipment thoroughly to remove all mud, dirt, and plant parts. Consult with Invasive Plant Management staff for cleaning techniques and procedures. If possible, clean vehicles before leaving each job site.
- Ensure that rental equipment is free of mud, dirt, and plant parts before the contracting officer's representative accepts it.

Prevent Introduction and Spread of Non-Native Plants- Tools

- Thoroughly inspect and clean dirt, mud, and plant parts from tools (shovels, pulaskis, winches, saws, weed eaters, etc) prior to mobilizing to a new job site, particularly when moving within the foothills or from a lower to higher elevation. A sufficient cleaning typically involves scrub brushes and picks to get out all seeds. Pay particular attention to chainsaws and other types of fast action equipment that have compartments that transport seed. Once mobilized, inspect and clean tools ON SITE, before leaving a job site.

Prevent Introduction and Spread of Non-Native Plants- Crews

- Inspect and clean shoes, clothing, and camping equipment of dirt, mud, and plant parts before mobilizing to a new job site, particularly when moving from lower to higher elevations. Clean shoes and lower extremities prior to leaving job site, particularly if there are known weed infestations in area (such as cheatgrass on Kings Middle Fork Trail and High Sierra Trail).
- Arrange for weed awareness training annually between trail crews and Invasive Plant Management staff. Coordinate with the parks' Invasive Plants Specialist.

Protect Native Vegetation and Soils

- Staging areas must be localized to job sites to prevent spread of non-natives from one area of the park to another. Pollution prevention measures and erosion control measures must be in effect, and natural features protected from scarring or damage while staging areas are in use. The only soil disturbance that may occur is on the surface. Upon project completion, all areas must be restored back to their original condition.
- All grazing and stock use is done within the constraints of MD-9 and using "Leave No Trace" stock techniques.
- Drift fence locations will not be changed without following the procedures outlined in the WILDERNESS STEWARDSHIP PLAN and MD-9.

Protect Native Vegetation and Soils- Crew Camps

- Where possible, crews use established stock camps, trail crew camps, and backpacker camps. When a project requires that a virgin site be used for crew camping, appropriate Resource Management & Science and Visitor, Fire, & Resource Protection subject matter experts will be consulted regarding camp selection. Paramount in selecting a new site will be ability to restore the site once the work project is completed and the camp is no longer needed.

Protect Native Vegetation and Soils- Restoration

- Consult with Restoration Ecologist on restoration techniques.

Protect Native Vegetation and Visual Resources

- Minor trail reroutes will be constructed to minimize resource damage and landscape and scenery impacts. Routes are selected that require the minimum of construction and trail-related structures, and construction is performed to match the character of the trail around it.
- Restoration of abandoned trail segments will be completed immediately on completion of a new trail reroute, and may also be performed on long-abandoned trails that exist as landscape scars. Local native vegetation will be used for plantings.
- All cuts are made cleanly, avoiding any shredding or tearing. Tree branches are cut flush with the trunk and stumps are flush-cut.
- Informal trails, shortcuts, and trail braids may be disguised using branches, duff, or rocks. Temporary signing may be installed in locations where shortcutting is a major resource damage concern. The temporary signing will be removed when the vegetation in the area has recovered.
- Limbs and brush (slash) are disposed of off-trail, out of drainages, and out-of-sight. Cut vegetation is hidden from trail users and dispersed into native vegetation.

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**Attachment 4: List of Trails with Particularly Compelling
Historic Context or Whose Historic Character is Largely Intact**

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LIST OF TRAILS WITH PARTICULARLY COMPELLING HISTORIC CONTEXT OR WHOSE HISTORIC CHARACTER IS LARGELY INTACT AND PRIORITY FOR EVALUATION PER NPS-28 CULTURAL RESOURCE MANAGEMENT GUIDELINE AND SECTION 110 OF THE NATIONAL HISTORIC PRESERVATION ACT (NHPA)

Trails are divided into 5 tiers for the purposes of prioritizing needs for evaluation of historic properties/features per NPS-28 Cultural Resource Management Guideline and Section 110 of the NHPA and for preservation of trail features:

