

Final
General Management Plan
and
Comprehensive River Management Plan /
Environmental Impact Statement

National Park Service
U.S. Department of the Interior



Sequoia and Kings Canyon
National Parks
Middle and South Forks of the
Kings River
and North Fork of the Kern River

Tulare and Fresno Counties
California



Volume 2:
The Affected Environment /
Environmental Consequences /
Appendixes / Glossary / Selected Bibliography
Preparers and Consultants / Index

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**SEQUOIA AND KINGS CANYON NATIONAL PARKS
and
MIDDLE AND SOUTH FORKS OF THE KINGS RIVER AND
NORTH FORK OF THE KERN RIVER**

Tulare and Fresno Counties • California

***FINAL
GENERAL MANAGEMENT PLAN AND COMPREHENSIVE
RIVER MANAGEMENT PLAN /
ENVIRONMENTAL IMPACT STATEMENT***

**Volume 2: The Affected Environment / Environmental Consequences /
Appendixes / Glossary / Selected Bibliography / Preparers and Consultants / Index**

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Abbreviations

The following abbreviations are used in the text or in bibliographic citations.

ADT	average daily traffic
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CE	California endangered species
CFR	<i>Code of Federal Regulations</i>
cfs	cubic feet per second
CO	carbon monoxide
CP	California protected species
CR	California rare species
CSC	California species of concern
CT	California threatened species
FE	federally endangered species
FERC	Federal Emergency Regulatory Commission
FSC	federal species of concern
FSS	Forest Service sensitive species
FT	federally threatened species
LOS	level of service
NAAQS	national ambient air quality standards
NO _x	nitrous oxides
NPS	National Park Service
O ₃	ozone
PL	Public Law
PM ₁₀	particulate matter less than 10 microns
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
SO ₂	sulfur dioxide
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compounds
VMT	vehicle miles traveled

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The Affected Environment



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Ecosystem Stressors

The Sierra Nevada Ecosystem Project (SNEP 1996) and decades of research in Sequoia and Kings Canyon National Parks have identified five important systemic stressors to park ecosystems:

- loss of pre-Euro-American fire regimes
- introduced species
- air pollution
- habitat fragmentation
- rapid anthropogenic climatic change

While these stressors all interact in complex ways, if projections are correct, climatic change could both exacerbate and dominate all other stressors in importance in the coming decades. The following description of stressors is from the *Natural and Cultural Resources Management Plan* (NPS 1999d).

LOSS OF PRE-EURO-AMERICAN FIRE REGIMES

Between 1891 and 1967 all fires in Sequoia, General Grant, and Kings Canyon national parks were suppressed, with a fair degree of success. This lack of fire resulted in important ecosystem changes. A buildup of dense vegetation along foothill streams and in their upper catchments reduced annual streamflow in the foothills, probably to the detriment of aquatic communities.

The consequences of fire exclusion have been characterized best in the mixed-conifer zone. Both stream chemistry (Williams and Melack 1997) and stream flow (Ralph Moore, NPS, unpublished data) in the mixed-conifer zone were altered by the lack of fire, with unknown consequence for aquatic ecosystems. Giant sequoia reproduction, which in the past depended on frequent fires to expose mineral soil and open gaps in the forest canopy, effectively ceased, and reproduction of other shade-intolerant species was reduced (Harvey et al. 1980; Stephenson 1994). Today more area is

dominated by dense intermediate-aged forest patches, and less by young patches (Bonnicksen and Stone 1978, 1982; Stephenson 1987). Perhaps most importantly, dead material has accumulated, causing an unprecedented buildup of surface fuels (Agee et al. 1978; van Wagtenonk 1985). One of the most immediate consequences of these changes is an increased hazard of wild-fires sweeping through the mixed-conifer forests with a severity that was rarely encountered in pre-Euro-American times (Kilgore and Sando 1975; Stephens 1995, 1998).

Lack of fire also reduced habitat critical for certain wildlife species. The number and extent of forest openings was reduced without fire, causing a reduction of key herbaceous and shrub species, particularly nitrogen fixers such as *Ceanothus* (Bonnicksen and Stone 1982). Wildlife that depend on these plants, such as deer, now have less habitat available to them. Black-backed woodpeckers declined in the absence of fresh fire-created snags. Rodents are also less abundant in areas where fire has been excluded (Harold Werner, NPS, unpublished data), almost certainly leading to a reduction in the carnivore populations that depend on them.

In 1968 the parks began an aggressive prescribed fire program to reestablish fire in the parks' ecosystems. This program has made great strides in restoring giant sequoia groves and considerable progress in other mixed-conifer forest stands. However, after more than 30 years, the parks still are far from restoring natural fire regimes to the entire park landscape (Caprio and Graber 2000). The inability of the parks to maintain a natural fire regime continues to result in changes to the parks' vegetation, aquatic ecosystems, and wildlife populations.

INTRODUCED SPECIES

Hundreds of introduced species have become established within the parks, and invasions are ongoing. More than 120 nonnative vascular

plant species are known within park boundaries, and new ones are discovered yearly. Plant invasions have severely altered some park ecosystems. For example, about 99% of the herbaceous biomass in foothills grasslands is due to introduced species (Parsons and Stohlgren 1989), potentially affecting soil water dynamics, stressing native species, and perhaps increasing the probability of invasion by particularly noxious species, such as the star thistle (Gerlach, in review).

Blister rust, an exotic fungus that attacks white pines, is reducing the number of sugar pines in the parks and may effectively eliminate this species from the ecosystem over time. Sugar pine is one of the most important food sources for seed-eating animals in the mixed-conifer zone, and the potential consequences of its decline are largely unknown. Additionally, new and destructive exotic pathogens, such as pine pitch canker, have become established in California, and some seem likely to invade the parks in the future.

Even before the parks were created, humans moved fish into waters that were originally barren of fish and also introduced new species. As a result, most aquatic communities above 7,000 feet have been altered, some severely (Knapp 1996). Impacts have included a decline in both native invertebrate and vertebrate species, with the precipitous decline of the mountain yellow-legged frog being one of the most notable (Bradford 1989; Bradford et al. 1993; Knapp and Matthews 2000). (Other factors, such as airborne pesticides, are also likely contributors to the decline of the frog.) Additional damage has been caused by hybridization. For example, the Little Kern golden trout was almost lost due to hybridization with introduced rainbow trout, and the status of the Kern rainbow remains to be determined. Native rainbow trout genotypes were contaminated by genotypes from other geographic areas.

At lower elevations within the parks, domestic species (especially cats) and other nonnative wildlife periodically establish themselves. These animals compete with native wildlife for re-

sources. Nonnative bullfrogs now occupy low-elevation streams, threatening the future of the western pond turtle (a California species of special concern) in the parks by preying on their young. Wild descendants of domestic pigs could become a major threat to native vegetation. Portions of Sequoia National Park have been severely grazed in the recent past by trespass cattle and now harbor numerous introduced plants. Human developments in the parks (especially residential areas and pack stations) have created conditions suitable for significant numbers of brown-headed cowbirds, which are nest parasites that attack rare native songbird species.

AIR POLLUTION

Sequoia and Kings Canyon National Parks periodically experience some of the worst air quality in the United States (Peterson and Arbaugh 1992; Cahill et al. 1996). Perhaps the most damaging pollutant is ozone. Ozone-sensitive individuals of ponderosa and Jeffrey pines show extensive foliar injury at present ozone levels (Peterson and Arbaugh 1992; Duriscoe and Stolte 1992; Stolte et al. 1992; Miller 1996). Compared to ozone-resistant individuals, ozone-sensitive pines have lower photosynthetic rates, lose their needles earlier, and have diminished annual ring growth (Miller 1996). In contrast to pines, mature giant sequoias seem to be relatively resistant to present ozone levels (Miller et al. 1994). However, newly emerged sequoia seedlings are more vulnerable to ozone injury (Miller et al. 1994; Miller 1996).

Research in southern California suggests that chronic ozone pollution can lead to shifts in forest structure and composition (Miller 1973). If ozone concentrations in the Sierra Nevada remain relatively constant into the future, they may affect the genetic composition of pine and sequoia seedling populations, and significantly contribute to increased death rates and decreased recruitment of ponderosa pine and Jeffrey pine (Miller 1996). Ponderosa/Jeffrey pines are important species ecologically in Sequoia and Kings Canyon. Increased damage due to ozone will cause a reduction in basal area, alter nutrient cycling patterns, change landscape stability, and

affect the fire susceptibility of forest ecosystems in the parks. The effects of chronic ozone pollution on other species are less well known.

High elevation lakes and streams in the parks are very dilute and potentially sensitive to human-induced acid deposition. While chronic acidification is not now a problem, episodic depression of acid-neutralizing capacity occurs during snowmelt (Melack and Sickman 1995; Melack et al. 1998), and episodic acidification occurs during rainstorms in summer and early fall (Stohlgren and Parsons 1987). If acid deposition increases in the future, episodic acidification will become more frequent, likely altering aquatic communities.

The deposition of atmospheric nitrogen in park watersheds has been increasing slowly (Lynch et al. 1995). However, there has been a decrease in dissolved nitrogen leaving watersheds (Melack et al. 1998). These changes parallel a shift in the phytoplankton community of the heavily studied Emerald Lake, from one dominated by phosphorus limitation to one dominated by nitrogen limitation. Mixed-conifer watersheds in Giant Forest have also shown net retention of nitrogen, with stream concentrations often below detection limits (Williams and Melack 1997). The consequences of increased nitrogen deposition and retention on terrestrial plant communities are unknown, but studies are underway.

Sequoia and Kings Canyon National Parks are downwind of one of the most productive agricultural areas in the world, the San Joaquin Valley, where tons of pesticides are applied to crops every year (Department of Pesticide Regulation 1999). Pesticides that become volatilized or suspended in the atmosphere as particulates drift into the parks on prevailing winds. Consequently, organophosphates have been found in precipitation as high as 6,300 feet (1,920 meters) (Zabik and Seiber 1993). Other synthetic chemicals (such as chlorinated hydrocarbons) drifting into the parks can have estrogenic or other effects as hormonal imitators. They can cause changes in wildlife reproductive capacity, longevity, intelligence, and behavior, or can lead to cancer or mutations.

While studies have not yet been conducted to establish cause-and-effect links between synthetic chemical drift into the parks and effects on park ecosystems, circumstantial evidence suggests that such effects may be occurring. For example, the parks' peregrine falcon aerie at Moro Rock has never produced offspring. Additionally, the foothill yellow-legged frog completely disappeared from these parks in the 1970s. The frog is much more common on the opposite side of the San Joaquin Valley (in the foothills of the Coast Range), upwind from pesticide drift. Synthetic chemical drift may also be playing a role in the ongoing decline in mountain yellow-legged frogs in these parks (Fellers, unpublished data), although other factors, such as fish introductions, are also contributing.

HABITAT FRAGMENTATION

Intensifying land use and population growth on lands adjacent to the national parks are turning the parks into biological islands, which will make the ecosystems significantly more difficult to preserve with their biodiversity intact. Several species have either already disappeared from this part of the Sierra Nevada or survive in very small numbers (e.g., black-tailed hare, foothill yellow-legged frog, California condor), most likely as a result of habitat loss on adjacent lands that leaves park habitat insufficient to support metapopulations over the long term (Graber 1996). There is a loss of stopover points and wintering grounds for migrating species. This problem is most serious for foothills species, including seasonal residents, because most adjacent lands are privately held and substantially altered through development, grazing, agriculture, hydrological diversions, exotic plants and animals (including pets and feral animals), and altered fire regimes.

The mostly public coniferous forested lands to the north and south of the parks have been altered by timber harvest, grazing, water diversions, introduced species, and loss of natural fire regimes, although to a much lesser extent than the foothills. The decline of forest wildlife populations in the region, including wolverine, fisher, and red fox, as well as some bat and owl species,

has been attributed to forest structural changes (DeSante 1995; Graber 1996). Fishers — which once occurred throughout the Sierra Nevada and whose populations were continuous with those in the Pacific Northwest — today are isolated from other populations, so opportunities for gene flow are now absent.

The loss of natural fire regimes and introduced plants and animals within as well as outside the parks' foothill zone may be exacerbating this regional problem. For example, eastern bullfrogs — which have benefited from water impoundments near the parks — may be an important predator on young western pond turtles, while European predatory brown trout and the over-shading of foothills streams as a result of fire suppression may have led to the extirpation of the foothill yellow-legged frog (pesticides may also have played a role). Settlement outside the parks prevents the re-establishment of the extirpated grizzly bear (*Ursus arctos*) because a durable population requires more low-elevation habitat than can be provided by the national parks.