- Tier 1: Previously assessed per NPS-28 Cultural Resource Management Guideline; either by preparation of a determination of eligibility (DOE) or by inclusion on the NPS List of Classified Structures (LCS). Trail exhibits significant historical integrity/context; intact features. These would have the highest priority for preservation.
- Tier 2: First priority for assessment per NPS-28 and next level of priority for preservation of identified historical features. Trail exhibits some integrity with significant historical context, intact features may need preservation.
- Tier 3: Second priority for assessment per NPS-28; intact features identified to preserve. Trail may exhibit possibly significant historical context; however, known intact features are not threatened by planned management action.
- Tier 4: Abandoned/moldering trails - assessment per NPS-28 when project work is proposed.
- Tier 5: All other formal trails: Lowest priority for assessment, little known or identified cultural significance; no identifiable historic features to preserve.

Tiers 1, 2, 3, and 5 apply to formal trails; Tier 4 applies to abandoned trails.

Earlier in this Trail Management Plan, a distinction was made between routes (travelways of social importance) and formal trails (built and maintained structures). The majority of the routes within the boundaries of Sequoia and Kings Canyon National Park have been used for over 50 years and many routes have been in use for thousands of years. This plan is concerned specifically with trails as constructed facilities and consisting of built features (alignment, bridges, culverts, etc.). In most cases, the contemporary trail does not possess integrity of location, design, setting, materials, workmanship, feeling, and association with the route's earlier history. For example, the Bubbs Creek Trail in Kings Canyon National Park is in a canyon that was used for travel in prehistoric times. The first EuroAmericans to go up Bubbs Creek were J. H. Johnson and Party in 1858. Later, William Brewer and the California Geological Survey crossed the Sierra using Bubbs Creek in 1865. John Muir crossed the Sierra by this route in 1873, and Bubbs Creek was part of the Visalia-Independence Trail in the 1870s. However, as a built structure, the current Bubbs Creek Trail was constructed subsequent to these uses and there are no identifiable historic features to preserve. Because of this, Bubbs Creek has been placed in Tier 5: Lowest priority for assessment.

Table K-3 shows Sequoia and Kings Canyon trails organized by historic priority tier. Although there are many abandoned trails in Sequoia and Kings Canyon, only a small sample with identified potential historic significance was included in the list below. Even though other abandoned trails are not on the list, all abandoned trails will be given consideration as Tier 4 priority for assessment and for preservation of features.

Figure K-3 shows where these trails are in wilderness. Abandoned trails were not shown on the map for two reasons: the geospatial information in hand is incomplete, and most management actions covered by this plan will be taking place on formal trails.

Historical stories that were considered in generating the priority list include:

- Prehistoric uses
- Exploration of the American West and California
- Regional economic development and extractive uses such as mining, grazing, logging, and trapping
- Early park history, administration, and development, including the military administration of Sequoia National Park
- Development of recreational trails
- Sierra Club and pioneering recreationists of the 1890's-1930's

Finally, this list is necessarily a work in progress, as the parks have not yet secured resources to perform a comprehensive inventory of the potential historic value of formal and abandoned trails on park lands.

Table K-3: Wilderness Historic Trails Preservation Priorities.

Tier	Trail Name	Wilderness	Significance	Suspected Contributing Features (existing/intact)	Known Compromised Features
1	Colony Mill Road	yes	Recreation/Logging	DOE - CA SHPO - 9/25/1978 The Colony Mill Road is on the LCS (ID 9506).	Documented in DOE
1	Crystal Cave Trail	no	Recreation/CCC	DOE for Crystal Cave Historic District, including the Crystal Cave Road, Parking Lot, Access Trail, Appurtenant Structures, Spiderweb Gate, and Cave Trail System submitted to CA SHPO 5/4/12 The POS is 1938 to 1941 The CC Barrier Gate (LCS ID 58113), CC Comfort Station & Generator Room (LCS ID 58116) and CC Trail (LCS ID 58117) are all on the LCS.	Documented in DOE
1	Moro Rock Trail	no	Recreation/CCC	The Moro Rock Stairway (includes rock walls and stairs) is on the LCS (ID 5026).	Documented in DOE
2	John Muir Trail	yes	Recreation Pre-JMT Histories	Muir/Mather/Forester Passes - Rock walls, alignment Whitney Summit - Rock walls,route Golden Staircase - route Boulder in Lower Goddard Canyon	Rerouted in many places; Lots of later construction/structures
2	High Sierra Trail	yes	Recreation	Alignment Cliff routes, rock walls, Kaweah Gap, Kern switchbacks	Rerouted in many places; Lots of later construction/structures
2	Lakes Trail	yes	Recreation/CCC	Cliff route, rock walls Pear Lake Cabin	Much later construction/structures
2	Hockett-Atwell Trail	yes	Regional commercial development Cattle/grazing Early recreation Early park administrative transportation	Alignment from Atwell to Hockett Meadow East Fork Bridge Approaches Deer Creek walls, Blasting on The Bluffs Various structures along 30% of trail length Hockett Ranger Station	Lots of later construction/structures
2	Upper Soldier Lake Trail (Army Pass)	yes	Early park administration by military	Route Trail tread Rock Walls	Much of trail missing