Domestic grazing on public lands east of the Sierra Nevada crest formerly threatened the reestablishment of healthy populations of Sierra Nevada bighorn sheep (*Ovis canadensis ssp. nova*) in and adjacent to the parks, leading to their endangerment. This is an example of functional habitat fragmentation. Bighorn are now recovering slowly.

Animals that routinely cross the park boundaries (e.g., deer, bear, and band-tailed pigeons) become legal game species once outside the boundaries. As a consequence, how these animals are managed outside the parks affects the age structure and abundance of populations within the parks. It is also likely that the un-hunted park populations are a reservoir of source material for hunted and less dense populations outside these parks.

RAPID ANTHROPOGENIC CLIMATIC CHANGE

Average global temperature has been rising in this century, and the world is now warmer than at any point during the last several centuries (Mann et al. 1998). Internationally, climatologists and atmospheric scientists generally agree that at least part of this warming is due to human-caused increases in atmospheric greenhouse gases (Houghton et al. 1996). Global temperatures are projected to rise by another 1.0 to 3.5°C (2 to 6°F) over the next century (Houghton et al. 1996). Much uncertainty surrounds the details of how global climatic change will manifest itself locally in the Sierra Nevada.

The paleoecological record is one of the best tools for understanding the possible magnitude of biotic changes resulting from future climatic changes. About 10,000 to 4,500 years ago global summertime temperatures were perhaps up to 2°C higher than now, with prolonged summer drought in California. Both the species composition and fire regimes of Sierran forests were quite different from those of today (Anderson 1990, 1994; Anderson and Smith 1991, 1994, 1997). For example, forests growing on sites now occupied by sequoia groves were much more heavily dominated by pines, including lodgepole (which no longer occur in sequoia groves; R. Anderson 1994). Firs were less abundant than today, and sequoias were quite rare (R. Anderson 1994; Anderson and Smith 1994), probably existing only along creek and meadow edges where present groves exist. These and other paleoecological records clearly indicate that climatic changes smaller than or comparable to those projected for the next century may profoundly alter Sierran ecosystems.

Increasing temperature will probably result in higher snow lines, earlier snowmelt, and prolonged summer droughts (Vaux 1991). Without increased precipitation, perennial streams could dry out during the summer. In forested ecosystems, there could be a widespread and continuing failure in the reproduction of certain species, such as giant sequoia, whose seedlings are

highly vulnerable to drought (Harvey et al. 1980; Mutch 1994). Death rates would likely increase among adult trees as drought stress made them more vulnerable to insects, pathogens, and air pollution.

Global warming is also likely to increase the probability of destructive wildfires in the Sierra Nevada. Models predict that global warming will be accompanied by increased lightning strikes (Price and Rind 1991), and extreme weather conditions are likely to make individual fires burn more total area, be more severe, and escape containment more frequently (Torn and Fried 1992; Miller and Urban 1999).

Most Sierran habitats will likely shift to higher elevations. Organisms with limited mobility may become extinct locally. For example, subfossil records from the Pleistocene-Holocene transition in the Grand Canyon (spanning a global warming comparable in magnitude to that expected

over the next century) indicate that rapid habitat displacement due to climatic change can lead to several millennia of depressed species diversity (Cole 1985). Finally, some habitats, such as high alpine habitats, are likely to disappear entirely, leading to the irreversible loss of some species.

Rapid anthropogenic climatic change has the potential to become the greatest stressor on the ecosystems of Sequoia and Kings Canyon National Parks. Climatic change undoubtedly will interact with other stressors, with unexpected consequences. While there is little that park managers can do to prevent global warming, they can take some steps to mitigate impacts on park ecosystems. For example, the resilience of forests to climatic change and consequent extreme wildfire behavior can be increased by restoring a more open structure to the forests, which would reduce both competition and fire intensity.



Air Pollution at Sequoia and Kings Canyon National Parks.

Natural Resources

Kings Canyon National Park encompasses the upper foothills and the subalpine and alpine region that forms the headwaters of the South and Middle Forks of the Kings River and the South Fork of the San Joaquin River. These rivers have extensive and spectacular glacial canyons. Both the Kings Canyon and Tehipite Valley are glacial “Yosemites” — deeply incised glacial gorges with relatively flat floors and towering granite cliffs thousands of feet high. To the east of the canyons are the high peaks of the Sierra Crest, with the 14,242-foot North Palisade being the highest point in Kings Canyon National Park. This is classic high Sierra country — barren alpine ridges and glacially scoured, lake-filled basins.

Sequoia National Park lies south of Kings Canyon. The park rises from the low western foothills to the crest of the Sierra at 14,495-foot-high Mount Whitney, the highest point in the lower 48 states. The Great Western Divide is a north-south ridge that runs through the middle of the park. Peaks in the vicinity of the divide rise as high as 13,802 feet. The eastern half of the park consists of the alpine headwaters of the North Fork of the Kern River, the glacial trench of Kern Canyon, and the Sierra Crest, which runs north-south and forms the eastern boundary of the park.

CAVES

Description

More than 200 caves and at least 75 active karst systems are known within Sequoia and Kings Canyon National Parks. Karst systems (subterranean stream systems), which have formed primarily along the five forks of the Kaweah River, are a major contributor to and potential groundwater storehouse for all five forks. The karst hydrology that creates caves feeds surface springs that have allowed extensive riparian areas to form.

The two parks contain some of the most extensive and least impacted caves in the western United States. Lilburn Cave is the most extensive cave in California, with over 17 miles of measured passages. A total of more than 30 miles of cave passages have been documented in the parks' caves. The caves contain many endemic invertebrates, several bat species, very unusual mineral deposits, and rare calcite speleothems (cave features such as helictites, stalactites, and curtains). Invertebrates that reside in the caves are largely cave-adapted and mostly endemic to a single valley, cave, or even room.

Many caves are in isolated areas and are not well known to the general public. Crystal Cave is the only cave now open to guided cave tours, and improvements have been made to facilitate visitation and resource protection (e.g., paved walkways, lighting, railings).

Stressors

Crystal Cave and Clough Cave (which was formerly commercialized) contain extensive areas of disturbance from trail construction and blasting, which have created unnatural habitats, altered microclimates, and broken fragile cave features. Other alterations in Crystal Cave include the effects of artificial lighting. Moss, algae, and even grasses are growing near lights along the cave tour route. The presence of this unnatural flora can alter habitats for cave-adapted animals. Anthropogenic lint and dust accumulations may be negative impacts in several park caves, including Crystal, Soldiers, and Clough. Local lints create acidic solutions that may alter habitat and damage cave surfaces. Lint is often deposited adjacent to trails, but may also be left behind by recreational cavers. Dust may be deposited dozens of feet away from an area of disturbance, altering the appearance of cave surfaces and surficial habitats. Restoration has begun on some caves, including Crystal, Clough, and Soldiers.

Recreational use of other park caves continues to grow slowly. Currently several hundred people per year visit park caves. Past damage from human use includes broken speleothems, trampled invertebrates, compacted soils, sediment transport on clothes, litter, deposits of toxic spent carbide, and the alteration of airflow and microclimates due to human modification of cave passages.

WATER RESOURCES

Hydrology

Description

The four large river systems with headwaters within the parks are the North Fork of the Kern River, the five forks of the Kaweah River, the South and Middle Forks of the Kings River, and the South Fork of the San Joaquin River. Surface water occurs primarily as rivers and streams at lower elevations, with a greater occurrence of lakes and ponds at higher elevations. The quantity of surface flow follows an annual cycle, with the lowest flows typically occurring in August and the highest flows in May or June. Spring flows are primarily snowmelt from glaciers and snowpack at higher elevations; by late August, the source is primarily groundwater. The largest streams produce peak flows of about 82,000 liters per second (L/sec), which decrease to about 1,500 to 2,500 L/sec during August.

Groundwater is common in alluvial deposits in meadows and wherever decomposed or fractured granite is suitable to form an aquifer. Precipitation appears adequate to recharge the groundwater, but the actual quantity of stored water in aquifers is unpredictable. Rainfall and melting snow tend to rapidly infiltrate weathered and fractured rock. Even in areas of relatively solid rock, runoff tends to channel into the nearest fractures and crevices. These characteristics mean that much of the streamflow is a result of interflow, or shallow groundwater movement, rather than direct surface runoff. Groundwater supplies many meadows, seeps, springs, creeks, and perennial streams.

Stressors

Water withdrawals not only decrease waterflows downstream, but also reduce the variability of the system's hydrograph. This in turn can affect downstream riparian or meadow vegetation and sequoia groves (see related impact topics), as well as the habitat available to aquatic communities. Water is diverted to feed electrical generating systems and to supply water to support park development and use.

Kaweah hydroelectric plant no. 3, which began operations in 1907, is on the Middle Fork of the Kaweah River just outside Sequoia National Park. Water is drawn from the Middle and Marble Forks by means of a diversion dam on each fork and flumes, diverting up to 100 cubic feet per second (the average is 30 cfs) from the river. No minimum release requirements existed prior to 1964, sometimes resulting in diversion of 100% of river flow. In 1964 seasonal minimum release requirements were established for both forks combined. These requirements prevent diversions from occurring when the combined flows decrease below seasonal minimum levels. In 1974 seasonal minimum release requirements were further distributed into percentages for each fork. Today, the combined river flow at the driest point in the year is reduced to 11 cfs, which can be as little as 10% of the natural flow. In addition to the dams and flumes, there are four gaging stations, a siphon crossing the Middle Fork, and a cable crossing with concrete abutments. The Kaweah no. 1 generating facility (which dates from 1899), draws its water below the park, but uses four storage dams above Mineral King on Upper Monarch, Lower Crystal, Lower Franklin, and Eagle Lakes. These dams store a total of 500 acre-feet. The dams are designed to produce a more even flow in the East Fork of the Kaweah.

Most of the water consumed in the parks comes from surface sources such as streams and springs. There are a few shallow wells with good water, but one of the deeper foothills wells contains sulfur and arsenic and is not potable. The status of the water systems, water source production capacities, and water consumption throughout the parks are detailed in appendix E.

Facilities such as roads, culverts, and buildings also alter the local hydrology and drainages in scattered locations throughout the park's developed areas or road corridors.

Water Quality

Description

Surface waters in the parks contain concentrations of dissolved constituents that are so dilute that the electrical conductivities are very low. Alpine lakes and streams are generally below 20 microSiemens per centimeter ($\mu\text{s}/\text{cm}$), and sometimes approach 2 $\mu\text{s}/\text{cm}$, the conductivity of distilled water. One consequence of such pure water is that it is poorly buffered (limited ability to absorb water chemistry changes or additions), making the ecosystem sensitive to human disturbance and pollution. Ion concentrations do increase as elevation decreases. Conductivities may exceed 100 $\mu\text{s}/\text{cm}$ when the rivers reach the park boundary. This is partially because marble, schist, and other metamorphic rocks add significant dissolved constituents, forming a band along much of the western portion of these parks and at several other scattered locations.

Surface water is also very clear, with turbidities generally well under 0.5 nephelometric turbidity unit (NTU), though meadow water may exceed 1.0 NTU. The waters are oligotrophic. Nutrients like phosphate or nitrate are generally less than 40 $\mu\text{g}/\text{L}$ and ammonia is generally undetectable. Except for mineral springs, thermal springs, and some meadows, the water is normally saturated with oxygen (6.8–8.8 mg/L) and generally quite cold (8°–16°C). The pH is normally slightly acidic, but varies from about 5.5 to 8.5, and some sites exceed those extremes. Park surface waters contain some biota (e.g., *Giardia lamblia*, *Campylobacter*, *Cryptosporidium*) that can be harmful if consumed.

Stressors

The primary threats to water quality are air pollution, loss of natural fire, runoff from park facilities, and runoff from heavy visitor use areas in the backcountry. The single biggest threat is

air pollution. Air pollution adds acidic deposition, nutrients, and other contaminants to park waters (Cory et al. 1970; Melack et al. 1985, 1995; Sickman and Melack 1989; Williams and Melack 1991; Zabik and Seiber 1993). Fire affects nutrients, buffering capacity, water temperature, sediment transport rates, and other water characteristics. Park facilities generate sewage effluent. Monitoring of the sprayfields at Red Fir and the former facility at Giant Forest detected elevated nutrients and conductivity in adjacent streams that extended as much as 1.3 kilometers downstream during low-flow conditions. In addition to sewage effluent, nonpoint pollution sources, such as recreational activities, roads, and parking lots, can contribute biological, physical, and chemical pollutants into aquatic systems.

Floodplains

Floodplains for most of the parks' watersheds have not been mapped. However, much of the parks encompass steep, upper watersheds that would limit the extent of floodplains. Of the parks' major developed areas, Lodgepole, Cedar Grove, and Mineral King are potentially subject to flooding from larger streams. Peak spring runoff, fed by melting snowpack, typically occurs in late spring through early summer. Winter flooding is associated with heavy warm rains falling on snowpack and is characterized by a large volume of runoff occurring in a relatively short time frame.

The Marble Fork runs through the Lodgepole area. From the developed area to its headwaters, the Marble Fork drains approximately 8,510 acres. The stream has a history of flooding in the Lodgepole area. Annual spring floods from snowmelt rise approximately 5 feet above the summertime stream level. Midwinter floods, which are the largest, have damaged campsites within 100 feet of the stream (NPS 1982). No buildings occur within the 100-year floodplain in the Lodgepole area. Campgrounds with sites in floodplain areas are being redesigned to remove those sites prone to flooding.

Cedar Grove is in a relatively broad portion of the lower valley of the South Fork of the Kings River. No buildings exist within the 100-year floodplain, although a portion of the Sentinel campground loop closest to the river is within the floodplain, as are sections of roads within the canyon.

The only NPS facility within the 100-year floodplain at Mineral King is a small segment of the Cold Spring campground, and a large segment is within the 500-year floodplain. Flood hazards are considered small due to low flows during the peak visitor use season. In addition, the probability of a large flash flood is low because of the size and nature of the drainage basin. Flows for the 100-year flood in the vicinity of the campground would be approximately 1,000 cfs and 6 feet above the river bottom.

SOILS AND VEGETATION

Description

Igneous rocks of Mesozoic origins (granite and its relatives) underlie the majority of the two parks, but extensive bands of Paleozoic metamorphic beds also occur. Within the latter, caves and beds of marble are common. Soils are derived from the two general igneous and metamorphic rock types, glacial debris, and alluvium. Sierran soils tend to be shallow and young, showing little development. They also tend to have high infiltration rates. Surface erosion is relatively low because infiltration rates are generally greater than rainfall or snowmelt rates, and water is absorbed into the soil.

Native plant communities within the parks are comprised of over 1,200 vascular plant species. Extreme topographic differences create a variety of habitat types and conditions that range from xeric low-elevation oak woodlands to high-elevation alpine communities. Within elevation and precipitation bands, an additional complex of species and communities exists that is affected by relatively static physical influences, such as aspect, slope position, soils, and the effects of past glacial action. Dynamic pro-

cesses, such as variable moisture regimes and fire, also affect these species and communities.

Extensive tracts of Sierran mixed-conifer forest, generally at altitudes between 5,000 and 9,000 feet, cover much of the southern Sierra and consist primarily of fir (white and red), mixed conifer (fir and various pine), montane chaparral (green-leaf manzanita), and montane meadows. On surrounding lands the great majority of this forest zone has been managed for multiple use. As a result, Sequoia and Kings Canyon National Parks now contain the largest remaining old-growth forest in the southern Sierra. Below the conifer forest (in the western portions of the Sierra), various plant communities and environments constitute the foothill region. There is very little land within this natural zone in Kings Canyon; but the lower canyons of the forks of the Kaweah River include extensive foothill lands in Sequoia National Park. This environment, which is typified by deciduous woodland (blue and black oak, north slope), evergreen hardwoods (canyon and interior live oak), chaparral (mixed and chamise), and deciduous riparian forest (alder and sycamore), covers much of lowland central California outside the parks. Privately held lands cover much of the foothills, which have been altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use, as well as regional population growth and air pollution.

The remainder of Sequoia and Kings Canyon National Parks, most of which are above 9,000 feet in elevation, can be described as "high Sierra." This environment covers nearly as much acreage as the two parks' other environments combined. It is a spectacular land of rugged, ice-sculptured alpine ridges and sparsely wooded, lake-filled basins. Alpine and subalpine areas contain pine (foxtail, whitebark, and lodgepole), juniper, wet and dry meadows, alpine tundra, fell fields, and lichens.

Stressors

The use, maintenance, and management of park facilities affect only a small area and do not

contribute to widespread destruction of soils within the parks. Localized impacts such as compaction and erosion result from visitor use and development and are the major stressors. Inappropriately placed culverts, flume failures, social trails, and new construction all contribute to unnatural erosion.

Primary vegetation stressors include air pollution, historic loss of natural fire regime, possibly global warming, and invasion by exotic pathogens and plant species. Tropospheric ozone air pollution has been observed to have an effect on some sensitive species within the parks. Ponderosa and Jeffrey pine are particularly sensitive. Surveys and studies on these species have shown that a small percentage of the population of each is significantly affected in the most severely polluted areas of the parks, resulting in reduced vigor and increased susceptibility to other pathogens. Other less sensitive species include the emergent seedlings of giant sequoia, black oak, mugwort, and blue elderberry. Visible symptoms of ozone injury have been observed on these species within the parks, but no effect on their physiology has been shown. Successful fire suppression beginning in the late 1800s has significantly altered stand structure and species composition throughout many of the parks' vegetation communities. The exotic pathogen, white pine blister rust, has had a significant effect on native white pines, particularly sugar pine and western white pine within the parks. A recent survey has shown the disease to be widespread, and in localized areas it has resulted in the decline and mortality of a significant number of individual trees, especially saplings. The displacement of the native herbaceous component of the foothill vegetation communities by exotics has been virtually complete. Exotic species have recently been detected in other areas of the park through focused inventory efforts. Habitats most likely to harbor exotic species include riparian corridors, developed areas, roads and trails, pack stations, campgrounds, abandoned settlements, sewer sprayfields, and other disturbed areas.

While past human activity has altered and shaped the native vegetation resource at the

landscape scale, visitor and administrative uses affect the vegetation on a local scale. Developments such as campgrounds and lodges require the local environment to be modified for safety and aesthetics. The maintenance and use of roads and trails have direct impacts and also provide corridors for the introduction of new exotic species. Direct compaction and trampling by visitors in high-use areas will modify local stand structure and composition over time. Grazing by pack and saddle stock in wilderness meadows creates localized impacts to the native vegetation, as well as provides a potential vector for the introduction of exotic plant species into new areas. Off-trail hiking can create informal social trails that lead to vegetation impacts. The infrastructure that supports park developments, such as the withdrawal of water and the discharge of wastewater, alter local to subwatershed hydrology, change local species composition, and affect nutrient availability.

Giant Sequoia Groves

Description

Sequoia trees do not grow continuously through the mixed-conifer forest belt, but rather in geographically limited areas called groves. In the Sierra Nevada, the only present natural home of sequoias, the trees grow in about 75 separate groves; about 37 of these groves are within the two parks. The parks contain roughly a third of all the naturally occurring sequoias.

Most giant sequoia groves are managed as integral to the surrounding ecosystem, and natural processes are allowed to shape the communities. However, because of their long life and immense size, individual sequoia trees tend to generate strong emotional reactions and attachments from many visitors and admirers. A number of large specimen trees have been imbued with additional significance by being named (e.g., the General Grant tree which is also, by proclamation, the Nation's Christmas Tree) or by their particular attributes (e.g., the General Sherman tree, recognized as the largest living tree on earth). Due to the strong social connections to certain specimen trees (along with an assortment of sequoia snags, stumps, and logs), such

featured specimens are managed to perpetuate their condition and appearance as substantially unchanged through time.

Sequoia trees have enormous limbs, which when stressed, can drop as part of their natural biology. This can present some risk to humans as trees can fall without notice. In 1941 the superintendent's summer cabin in the Giant Forest / Round Meadow area was crushed by a falling tree. Overnight camping in the Giant Forest grove was removed in 1962, but in August 1969 a woman was killed by a falling tree at the Hazelwood picnic area. Popular overnight lodging in cabins and tent cabins have since been removed and the Giant Forest grove converted to day use.

Stressors

Prior to their inclusion in the parks, some groves (Atwell, Big Stump, Dillonwood, Squirrel Creek, and Redwood Mountain) were partially logged for commercial timber. Park developments at Grant Grove, Atwell Mill, and Giant Forest were constructed in and among the sequoia trees to provide direct visitor access to the prime resource. In the 1980s the process of removing overnight lodging and other commercial facilities from the Giant Forest Grove began. The project is substantially complete. Intensive commercial and administrative developments exist at Grant Grove, and a campground development remains in a second-growth portion of Atwell Grove. The 1,540-acre Dillonwood Grove, which was logged from the 1880s to the 1950s, contains both ancient, old-growth monarchs and extensive stands of second-growth forest.

The park has long identified the loss of the historic fire regime as a primary stressor and threat to the integrity of the giant sequoia groves. The Sierra Nevada Ecosystem Project (SNEP 1996) identified the loss of the natural fire regime as one of the dominant negative effects on the greater Sierran ecosystem. Frequent fire reduces competition for light and water and prepares an ideal set of conditions necessary for giant sequoia reproduction. A history of fire suppression

over the past century has inhibited giant sequoia reproduction, increased hazardous fuel accumulation, and changed the forest structure within the parks. Since the advent of ecologically based management in the late 1960s, protection and management of natural grove conditions and fundamental natural processes have been emphasized over strict protection of individual specimen trees. Natural processes such as fire and native forest insect outbreaks have been reintroduced or managed to preserve the groves' ecological integrity. Threats from damage by unusually severe wildfire have been reduced, and giant sequoia reproduction has been stimulated.

Degradation of regional air quality has several potential effects on the giant sequoias. In fumigation chamber experiments, high ozone levels produced visible symptoms of damage in sequoia seedlings (Miller et al. 1994; Miller 1996), though no significant difference was found in short-term seedling survival. Long-term seedling mortality and differential genetic selection due to the observed effects of air pollution are unknown, but these are possible impact sources to sequoia groves (SNEP 1996). Ozone and other pollutants have been shown to be factors in the decline of several tree species that are part of the giant sequoia grove structure (ponderosa and Jeffrey pine) (SNEP 1996). Severe impacts to those species could result in significantly altered grove conditions over time.

White pine blister rust has had a significant effect on the native white pines, particularly sugar pine and western white pine within the parks. Sugar pine is a major component of the giant sequoia groves' forest structure, and the Redwood Mountain and Atwell Groves display some of the most severe blister rust infections. Active management of the sugar pine population may be necessary to maintain its historic importance in the composition of these mixed conifer forests.

Direct impacts of visitor use include trampling and soil compaction in high-use areas; these impacts are usually confined to specific sites. Indirect impacts, which occur as a result of the

development of visitor services and related support services, include the interception of natural fire ignitions by roads and trails throughout the giant sequoia groves. Indirect impacts are more widespread and difficult to detect and manage. Another indirect impact includes the withdrawal of surface and subsurface water. Both surface and groundwater conditions are important to the reproduction and maintenance of sequoias. High soil moisture availability in well-drained soils is the primary factor that determines the occurrence and extent of sequoia groves. Park developments and inholdings at Grant Grove and park developments at Atwell Mill use water from the grove hydrologic systems. A well supplies water at Atwell Mill. NPS and concession facilities at Grant Grove are supplied by water from four sources:

- The primary source is an artesian well in Round Meadow, which drains into Abbott Creek. This drainage is north of the General Grant Grove, and there is no known groundwater connection between Abbott Creek and the Mill Flat and Sequoia Creek drainage systems. If rock fractures that function as underground conduits exist, then water from the Round Meadow may affect groundwater in the sequoia groves in the Mill Flat and Sequoia Creek drainages.
- Rona and Merritt Springs supply water and are part of the Sequoia Creek drainage.
- The fourth source is a well in the Sequoia Creek drainage. Inholdings in Wilsonia also use wells located in this drainage.

Meadow / Riparian / Aquatic Communities

Description

Lakes, rivers, streams, and adjacent riparian areas are classified as wetlands. Wet meadows also fall into this category. The National Park Service defines wetlands as any area classified as wetland habitat according to the U.S. Fish and Wildlife Service's *Classification of Wetlands and Deepwater Habitats of the United States* (1979). According to this definition, a wetland has at least one of three attributes: undrained

hydric soils, predominantly hydrophytic vegetation, or if the substrate is nonsoil, the area is saturated with water or covered with shallow water at some time during the growing season of each year. The primary types of wetlands and deepwater habitats within the parks are persistent palustrine emergent (wet meadows), deciduous broad-leaved palustrine scrub-shrub (primarily willow thickets), upper perennial riverine (permanent rivers and streams), lacustrine (lakes), open-water palustrine (ponds), and intermittent riverine (ephemeral streams). Many of the rivers and streams have riparian areas that are either forested palustrine (e.g., alder) or deciduous broad-leaved palustrine scrub-shrub (e.g., spice bush) along their banks. Park staff have determined that the Fish and Wildlife Service's wetland inventory is incomplete (Werner 2005). The staff use field survey data (Neuman 1990) and a recently completed vegetation map to identify additional wetland vegetation, particularly meadows.