Tier	Trail Name	Wilderness	Significance	Suspected Contributing Features (existing/intact)	Known Compromised Features
3	Alta Trail	yes	Early park recreation	Alignment	No structures
3	Marble Falls Trail	yes	Early power development Early park recreation	Mostly original alignment Last half mile has walls	Reroutes in drainages below falls
3	White Chief Trail	yes	Mining	Route for access of historic mines, dams	Some later construction/structures
3	Timber Gap Trail	yes	Mining Early park development	Mostly original alignment Switchbacks and walls	Some later construction/structures
3	Tibmer Gap Cliff Creek Trail	yes	Mining Early park development	Mostly original alignment	Some later construction/structures
3	Franklin Lakes	yes	Mining	Access to mines and dam	Some later construction/structures
3	Tehipite Switchbacks (Winchell-Dusy)	yes	Mining/cattle (Winchell/Dusy)	Original route, unmodified construction	
3	Blue Canyon (beginning of Tunemah)	yes	Sheepherding/cattle	Original route, unmodified construction	Trail moves around within general original route.
3	Non-wilderness Giant Forest Trails	no	Early park recreation	Some parts of alignment	Lots of later construction
4	Little Tehipite Trail (abandoned)	yes	Mining	Route, mines	Trail overgrown and missing in many places
4	Cartridge Pass Trail (abandoned)	yes	Original JMT	Route	Trail overgrown and missing in many places
4	Tunemah Trail (abandoned)	yes	Sheepherding	Route	No trail exists
4	River Valley Trail (HST Construction)	yes	Contributing to HST	Route, walls	Trail overgrown with brush
4	Visalia-Lone Pine Trail (Abandoned)	yes	1860's travel route	Parts of Hockett Trails follow route	Trails mostly not on historic alignment
4	Visalia-Independence Trail (parts of Bubbs/ Kearsarge)	yes	1870's travel route	Parts of Bubbs Creek, Kearsarge Pass	Trails mostly not on historic alignment

Tier	Trail Name	Wilderness	Significance	Suspected Contributing Features (existing/intact)	Known Compromised Features
4	Junction Pass Trail (Abandoned)	yes	Original JMT	Route	Trail deteriorated and missing in many places
4	Cataract Creek	yes	Mining	Route, Trail structures	Trail overgrown and missing in many places
4	Black Oak Trail (abandoned)	yes	Middle park recreation, 1920's	Route	Trail overgrown and missing in many places
4	Coppermine Pass Trail (abandoned)	yes	Mining Early recreation (Stewart E White)	Route Abandoned mines	Missing in many places
5	All other formal trails	Current constructed trail has no known connection to historic uses of the routes they may follow.			