Riparian areas, lakes, and meadows occur throughout the parks, although lakes and meadows are primarily found in the mid- to upper-elevations of the park. These communities provide important habitat for populations of a number of special status species, including amphibians, fish, and invertebrates (see the "Threatened, Endangered, and Sensitive Species" section). They affect the quality, quantity, and timing of streamflows. These ecosystems are also principal destinations for recreation within the parks.

Meadows are among the most attractive and important natural resources within the parks. Less than 2% of the land base supports meadow vegetation. Meadows are complex systems, varying widely in character and composition (Benedict and Major 1982; Ratliff 1982). Although meadow vegetation is generally highly productive and relatively resilient, meadow systems vary in their sensitivity to impacts and in their ability to recover. Meadows and their adjacent camp areas are frequently a principal destination for backcountry hikers and horseback riders. Many, if not most, of the grazed

meadows contain flora, soils, and hydrology associated with wetlands.

Stressors

Meadow, riparian, and aquatic communities can all be directly affected by visitor impacts. Visitor-caused impacts on wetlands include social trails around the edges of lakes that often cut through the wetland meadows adjacent to many lakes and ponds. In heavy use locations, upland areas adjacent to rivers are also impacted. Trampled streambanks are often associated with swimming areas. How swimming and wading affect benthic communities is unknown. Because streams undergo constant natural disturbance, they are unlikely to be damaged by visitor use. However, waders sometimes leave conspicuous scars on lake bottoms. Whether these effects are biological or just aesthetic is not known.

Park regulations prohibit backcountry camping in meadows. Since the 1980s a program has been undertaken to relocate trails outside sensitive meadows, further reducing direct hiker impacts on meadow vegetation.

In some wilderness meadows a limited amount of grazing by administrative and visitor pack and saddle stock is allowed. This creates localized impacts to native vegetation and wildlife, soils, and water quality, and provides a potential vector for the introduction of exotic plant species. Some park meadows are permanently closed to stock because of heavy backpacker camping use, their small size, research purposes, or relative sensitivity to grazing impacts. Stock animals are permitted in other areas, but feed must be packed in. All park meadows open to grazing are subject to seasonal opening dates, which are determined according to soil moisture conditions as predicted by May snowpack. In most park meadows, reduced levels of use and increased minimum impact awareness among stock users has led to a general improvement in site conditions since the 1970s and 1980s.

Residual biomass monitoring is a central component of wilderness meadow management at

Sequoia and Kings Canyon National Parks. (Residual biomass refers to the amount of aboveground plant material present in a meadow after grazing. In systems dominated by herbaceous plants, adequate residue must be present to protect soil surfaces and plants, to replenish the soil mulch and organic layers, and to trap and hold moisture [Neuman 1991].) Residual biomass (production) and groundcover data are collected at the end of the growing season from approximately two dozen wilderness meadows that consistently receive moderate to heavy use. These data provide NPS staff with short-term information on site conditions and allow for the development of minimum residual biomass standards for grazed meadows in the long term. These standards will then be used to establish appropriate use levels that are directly tied to site conditions. Seven years of preliminary residual biomass data are currently being analyzed to develop minimum standards that will allow managers to set limits on the amount of use allowed during a given season. These standards will ensure that adequate residual matter remains on a site each year.

Wetlands are also impacted by trespass cattle. Cattle not only trample and defecate on the edges of riparian wetlands, they heavily graze riparian sedges and other vegetation. Trespass cattle have been seen grazing in the middle of the North Fork of the Kaweah.

In a few areas, exotic wetland flora (*Elodea* sp.) have apparently displaced the native benthic flora (*Isoetes* sp.) that normally dominate the parks' lake bottoms. Today, these sites are structurally and floristically very different from what should be there (e.g., Rae Lakes).

Fire has an important influence on wetlands. During severe fire conditions, fires will push through riparian areas, completely altering the structure and function of the vegetation and temporarily influencing the composition of future species. During drought conditions, fires sometimes burn the organic soils, causing long-term changes to the wetland community structure and species composition. In moist conditions, wetlands serve as barriers to the spread of

fire, but fire influences the wetlands by liberating nutrients, altering sediment loads, and changing hydrologic yield.

WILDLIFE

Description

Sequoia and Kings Canyon National Parks are known to include 264 native vertebrate terrestrial species, and an additional 25 species may be present. Of the native vertebrates, five species have been extirpated, and 126 are rare or uncommon. The 264 terrestrial vertebrates include 5 species of amphibians, 21 species of reptiles, 168 species of birds, and 70 species of mammals.

Few studies of terrestrial invertebrates have been conducted. The most extensive work is the ongoing collection at the end of the flume on the Middle Fork of the Kaweah River. Many of the parks' caves are known to contain invertebrates. While the taxonomic work on cave fauna is incomplete, the available information shows high levels of endemism, with some species being restricted to a single cave.

For purposes of distinguishing aquatic fauna from terrestrial fauna, aquatic wildlife species are defined as those that depend on occupying either lentic or lotic environments for all or portions of their lives. These species may be either fully aquatic or amphibious. Aquatic wildlife does not include species that frequent wetlands or deepwater habitats but that are not dependent on those environments (e.g., *Microtus longicaudus*). Of the vertebrates, Sequoia and Kings Canyon National Parks are known to have 45 native species that fit this definition, and an additional 16 species may be present. Of the 45 native vertebrates, one species (*Rana boylei*) is extirpated, and 15 are rare or uncommon. The 45 vertebrate species include 5 fish, 7 amphibians, 1 reptile, 30 birds, and 2 mammals. While some studies of aquatic invertebrates have been conducted (Abel 1977, 1984; Kubly 1983; Bradford et al. 1998; Kratz et al. 1994; Stoddard 1987; Taylor and Erman 1980; Knapp and Matthews 2000), known invertebrates have not been

compiled into a master list. The broad taxonomic groups studied include both benthic invertebrates (primarily aquatic insects) and zooplankton.

Stressors

Terrestrial wildlife are affected by landscape level stressors, including

- ecological impacts from exotic species
- changes in the species composition and abundance due to the altered fire regime
- bioaccumulation of contaminants
- isolation and fragmentation of some species due to differences in land-use practices on adjacent lands

Other effects to wildlife occur from conflicts with visitor use, changes to the natural distribution and abundance of native species due to park developments, and anthropogenic mortality (both accidental and by poaching).

The primary threats to native aquatic wildlife include competition and genetic introgression from exotic species, and predation. Thirteen vertebrate species have been introduced to the parks' aquatic environments, and at least nine have become established. At least one aquatic invertebrate and several plants have been introduced into park waters. There is also a serious concern about the introduction of contaminants, especially biocides and pollutants from internal-combustion engines. Some native aquatic species are declining. There has been some anthropogenic alteration of aquatic habitats and harvest of fish.

THREATENED, ENDANGERED, OR SENSITIVE SPECIES

Description

The U.S. Fish and Wildlife Service lists 2 wildlife species in Sequoia and Kings Canyon as threatened, 5 as endangered, and 39 as species of concern (see Table 1). California lists 3 species as threatened, 5 as endangered, and 36 as

protected, sensitive, or of concern. Three species are listed as sensitive by the U.S. Forest Service.

Of over 1,400 species of vascular plants in the parks, no species are listed as federally threatened or endangered, and only one, Tompkins' sedge (*Carex tompkinsii*), is listed by the state as

rare. Little is known about the status and habitat requirements of this species within the two parks. What is known is primarily derived from a single systematic survey conducted during the early 1980s (Norris and Brennan 1982), and more localized surveys carried out in conjunction with major construction projects.

TABLE 1: THREATENED, ENDANGERED, OR SENSITIVE SPECIES

Common Name	Status	Occurrence in the Parks
Vertebrate Animals		
Mammals		
Bat, big-eared bat	FSC, CSC	Uncommon foothill resident.
Bat, greater western mastiff	FSC, CSC	Uncommon in the Sierra Nevada.
Bat, spotted	FSC, CSC	Uncommon to rare resident at mid elevations.
Bear, grizzly	FT	Extirpated from the Sierra Nevada.
Beaver, mountain	FSC, CSC	Uncommon resident of montane riparian areas; at its southern extent of range in the Sierra Nevada.
Fisher, Pacific	FSC, CSC	Uncommon to rare resident in foothill hardwood and mixed conifer zones.
Fox, Sierra Nevada red	CT, FSC	Very rare resident to subalpine and alpine. May be extirpated.
Hare, white-tailed	CSC	Uncommon resident of upper montane and subalpine areas.
Marten	FSS	Same as above.
Myotis, fringed	FSC	Widely distributed in the Sierra Nevada.
Myotis, long-eared	FSC	Occurs in mid to high elevations.
Myotis, long-legged	FSC	Ranges length of the Sierra Nevada in woodland, montane, and subalpine areas.
Myotis, small-footed	FSC	Parks fall within range but no records exist.
Myotis, Yuma	FSC, CSC	Common in lower elevations in the parks and throughout the Sierra Nevada.
Pallid	CSC	Status unknown in the parks — surveys in progress for this and following bat species. Uncommon foothill resident.
Sheep, bighorn	FE, CE	Rare resident of alpine areas.
Wolverine, California	CT, FSC	Rare resident of upper montane to alpine areas.
Birds		
Condor, California	FE, CE	Extirpated from the parks.
Eagle, bald	FT, CE	Species rarely uses the parks, which are outside of this species preferred habitat. No known nesting or communal roosting in the parks.
Eagle, golden	CP, CSC	Moderately common at all elevations.
Falcon, peregrine	CSC	Rare breeding resident of montane zones.
Falcon, prairie	CSC	Uncommon migrant and rare resident of alpine and subalpine areas.
Flycatcher, willow	CE, FSS	Rare in the parks in montane.
Goshawk, northern	FSC, CSC	Uncommon in montane to subalpine.
Gull, California	CSC	Uncommon migrants through alpine/subalpine areas.
Harrier, northern	CSC	Uncommon in the parks. Uses open, burnt, chaparral habitat.
Hawk, Cooper's	CSC	Uncommon to rare in foothills to montane.
Hawk, sharp-shinned	CSC	Uncommon in foothills to montane.
Hawk, Swainson's	CT	Rare resident/accidental visitor in the parks, which are outside usual range / preferred habitat.
Kite, white-tailed	CP	Same as above.
Lark, horned	CSC	Same as above.
Martin, purple	CSC	Same as above.
Merlin	CS	Sporadic use of open terrain in the parks.
Osprey	CSC	Rare resident/accidental visitor in the parks, which are outside usual range / preferred habitat.
Owl, great gray	CE, FSS	Parks are apparently south of normal range in Sierra Nevada. Rare/limited occurrence in the parks.
Owl, long-eared	CSC	Very rare in montane areas.
Owl, short-eared	CSC	Very rare visitor.

THE AFFECTED ENVIRONMENT

Common Name	Status	Occurrence in the Parks
Owl, spotted	FSC, CSC	Uncommon resident of montane forests.
Shrike, loggerhead	FSC, CSC	Rare resident / accidental visitor in the parks, which are outside usual range / preferred habitat.
Swift, Vaux's	CSC	Uncommon resident of oak and fir forests.
Reptiles		
Lizard, California legless	FSC, CSC	Status unknown. Found in foothill chaparral and oak woodland/savanna areas.
Lizard, coast horned	FSC, CP, CSC	No modern records for parks. Either extirpated or never established in the parks.
Amphibians		
Frog, foothill yellow-legged	FSC, CP, CSC	Extirpated from the parks.
Frog, mountain yellow-legged	FSC, CP, CSC	Occurs in upper montane and subalpine/lower alpine areas.
Toad, Yosemite	FSC, CP, CSC	Occurs in subalpine/lower alpine areas.
Turtle, Western pond	FSC, CP, CSC	Locally common in some foothill rivers and streams.
Salamander, Mount Lyell	FSC, CP, CSC	Habitat includes alpine/subalpine areas.
Fish		
Roach, California	CSC	Found in the lower reaches of the Middle Fork of the Kaweah River.
Trout, California golden	FSC, CSC	Does not occur within the park as a native species. This species is native immediately south of the park and occurs within the park as an introduced species.
Trout, Kern River rainbow	FSC, CSC	Native to the Kern River.
Trout, Little Kern golden	FT	Native to the Soda Springs Creek drainage — a small area within the parks.
Invertebrate Animals		
Insects		
Beetle, Ciervo aegialian	FSC	Status unknown in the parks. No records for the park.
Beetle, Hopping's blister	FSC	Species occupy treeless habitats. Not present in the parks.
Beetle, moestan blister	FSC	Same as above.
Beetle, molestan blister	FSC	Same as above.
Beetle, Morrison's blister	FSC	Same as above.
Beetle, San Joaquin dune	FSC	Species found on the west side in the Central Valley and the Sacramento-San Joaquin delta. Not present in the parks.
Beetle, San Joaquin tiger	FSC	Same as above.
Beetle, valley elderberry longhorn	FT	All specimens collected are from the Kaweah drainage and have been identified as the unlisted and common coastal subspecies. This species occurs below 3,000 feet elsewhere.
Beetle, wooly hydroporous diving	FSC	Status unknown in the parks. No records for the parks.
Bug, Dry Creek cliff strider	FSC	Same as above.
Butterfly, Bohart's blue	FSC	Same as above.
Butterfly, San Emigdio blue	FSC	Same as above.
Caddisfly, Denning's cryptic	FSC	Occurs in freshwater habitat in the parks.
Caddisfly, Kings Canyon cryptochian	FSC	Same as above.
California linderiella	FSC	Status unknown in the parks. No records for the parks.
Grasshopper, Sierra pygmy	FSC	Same as above.
Crustaceans		
Vernal pool fairy shrimp	FT	Status unknown in the parks. No records in the park.
Plants		
Tompkins' sedge	CR	Foothills and lower montane forests.

FE = federally endangered
 FT = federally threatened
 FSC = federal species of concern

CP = California protected
 CE = California endangered
 CT = California threatened

CSC = California species of concern
 CR = California rare
 FSS = Forest Service sensitive

Stressors

Stressors to sensitive species include those mentioned under previous resource topics. Landscape level stressors include invasion by exotic species, altered fire regime, bioaccumulation of

contaminants, isolation or fragmentation of populations, and anthropogenic climate change. Other effects are associated with visitor use and developments within the parks.

AIR QUALITY

Sequoia and Kings Canyon National Parks have been designated as class I areas under the federal Clean Air Act, as amended in 1977. As such, the parks are afforded the greatest degree of air quality protection under the Clean Air Act, and the National Park Service is required to do all it can to ensure that air quality related values are not adversely affected by air pollutants. This includes participation in the review of permits of those sources whose emissions will potentially affect the park as defined in the Prevention of Significant Deterioration (PSD) program, which was established in the 1977 amendments to the Clean Air Act (Title I, Part C).

Regional Air Quality

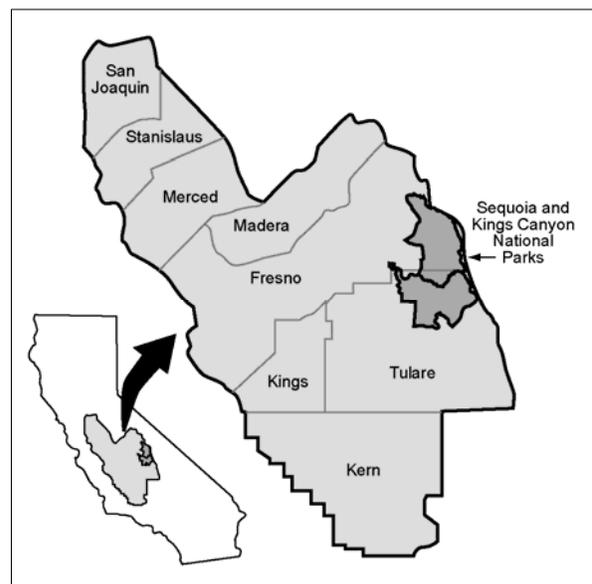
The San Joaquin Valley to the west of the parks is a trap for air pollutants originating in the valley as well as pollutants from cities along the central California coast that are carried in on prevailing winds. Southerly wind patterns carry these pollutants through the valley until they reach the mountains at the southern end of the basin, causing an eddy to form in the vicinity of Visalia and Fresno. Frequent inversions over the valley place a lid over the valley air at night. Rising daytime air currents then carry these trapped pollutants up into the parks, giving the parks some of the worst air quality of any national park in the country. This movement of polluted air into the Sierra occurs daily during the summer months.

Vehicular traffic is one of the major sources of pollutants in the San Joaquin Valley, contributing much of the particulates, carbon monoxide, nitrogen oxides, and hydrocarbons annually emitted. In the presence of sunlight, the latter two constituents interact to form ozone. Ozone levels in the parks approach and often exceed state and federal health and welfare standards during the summer (based on the newer 8-hour ozone average). Other sources of pollution include power generation, petroleum production, and agricultural practices.

Not only does pollution pose a human health risk, it also impairs visibility and injures plant and animal life. The once vast panoramas from vista points in the parks looking westward are highly obscured by regional haze. Plant species differ in their sensitivity to pollutants. Studies have shown that Jeffrey and ponderosa pines are especially susceptible to ozone. Sequoia seedlings suffer needle damage at current ozone levels and reduced growth when exposed to elevated levels. Acid deposition has been found to affect the chemical composition of lakes and streams within the parks, which can harm aquatic life.

Air pollution is one of the most serious external threats to Sequoia and Kings Canyon National Parks. Most of the air pollution originates outside park boundaries, and the National Park Service has virtually no control over the air quality within the San Joaquin Valley Air Pollution Control District (see Figure 1). Therefore, park staff participate in local and state air quality planning efforts to improve air quality and protect park resources. Park monitoring stations have been established to measure ozone, carbon monoxide, particulates, acid deposition, and visibility in order to define the extent of the problem and pollutants' effects on park resources.

FIGURE 1: SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT



Air Emissions in the Parks

Typical air emissions found within the boundaries of Sequoia and Kings Canyon National Parks include stationary, area, and mobile sources. Stationary sources can include water-heating equipment, generators, and fuel storage tanks. Area sources include prescribed burning, campfires, highway maintenance, and wastewater treatment plants. Mobile sources include vehicles operated by the public, cooperators, and NPS and concession employees. On-road mobile sources are greatest in the summer, when visitation is at its highest. During the winter most in-park emissions are from wood used for heating.

In 1999 a survey of emissions was conducted using 1998 data. This was done to help park managers determine which emissions are associated with what park activities. The knowledge of what is generated within park boundaries allows managers to better understand the contribution of outside sources to air pollution levels

found in the park. (See *Final Air Emissions Inventory: Sequoia and Kings Canyon National Parks, California*, EA Engineering, Science, and Technology 2000.)

Almost a century of fire suppression has led to major changes in the structure and composition of forested ecosystems. Before Euro-American settlement, fires were frequent and of variable intensity and size. Now with high fuel loads, there is a greater risk of large fires. Since 1968 the parks have been actively restoring fire as a natural process, and both management-ignited fires and natural ignitions are used to achieve fire management objectives. Because of conflicts over the effects of smoke and the need to restore an altered fire regime, ways are being explored to improve the management of smoke from prescribed fires. The parks work closely with the San Joaquin Valley Unified Air Pollution Control District in conducting prescribed fires under favorable air quality conditions.

TABLE 2: NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Primary Standard	California Standard
Carbon Monoxide (CO)	8-hour	9 ppm (10 µg/m ³)	9.0 ppm (10 µg/m ³)
	1-hour	35 ppm (40 µg/m ³)	20 ppm (23 µg/m ³)
Hydrogen Sulfide	1-hour	-	0.03 ppm (42 µg/m ³)
Lead (Pb)	Calendar Quarter	1.5 µg/m ³	-
	30-day average	-	1.5 µg/m ³
Nitrogen Dioxide (NO ₂)	Annual	100 µg/m ³ (0.053 ppm)	-
	1-hour	-	470 µg/m ³ (0.25 ppm)
Ozone (O ₃)	8-hour	0.08 ppm	-
	1-hour	0.12 ppm (235 µg/m ³)	0.09 ppm (180 µg/m ³)
Particulate Matter (PM ₁₀)	Annual Arithmetic Mean	50 µg/m ³	20 µg/m ³
	Annual Geometric Mean	-	30 µg/m ³
	24-hour	150 µg/m ³	50 µg/m ³
	1-hour	-	-
Particulate Matter (PM _{2.5})	Annual Arithmetic Mean	15 µg/m ³	12 µg/m ³
	Annual Geometric Mean	-	-
	24-hour	65 µg/m ³	-
	1-hour	-	-
Sulfates	24-hour	-	25 µg/m ³
Sulfur Dioxide (SO ₂)	Annual	80 µg/m ³ (0.03 ppm)	-
	24-hour	365 µg/m ³ (0.14 ppm)	105 µg/m ³ (0.04 ppm)
	1-hour	-	655 µg/m ³ (0.25 ppm)
Vinyl Chloride (chloroethene)	24-hour	-	0.010 ppm (26 µg/m ³)

NOTE: Federal primary standards are designed to protect human health. Federal secondary standards are designed to protect human welfare, including economic impacts such as damage to crops, vegetation, and materials.

ABBREVIATIONS: µg/m³ — micrograms per cubic meter
 ppm — parts per million
 - - no standard exists for this pollutant and/or averaging time.

National and State Ambient Air Quality Standards

Sequoia National Park is located in the mountainous portion of Tulare County in the southern Sierra Nevada, and Kings Canyon National Park is located in Fresno and Tulare counties, which are part of the eight-county San Joaquin Valley air basin. The San Joaquin Valley Unified Air Pollution Control District is the governing authority that has primary responsibility for controlling air pollution from stationary sources.

The U.S. Environmental Protection Agency (USEPA) has established national ambient air quality standards (NAAQS) for each of six “criteria” pollutants to protect the public from the health hazards associated with air pollution. These six criteria pollutants are carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter less than 10 microns in diameter (PM₁₀), and lead (Pb). The state of California has adopted additional air quality standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particulates. Table 2 lists the national and California standards for these pollutants.

Geographic areas (including counties, air basins, or portions thereof) that exceed a particular national or state pollutant standard are considered “non-attainment” areas for that pollutant. The attainment status of the San Joaquin Valley Air District, which includes Fresno and Tulare counties, is shown in Table 3.

TABLE 3: SAN JOAQUIN VALLEY AIR DISTRICT ATTAINMENT STATUS

Pollutant	Designation / Classification	
	Federal	State
Ozone (1 hour)	N/Extreme	N/Severe
Ozone (8 hours)	N/Serious	No state standard
Carbon monoxide	U/A	A
PM ₁₀	N/Serious	N
PM _{2.5}	N	No state standard
Nitrogen dioxide	U/A	A
Sulfur dioxide	U	A
Lead	No designation	A

SOURCE: San Joaquin Valley Air Pollution Control District 2005.
A = attainment. N = non-attainment. U = unclassified.

The San Joaquin Valley Air District is designated as a serious non-attainment area for PM₁₀, an extreme non-attainment area for 1-hour ozone, and a serious non-attainment area for 8-hour ozone. The San Joaquin Valley Unified Air Pollution Control District is empowered to adopt rules and regulations to protect the public health and prevent the violation of ambient air quality standards. The air district requires all federal agencies to comply with appropriate general conformity requirements and emission budgets within non-attainment areas.

As a non-attainment area, the San Joaquin Valley Unified Air Pollution Control District is required to develop three attainment plans — a rate of progress plan, a post rate of progress plan, and an attainment demonstration plan.

Stationary Sources

Existing stationary air pollution sources within the park were determined in a *1998 Air Emissions Inventory* (EA Engineering, Science, and Technology 2000). The inventory shows that the largest park air pollution sources are smoke from managed wildland fires and vehicle emissions. Stationary sources within the parks are minor and include generators, boilers, and furnaces; emissions from these sources are between 8.1 and 16.6 tons per year for all pollutants (EA Engineering, Science, and Technology 2000).

The California Air Resources Board (CARB) estimates average annual emissions from California counties. Table 4 summarizes estimates for criteria emissions from stationary sources in California, Fresno and Tulare counties, and the San Joaquin Valley air basin, and it compares them to emissions from stationary sources in Sequoia and Kings Canyon National Parks. The CARB data indicate that the majority of volatile organic compound (VOC) emissions, which are a precursor for ozone formation, are generated by landfills in Fresno County. NO_x and VOC emissions from stationary sources in Sequoia and Kings Canyon National Parks are relatively minor compared to totals in the two counties.