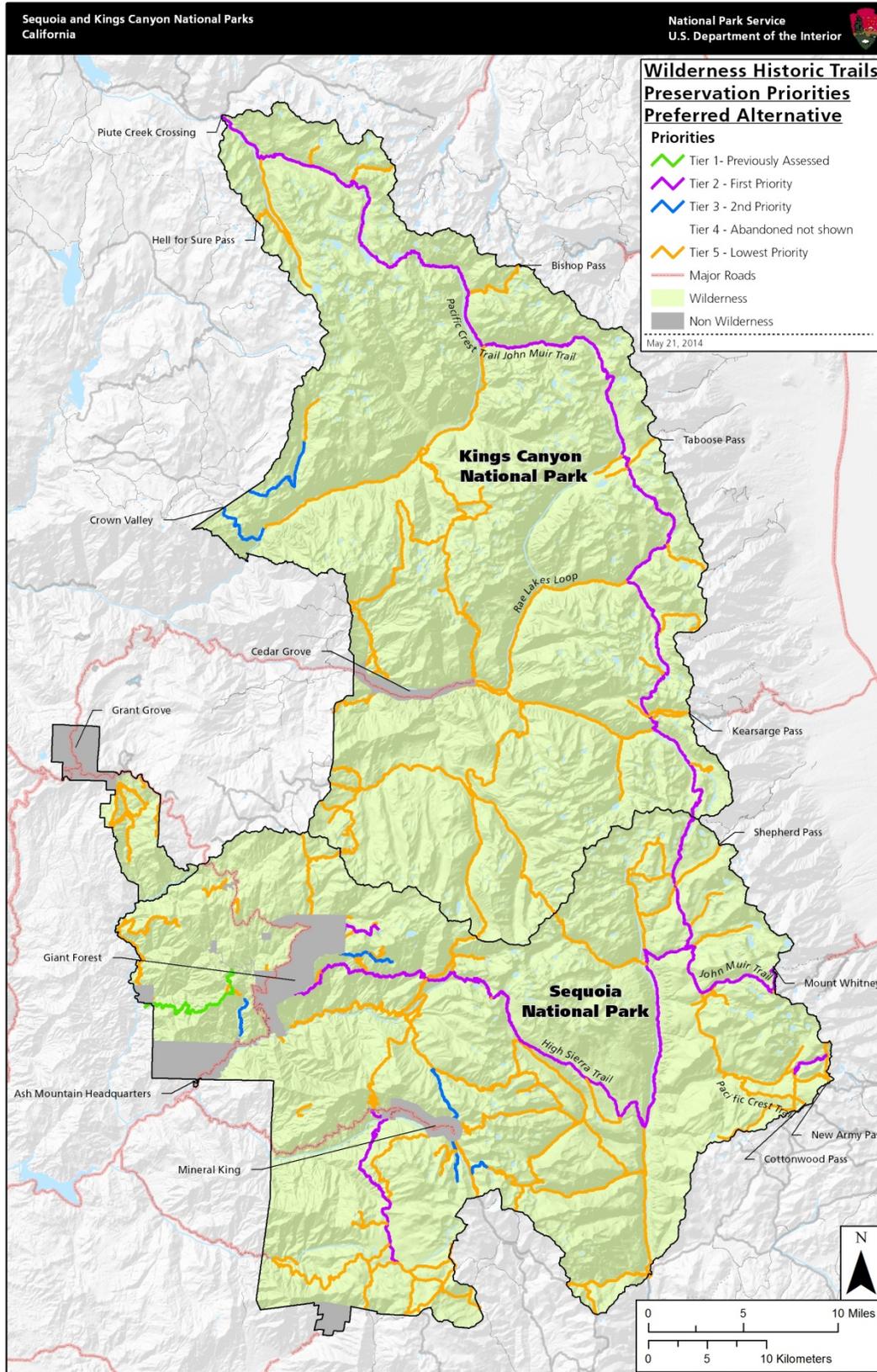


Figure K-3: Preservation Priorities of Historic Wilderness Trails for the Preferred Alternative

**Attachment 5: Routes and Destinations of Concern for
Monitoring Informal Trail Impacts**

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2015 ROUTES AND DESTINATIONS OF CONCERN FOR MONITORING INFORMAL TRAIL IMPACTS

This attachment contains a list and map of routes and destinations of concern where park staff will attempt to make observations to detect undesirable changes to prompt management action.

ROUTES

- High Route (Milestone Basin to Tablelands section)
- Lamarck Col/Darwin Bench
- Miter Basin-Crabtree
- Roper's Route
- Silliman Creek
- South Side Mt Langley
- Tableland Divide

DESTINATIONS OF CONCERN

- Crabtree Pass
- Crabtree Lakes
- Barrett Lakes
- Dusy Basin
- Guitar Lake
- Rae Lakes
- Moose Lake
- Miter Basin

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