TABLE 4: ESTIMATED ANNUAL EMISSIONS FROM STATIONARY SOURCES

Area	PM ₁₀ (tons/yr)	SO _x (tons/yr)	NO _x (tons/yr)	CO (tons/yr)	VOC (tons/yr)
California*	130.4	134.4	507.4	405.6	507.3
Fresno County*	4.0	8.0	19.2	9.4	17.5
Tulare County*	3.5	0.6	4.3	2.1	4.4
San Joaquin Valley Air Basin*	23.6	21.0	138.9	53.7	86.7
Sequoia and Kings Canyon National Parks**	1.1	0.1	1.2	7.9	3.3

* California Air Resources Board Almanac Emission Projection Data (2004).

**EA Engineering, Science, and Technology 2000.

Smoke Emissions

The parks' fire management and natural resources staff work closely with staff of the San Joaquin Valley Unified Air Pollution Control District. Projected smoke emissions from prescribed fire in the parks are included in the "San Joaquin Valley Smoke Management Plan." This plan is part of the State Implementation Plan for the San Joaquin Valley. A memorandum of understanding between the San Joaquin Valley Unified Air Pollution Control District and land management and fire protection agencies establishes a formal working relationship to develop and implement methods of reducing air quality impacts from prescribed burn practices.

Prior to igniting a prescribed fire, park staff must obtain permission from the San Joaquin Valley Unified Air Pollution Control District, which has the responsibility to adopt, implement, and enforce air quality rules and regulations for prescribed burns, in accordance with the smoke management program and the State Implementation Plan (Title 17, California Code of Regulations, Rule 4106). As an additional measure to mitigate the potential cumulative impacts of prescribed fires, park fire management staff are members of a Sierra-wide interagency group, which addresses smoke impacts and plays a role on the Interagency Air and Smoke Council. The goal of these groups is to ensure that planned ignitions on federal and state lands in the Sierra do not adversely impact smoke sensitive areas in and around the burn area. Both groups meet on a regular basis to discuss policy updates, data needs, and current technology.

A smoke communication strategy and a smoke management plan have been included as appen-

dixes in the latest park *Fire Management Plan and Environmental Assessment* (NPS 2000b). These documents provide guidance for managing future smoke events from prescribed fires, fire use projects, suppression actions, and fires occurring outside the parks. Messages and information on health issues and concerns are posted for visitors, employees, and residents in affected smoke-sensitive areas. The parks also have the ability to monitor particulate levels in the parks during smoke events on an hourly basis. These levels are used to compute a 24-hour average, which correlates with the national ambient air quality standards for particulates.

Transportation Sources

Since the proposed transportation system improvements are within national parks, and the air basin is designated as non-attainment for PM₁₀ and O₃, the general conformity rule will apply to any project construction. Conformity with the air quality standards is presumed if the project will emit less than the general conformity *de minimis* thresholds. In serious ozone non-attainment areas, the *de minimis* thresholds for VOC and NO_x are 50 tons per year. In serious PM₁₀ non-attainment areas, the *de minimis* threshold for PM₁₀ emissions is 70 tons per year. If emissions from a project could exceed the *de minimis* threshold of any criteria pollutant in one year, a more rigorous determination of conformity will be required.

A regional transportation model was developed by the San Joaquin Valley Association of Governments. The model is used to generate information about existing and future traffic volumes, patterns, and congestion for the San Joaquin Valley. It takes into consideration all planned

land developments, and it estimates the most likely amount and type of future development for the region. Traffic volumes for 1998 were used to reflect existing conditions, and 2010 was used for the planning year horizon analysis. The San Joaquin Valley Unified Air Pollution Control District uses the regional transportation plan to demonstrate attainment of the federal Clean Air Act pollutant standards and also conformity.

The park vehicle fleet increasingly uses alternative fuels, such as compressed natural gas, to reduce transportation-related emissions.

Human Health and Enjoyment

Sequoia and Kings Canyon National Parks use air quality data to issue periodic warnings to staff and visitors about limiting activity in times of lower air quality. Wayside signs describe regional air quality conditions and point out reduced visibility from historical conditions.

Air Quality Monitoring and Research

Air monitoring efforts in Sequoia and Kings Canyon National Parks began in the early 1980s and have grown over the years to include more sites and types of monitoring equipment. Three air quality monitoring stations operate year-round, measuring a combination of ambient ozone concentrations, meteorological data,

visibility, particulate matter, UV, and wet/dry deposition chemistry. The stations are at the Ash Mountain headquarters area, at Lookout Point near the Mineral King road entrance station, and at the Lower Kaweah site in Giant Forest (see Table 5 and Figure 2).

The national parks are part of several national networks, including the following:

- National Atmospheric Deposition Program / National Trends Network (<<http://nadp.sws.uiuc.edu/nadpoverview.asp>>)
- Clean Air Status and Trends Network (<<http://www.epa.gov/castnet>>)
- Interagency Monitoring of Protected Visual Environments (<http://vista.cira.colostate.edu/improve/>>)
- National Park Service / Air Resources Division monitoring data (<<http://www2.nrintra.nps.gov/air/monitoring/network.htm>>)
- Mercury Deposition Network (<http://nadp.sws.uiuc.edu/mdn/>>)
- Park Research and Intensive Monitoring of Ecosystems Network

Ambient concentrations of PM₁₀ are only monitored at the air monitoring site at Ash Mountain. During summer months portable monitors and passive samplers are installed throughout the park to measure particulate matter and ozone.

In 1999 the parks implemented a parkwide air advisory program from about May to October. Air quality designations are based on ozone values from the parks' monitoring station. Health standards were exceeded every year through 2002.

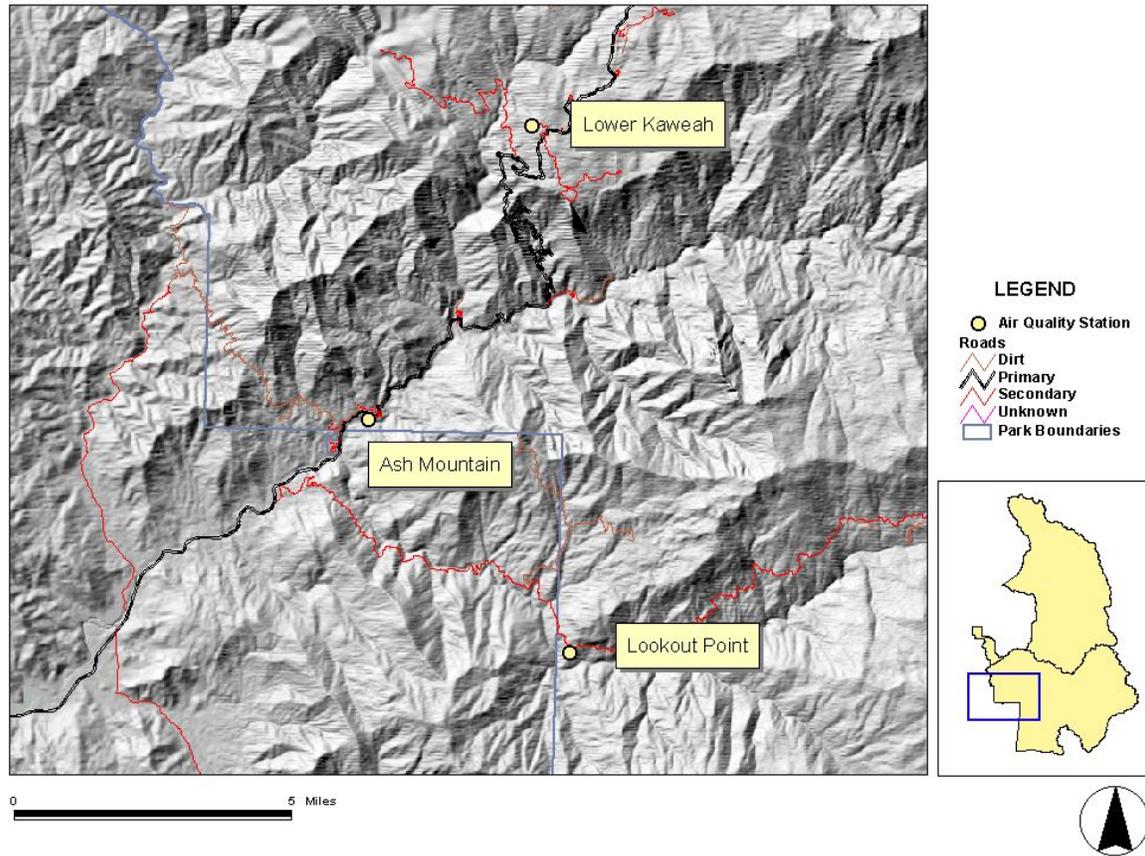
Since the late 1970s air-related research has helped determine the effects of air pollutants on park resources and air quality related values, as required in a designated class I park. (Air quality monitoring data can be obtained from the NPS Air Resources Division Website at <www2.nature.nps.gov/air>. Information on air quality related values for Sequoia and Kings Canyon National Parks can be found at <<http://www2.nature.nps.gov/air/Permits/ARIS/seki/index.htm>>.)

TABLE 5: AIR MONITORING STATIONS

Site	Type	Network*
Ash Mountain	Meteorology	NPS – ARD
	Ozone	NPS – ARD
	Particulate Matter	SEKI Fire
	PM 2.5 and 10	IMPROVE
Lookout Point	Meteorology	NPS – ARD
	Ozone	NPS – ARD
	Dry deposition	CASTNet
Lower Kaweah	Meteorology	NPS – ARD
	Ozone	NPS – ARD
	Wet deposition	NADP/NTN
	Mercury	MDN
	Webcam	NPS – ARD

* CASTNet — Clean Air Status and Trends Network
 IMPROVE — Interagency Monitoring of Protected Visual Environments
 MDN — Mercury Deposition Network
 NADP/NTN — National Atmospheric Deposition Program / National Trends Network
 NPS-ARD — National Park Service – Air Resources Division

FIGURE 2: AIR QUALITY STATIONS IN SEQUOIA-KINGS CANYON NATIONAL PARKS



Air Quality Conformity

In 1993 the Environmental Protection Agency adopted regulations implementing section 176 of the Clean Air Act, which requires that federal actions conform to State Implementation Plans (SIP) for achieving and maintaining national air quality standards. Federal actions must not cause or contribute to new violations of any standard, increase the frequency or severity of any current violation, interfere with timely attainment or maintenance of any standard, delay emission reduction milestones, or contradict requirements in the State Implementation Plan.

The conformity rule has two parts — general conformity and transportation conformity. General conformity deals with stationary sources such as boilers or generators, and area sources, such as smoke from prescribed fire. Transportation con-

formity deals with mobile air pollution sources, such as cars and buses. The conformity rule applies only in federally designated non-attainment areas, or those areas that currently exceed federal standards. Conformity applies to park activities because Fresno and Tulare counties exceed federal ozone and particulate matter standards.

To determine if the park emissions conform, the National Park Service must prove that total direct or indirect emissions are in compliance with all State Implementation Plan requirements. Park emissions have either been identified and accounted for in the state plan, or based on air quality modeling, do not cause or contribute to any new violations or increase the severity or frequency of existing violation. The two main sources of air pollution in the park are smoke from managed wildland fire and mobile source emissions from visitor vehicles and concessioners.

Wild and Scenic Rivers

DESCRIPTION OF DESIGNATED RIVER SEGMENTS

The Middle and South Forks of the Kings River and the North Fork of the Kern River, which have been designated as wild and scenic rivers, are described below. The outstandingly remarkable values of each river segment are listed in volume 1 in the alternatives table.

Middle Fork and South Fork of the Kings River

The Kings River is the largest free-flowing river in the Sierra Nevada. Approximately 88.8 river miles* of the Middle Fork, South Fork, and main stem of the Kings River were added to the national wild and scenic rivers system on November 3, 1987 (PL 100-150). The designated reaches include:

- the Middle Fork from its headwaters at Lake Helen between Muir Pass and Black Giant Mountain to its confluence with the main stem (29.5 miles)
- the South Fork from its headwaters at Lake 11599 to its confluence with the main stem (31.7 miles)
- the main stem of the Kings River from the confluence of the Middle Fork and the South Fork to the point at elevation 1,595 feet above mean sea level (this portion is outside the park and is managed by the U.S. Forest Service)

These reaches encompass the entire Middle and South Forks, which are largely in Kings Canyon National Park. The National Park Service manages the 61.2 miles of the Middle and South Forks within Kings Canyon National Park and

the U.S. Forest Service the remaining 27.6 miles (USFS 1991a).

The portions of the Middle and South Forks managed by the National Park Service begin in glacial lakes above timberline and flow through deep, steep-sided canyons, over falls and cata-racts, and eventually become an outstanding whitewater rafting river in Sequoia National Forest (USFS 1991a). Both the Middle and South Forks flow through extensive and spec-tacular glacial canyons. All of the Middle Fork is within designated wilderness, as is the upper portion (24.1 miles) of the South Fork. The lower 7.6-mile portion of the South Fork canyon is known as the Kings Canyon, giving the park its name.

The Kings Canyon, including the Cedar Grove developed area, is the only segment of the Kings River accessible by motor vehicle.

North Fork of the Kern River

The North Fork of the Kern River was added to the national wild and scenic rivers system on November 24, 1987 (PL 100-174). This 78.5-mile segment extends from its headwaters at the 12,000-foot contour just south of Harrison Pass Lake below the Kings-Kern Divide and off the west slopes of Mount Whitney in Sequoia National Park to the Tulare-Kern county line. The National Park Service manages the upper 28.9 miles of the North Fork within Sequoia National Park, and the U.S. Forest Service manages the remainder of the river, which flows almost entirely through national forest land, including the Golden Trout Wilderness.

The upper river portion is free flowing for over 61 miles, the longest stretch of free-flowing river in the Sierra Nevada, and it is classified as wild. The lower 17.5-mile stretch managed by the U.S. Forest Service is classified as recreational due to road accessibility and minor impoundments (USFS 1994).

* Stated mileages are from the 2002 GIS-based calculations; some of these mileages differ slightly from those given in the Wild and Scenic Rivers Act, as amended in 1987.

The 28.9-mile segment of the North Fork managed by the National Park Service includes the headwaters and the spectacular reaches of the Kern Canyon within the park, all of which is within designated wilderness.

RIVERS BEING STUDIED FOR INCLUSION IN THE SYSTEM

Description

The South Fork of the San Joaquin River and five forks of the Kaweah River (North, Marble, Middle, East, and South) were studied for their suitability and eligibility for inclusion in the national wild and scenic rivers system. The following descriptions are inventories of all features that were analyzed to determine the outstandingly remarkable values for these rivers. The outstandingly remarkable values of the eligible segments are listed in volume 1 in the alternatives table. Only the North Fork of the Kaweah within the park boundary was determined to be ineligible because no outstandingly remarkable values were identified.

South Fork of the San Joaquin River

The South Fork of the San Joaquin River originates at Martha Lake, a scenic alpine basin at 11,000 feet on the west slope of Mount Goddard (13,568 feet). From Martha Lake the stream descends to the northwest into a rough rocky gorge of increasing depth. At an elevation of 8,800 feet the South Fork joins Evolution Creek, a major eastern tributary. Five miles downstream, at an elevation of 7,900 feet, the South Fork leaves Kings Canyon National Park.

The South Fork canyon is glaciated throughout its length within the park and has numerous interesting glacial features. The Mount Goddard roof pendant, a geological formation at the headwaters of the South Fork, contains metamorphic formations of scientific and scenic interest, including meta-volcanic marine rocks (largely metamorphosed rhyolite).

The South Fork canyon is designated wilderness and provides for a variety of outdoor recrea-

tional opportunities. The entire canyon, with the exception of the uppermost 2 miles, is accessible via a maintained trail that parallels the river. All points within the canyon are more than a day's travel from the nearest roads. In addition to wilderness camping, the area is used for climbing and photography.

The South Fork is a cold water trout fishery, with rainbow trout being dominant (these are possibly from native stock, though genotypes are likely altered). No stocking is done, the river being self-sufficient. The river's cold water provides for a high level of dissolved oxygen that in turn provides good habitat for aquatic invertebrates, such as stoneflies (restricted to highly oxygenated water). While the area contains typical California alpine wildlife, the drainage contains major clusters of fishless waters (west of Mount Goddard) that provide good habitat for populations of the mountain yellow-legged frog and the Yosemite toad, which are both declining across their range. This rocky area is sparsely wooded. The most common trees include lodgepole and whitebark pine, with some scattered populations of mountain hemlock, mountain juniper, aspen, and cottonwood. While vegetation is sparse, it plays a role in determining the character of this area.

Human use of this drainage is not well documented. A handful of sparse lithic scatters in the upper end of the drainage attest to some prehistoric use; a systematic survey would likely find additional evidence. Various Western Mono (Monache) groups would have known about the drainage and its tributaries, and it can be inferred that they would have used the area for hunting, travel, and probably trade and interaction with Paiute groups to the east. During historic times this remote, high alpine country was seldom visited, and there was little interest from sheep grazers and miners.

Water quality is excellent.

North Fork of the Kaweah River

The North Fork of the Kaweah River rises in several headwater streams along the Kings-

Kaweah Divide and flows out of the Jennie Lakes Wilderness. It becomes the North Fork at the confluence of Stony Creek (from the north) and Dorst Creek (from the east), at an elevation of approximately 5,400 feet. At this point it forms the boundary between Sequoia National Park and Kings Canyon National Park. The river flows southwest then turns to the south, serving as the western boundary of Sequoia National Park, leaving the park at approximately 1,700 feet elevation. The full extent of the river passes through numerous areas of metamorphic rocks and also forms deep, steep gorges in granitic rocks in its upper reaches. The North Fork provides examples of an incised river canyon and gorge with a moderate, stepped gradient of descent. In its lower reaches the river eases its rate of descent, creating long gentle stretches of calm water with extensive riparian development and deep pools. Examples of karst topography in the watershed include Lilburn Cave, Hurricane Crawl, and Crystal Cave.

Redwood Creek, a primary tributary, flows for approximately 5 miles through the lower reaches of Redwood Canyon. This drainage contains the Redwood Mountain Grove and several other sequoia groves. The lower reaches support stands of foothill riparian forest vegetation, which is dominated by an overstory of alder and sycamore with tangles of blackberry and wild grape in the understory.

The river supports a self-sustaining population of naturalized trout. Rainbow are native (though genotypes are likely altered), with several other species, including the golden, brown, and brook trout, having been introduced. The native western sucker is also present. There is a self-sustaining population of the western pond turtle in the river. Peregrine falcons regularly nest in the Chimney Rock area above the North Fork. The water and riparian vegetation create oasis-like habitats for various species during the hot summer months.

The North Fork is accessible only with difficulty in its middle reaches, as essentially there are no roads (remnants of historic roads still exist), and

the popular North Fork trail is generally high above the river corridor.

Native American use of the North Fork is indicated by a handful of mid-elevation and foothill sites, including bedrock mortars, grinding slicks, and scatters of obsidian tools and debris. Ethnographically, the river and its upland tributaries were most often frequented by Western Mono (Monache) groups, especially the Wuksachi. Historically, the lower stretches of the river witnessed activity by the settlers of the Kaweah Colony, and features are associated with the sites of Kaweah, Advance, and Camp Flagstaff, as well as Colony Mill Road. The Grunigen homestead is found along the lower elevations of Yucca Creek, with a CCC camp having been located at the confluence of Yucca Creek and the North Fork; this junction marks the western boundary of Sequoia National Park.

Most of the lands west of the river are managed by the Bureau of Land Management, and there are grazing allotments. Some private land and USFS land lies to the west. (Note: The Forest Service did not address its portion of the North Fork in regards to wild and scenic river status in the 1988 *Sequoia National Forest Land and Resource Management Plan — Forest Plan*. The USFS parcel adjoining the North Fork was zoned as “semi-private motorized.”)

Water quality is generally good to fair, with some limited agricultural and air pollutant deposition.

Marble Fork of the Kaweah River

The Marble Fork is one of the most spectacular watercourses in California, dropping 8,000 feet in approximately 15 miles; it is the only major watercourse wholly contained within Sequoia National Park. The Marble Fork originates above timberline at Lake 10,559, and the upper reach (4.1 river miles) flows from the area known as the Tableland. At Tokopah Falls the river drops 1,500 feet over a massive granite bluff to the floor of a spectacular, glacially carved canyon known as the Tokopah Valley. Below Lodgepole the river plunges through a

steep-walled canyon that is essentially inaccessible, except for the Crystal Cave Road bridge. In its middle reaches the river flows through Marble Falls and Wild Child Caves; at low flow, the entire river flows through these caves. At the multisteped Marble Falls the river drops more than 1,000 feet. Below the falls, the steep canyon again does not allow access until just above the Potwisha campground, where an impoundment dam for hydroelectric generation alters the river's flow. The river then flows through Potwisha campground and under the Generals Highway before joining the larger Middle Fork of the Kaweah River.

The Tableland is a wilderness recreation area accessed by the Lakes Trail and used primarily by backpackers and climbers, with some limited stock use. In the Tokopah Valley the river is paralleled by a popular frontcountry trail from the Lodgepole campground to the falls.

The lower reaches of the Marble Fork support outstanding examples of foothill riparian forest vegetation, with towering sycamores providing welcome shade to park visitors near Potwisha. Marble outcrops provide habitat for yucca and other plants with calcicole (marble) affinities. Stands of big-leaf maple and alder line the river in the reaches below the Crystal Cave bridge, along with mixed coniferous vegetation from the adjacent forested slopes.

There are numerous prehistoric and historic sites along the Marble Fork and its tributaries. The Potwisha had village sites at the mouth of the Marble Fork. A variety of bedrock mortar sites, grinding slicks, large bedrock basins, pictographs, midden soils, caves, and lithic scatters have been recorded within the drainage. Yokuts (e.g., Wukchumni) and Western Mono (e.g., Potwisha and Wuksachi) peoples were present throughout the area in protohistoric and early historic times. Military patrol camps, CCC camps, ranger stations, and even a remote trapper's cabin site mark historic era activities.

At the turn of the 20th century the Mount Whitney Power Company constructed a complex of power generation facilities on the Kaweah,

including the impoundment about 0.5 mile above the Potwisha campground. The impoundment (which is still used under a park permit) consists of a small concrete dam with a concrete diversion flume that feeds into a siphon, passes under the Middle Fork, and then joins the Middle Fork flume. The total length of the flume and siphon is about 1.25 miles. In accordance with the park permit, the amount of water released from the diversion into the natural stream course is either the natural streamflow or the following, whichever is less: January and February, 6 cfs; March through June, 9 cfs; July through August, 6 cfs; September through December, 1.5 cfs.

Water quality of the Marble Fork is very good.

Middle Fork of the Kaweah River

The Middle Fork of the Kaweah River begins in a glacial U-shaped head-valley several thousand feet deep, at the confluence of Lone Pine and Hamilton (Deer) creeks, and flows 17.6 miles to the park boundary. The river lunges through a spectacular, very rugged, V-shaped canyon, among the deepest in the Sierra Nevada. Much of its course is cut through solid granite in the form of a slickrock gorge, which is very difficult to access. Below the river's confluence with Moro Creek, a road winds through the river canyon, usually 100–200 yards from the river's banks, so the character of the river is not changed. In its lower stretches the river has a riparian oasis-like character owing to the very dry nature of the surrounding landscape.

The Middle Fork canyon is a popular wilderness and non-wilderness recreation area for hikers and stock users, especially in spring, fall, and winter when its foothill trails are snow free. The Middle Fork trail in the upper 10 miles or so of the canyon parallels the river on the north side. Several giant sequoia groves are in the watershed, and the Redwood Meadow Grove is immediately adjacent to the river. Patches of alder, sycamore, and live oak line the river corridor near the Buckeye Flat campground and along the lower reaches. There is a naturalized and self-sustaining fishery, with surviving native roach, western sucker, and rainbow trout; brown,

golden, brook, and hatchery rainbow trout have been introduced, some in tributaries only. The foothills habitat also serves as home to wildlife such as bear, deer, mountain lions, and a variety of birds. There are notable bat colonies at Walk Softly Cave near Ash Mountain.

The Middle Fork area is a popular summer recreation area, with the river providing a welcome respite from the high ambient summer temperatures. The Buckeye Flat campground and the Ash Mountain administrative headquarters are located on and near the Middle Fork.

The Middle Fork Canyon supports a high density of prehistoric and historic sites, especially along its mid-slope and foothill elevations. Lithic scatters, bedrock mortar sites, granite basins, rock art panels, and midden soils are recorded. The village site of Potwisha marks the confluence with the Marble Fork, and the village site of Hospital Rock occurs a few miles farther upstream and is traversed by the historic Generals Highway. Other historic sites include the remains of a fish hatchery, a CCC camp, hydroelectric facilities, and the Ash Mountain headquarters complex.

The lower reach of the Middle Fork contains an impoundment/diversion that is part of the Kaweah power generation complex constructed by the Mount Whitney Power Company at the turn of the 20th century. The impoundment is about 1 mile above the confluence with the Marble Fork and consists of a small concrete dam with a concrete and wooden diversion flume running along the south side of the Middle Fork canyon for about 4 miles inside the park. According to the park permit, the amount of water released from the diversion into the natural stream course is either the natural streamflow or the following, whichever is less: January and February, 14 cfs; March through June, 21 cfs; July through August, 14 cfs; September through December, 9.5 cfs.

Water quality of the Middle Fork is very good.

East Fork of the Kaweah River

The East Fork of the Kaweah River begins on the slopes of spectacular granitic peaks of the Great Western Divide. Tributary streams flow through Mesozoic metamorphic rocks in the vicinity of the U-shaped, glaciated Mineral King Valley. Evidence of glaciation extends to an elevation of 7,000 feet, below which is a deep granitic canyon extending to and below the park boundary. The upper river canyon (Mineral King Valley) is a rare glaciated metamorphic landscape in the Sierra Nevada. This area has a variety of geologic features, including tufa deposits and soda springs, which are the result of groundwater systems super-charged with carbon dioxide; these features are unusual in the region. Karst features are extensive and notable due to their alpine location. The river then rapidly descends into a steep and deeply incised granite V-shaped canyon, which is essentially inaccessible due to its ruggedness. The area's dominant scenic features are the dramatic subalpine valley, several giant sequoia groves, and the deep river-cut canyon.

Stands of quaking aspen, uncommon in this part of the Sierra, line the river in its upper reaches as it flows through the Mineral King Valley. Thickets of willow and stands of cottonwood provide habitat along the river corridor below the valley and adjacent to the Cold Springs campground.

There is abundant wildlife in the East Fork drainage, including deer, bear, and marmots. In the lower reaches deep pools provide valuable habitat for resident and migratory species.

Less well documented for cultural resources, especially along its lower reaches, the East Fork parallels the Mineral King Road Cultural Landscape District, which has been listed on the National Register of Historic Places. The area contains the remains of a homestead, NPS ranger stations, CCC-era structures, water troughs, and subalpine special use permit cabin communities, along with the historic road corridor.

Also within the upper reaches of the drainage are abandoned mines, remnants of a sawmill, former sequoia logging sites, and old military

campsites. Prehistoric and protohistoric sites are not well documented, though clearly Native American use is evidenced by bedrock mortars, granite basins, and lithic scatters. The Mineral King Valley was the focus of a landmark environmental battle in the 1970s over its long-term future.

The diverse mountain environment provides excellent recreational opportunities for activities such as hiking and photography.

There are two private inholdings along the river, one in the Mineral King Valley and one at Kaweah Han, just downstream from the valley. The park's current *Land Protection Plan* for this area (NPS 1984) recommends that the Mineral King Valley inholding (5 acres, owned by the Disney Corporation) be acquired in fee for visitor use and minor facility development. The Kaweah Han inholding (60 acres) is expected to continue in private use (the existing historic Kaweah Han building complex is south of Silver City). So long as existing use continues, private ownership of Kaweah Han is compatible with park purposes. If uses changed, this position would need to be reassessed. One option would be to purchase an easement, which would safeguard park purposes and provide land protection while recognizing the rights of the private owners.

Four dams are used in the upper reaches of the East Fork drainage above Mineral King Valley at Monarch, Crystal, Franklin, and Eagle lakes. Constructed as part of the Kaweah complex of power generation facilities in 1903–5 by the Mount Whitney Power Company, they consist of concrete and native stone with check gates to regulate flow for downstream (out of park) diversion and power generation.

Water quality is generally good. Runoff in Mineral King Valley from some permittee cabins does not meet the California standards and may contribute to localized degradation.

South Fork of the Kaweah River

The South Fork of the Kaweah River originates on the granitic Hockett Plateau (near 10,000

feet) west of the Great Western Divide. It flows through a steep granite canyon to areas with Mesozoic metamorphic marine rocks near the park boundary. Prominent depositional terraces line the river in its lower reaches. It flows past one of these terraces (near the South Fork campground) before leaving the park at approximately 3,400 feet elevation. The South Fork canyon has been cut by glaciation and river erosion. It may be an example of a “captured stream,” i.e. its pre-glacial course was notably altered by glaciation. The upper reaches are on a large glaciated plateau, and the lower reaches are a deeply incised river canyon. There are several examples of karst topography, among them Clough and Soldiers Caves. There is evidence of a massive landslide from the 19th century, which temporarily blocked the flow of the river. Large meadows line the upper reaches of the river as it cuts through the lodgepole and red fir forest, which characterize the Hockett Plateau. Several populations of purple mountain parsley, a sensitive plant species, can be found in the decomposed granites near the river and adjacent to Hockett, Mitchell, and Tuohy meadows. Nearby giant sequoia groves include the Garfield and South Fork groves. In the lower elevations, big-leaf maple, alder, and an occasional California nutmeg line the river corridor.

In the South Fork drainage, Homer's Nose is a regular nesting area for peregrine falcons. The karst features are known to provide nesting areas to notable populations of several species of bats near the river.

The headwaters of the South Fork suggest mid-elevation to higher elevation use by Native Americans, as evidenced by campsites, bedrock mortar sites, and lithic scatters. A few historic cabins and ranger stations are also found along the drainage. Hockett Meadow supports a well-preserved CCC-era ranger cabin and storage building. Evidence of the previous South Fork ranger station is found on the river floodplain near where the river leaves the park.

The South Fork canyon was utilized by Euro-Americans as the first Trans-Sierra trail, ca. 1863–64 and was known as the Hockett Trail.

The area is very popular with backpackers and stock users. Clough Cave is a popular recreational cave (use requires a permit).

Water quality is very good.

Status of Hydroelectric Facilities in Relation to Wild and Scenic Rivers

The Mount Whitney Power Company constructed the Kaweah complex of hydroelectric power generation facilities roughly between 1902 and 1913. The complex encompasses facilities both inside and outside Sequoia National Park. These facilities have been in continuous operation since their construction. In 1920 the Mount Whitney Power Company was dissolved and became a part of its parent company, Southern California Edison.

The operation of these facilities, and their permitting and licensing, is currently mandated by congressional legislation. In 2005 Congress authorized the secretary of the interior to permit the operation of impoundments and diversions on the Marble and Middle Forks of the Kaweah River until 2026.

In 1978, pursuant to PL 95-625, the Mineral King area (including four Southern California Edison dams on tributaries of the East Fork of the Kaweah River) was transferred from the U.S. Forest Service to the National Park Service. PL 95-625 amended PL 93-522 to incorporate studies of hydroelectric facilities contained within the Mineral King addition.

In 1984 a report on the impacts of hydroelectric facilities on park resources (Jordan/Avent 1984) found that the impacts were not sufficiently significant to compel the secretary to remove or cease operation at that time, hence both the permit and license were subsequently renewed.

In 1992 the Federal Energy Regulatory Commission renewed Southern California Edison's license for the Kaweah complex facilities outside Sequoia National Park (Project 298-000-California). The commission specifically excluded from its licensing those portions of the complex in the national park. The current FERC license runs through December 31, 2021.

The impoundments and diversions for hydro-power generation on the Marble and Middle Forks, and from impoundments on the tributaries of the East Fork, have an adverse impact on the free-flowing condition and ecological functions of these rivers. However, it has been determined that the magnitude of impacts resulting from these relatively small-scale facilities does not preclude the inclusion of these river segments in the wild and scenic rivers system, since even with these facilities the waterways remain "generally natural and riverine in appearance" (*Federal Register* 47, no. 173: 39458). The desired future condition for these rivers is to provide for the removal of the impoundment and diversion infrastructure, which would allow the rivers to be restored to naturally functioning and free-flowing condition.

Backcountry / Wilderness

Backcountry is a term used by the National Park Service to refer to primitive, undeveloped, and roadless portions of parks. Backcountry includes areas designated or managed as wilderness. In Sequoia and Kings Canyon National Parks backcountry includes steep inaccessible areas, as well as areas reached by an extensive trail system. Most backcountry areas, which comprise about 96% of the parks, are managed as wilderness.

The NPS *Management Policies 2001* (sec. 8.2.2.4) state the following for backcountry use:

The number and type of facilities to support visitor use, including sanitary facilities, will be limited to the minimum necessary.

Public use levels will be managed . . . in accordance with the natural system's ability to absorb human waste.

All refuse must be carried out.

Background material related to congressional wilderness designation has been presented in the context for the plan. This section describes wilderness status and related issues for Sequoia and Kings Canyon National Parks.

DESIGNATED WILDERNESS

On September 28, 1984, the Sequoia–Kings Canyon Wilderness was established as federally designated wilderness, including approximately 723,000 acres, or about 83.5% of the parks. Immediately adjacent wilderness areas managed by the U.S. Forest Service include the following:

- the John Muir Wilderness within Sierra and Inyo national forests, 580,293 acres, established in 1964
- the Golden Trout Wilderness in Inyo and Sequoia national forests, 303,287 acres, established in 1978
- the Jennie Lakes Wilderness in Sequoia National Forest, 10,289 acres, established in 1984

- the Monarch Wilderness in Sequoia and Sierra national forests, 44,896 acres, established in 1984

Other nearby wilderness areas include Dinkey Lakes, Ansel Adams, Hoover, and Kaiser. As a result of the 1984 designation, the parks became the core of the second largest wilderness in the lower 48 states, totaling 1,661,785 acres.

POTENTIAL WILDERNESS AND OTHER AREAS

The following areas are potential wilderness, meaning that when and if the facilities were removed, they would become wilderness.

- The Bearpaw Meadow high Sierra camp is a 32-acre roadless area surrounded by wilderness. The area is at 7,800' elevation and is east of Giant Forest. It contains a popular concessioner-run tent hotel and backcountry campground.
- Pear Lake is a 5-acre area surrounded by wilderness. The area includes a ranger station.
- Two utility corridors for powerlines total 34 acres.

Oriole Lake and adjacent park lands are designated wilderness, including a primitive road that provides access to 12 acres of private inholdings. Surrounded by wilderness, the current private uses, including five cabins, are inconsistent with wilderness. A private airstrip has been removed.

BACKCOUNTRY AREAS MANAGED TO PRESERVE WILDERNESS CHARACTERISTICS

In 1984 three other areas of Sequoia and Kings Canyon National Parks were included in the wilderness recommendation but were not formally designated as wilderness. At that time Congress stated that this was done “without

prejudice.” The parks have continued to manage these areas to preserve wilderness characteristics per NPS policy. These areas include:

- Redwood Canyon in Kings Canyon and the North Fork of the Kaweah River in Sequoia National Park, which have a combined total of 35,321 acres

Redwood Canyon, which is separated from the core of Kings Canyon National Park and lies to the southwest, includes the largest sequoia grove in the parks — the Redwood Mountain Grove. There are over 10 miles of hiking trails and extensive karst features (including Lilburn Cave, one of the largest caves in California). Adjacent to the area that was originally recommended as wilderness is a rough, unpaved road less than two lanes wide that provides access to a trailhead. Some of the area was logged and contains second-growth sequoias, as well as a historic ranger station and an experimental sequoia management station. The area is used by hikers and stock parties.

- The North Fork of the Kaweah River is south of the Redwood Canyon area, in the northwestern section of Sequoia National Park. It contains rugged terrain and ranges from low foothill country to coniferous forests, including several giant sequoia groves. The area also contains the historic Colony Mill Road, now a trail, which was a wagon road built to access timber from giant sequoia groves in the late 19th century. Light use by hikers, stock parties, and anglers occurs mostly in spring and fall.
- Hockett Plateau in the watershed of the East Fork of the Kaweah River contains around 56,315 acres. Lying in the southwestern corner of Sequoia National Park, the area contains a variety of natural resources, including extensive tracts of giant sequoia

groves. Part of Hockett Plateau was included in the original legislation for Sequoia National Park in 1890. At an elevation of 8,500', the Hockett Plateau receives considerable stock and backpacker use. A historic ranger station is staffed seasonally. The southeast portion of the Hockett Plateau area is adjacent to Dillonwood and the Golden Trout Wilderness, and the northeast portion is adjacent to the Mineral King area.

WILDERNESS STUDIES

At the direction of Congress or in accordance with NPS *Management Policies 2001*, wilderness studies are to be conducted for the following areas:

- The 1,756-acre Chimney Rock area in Kings Canyon National Park is a rocky, rugged, and little-used area that is accessed by way of Forest Service roads. It has been determined to have characteristics that make it eligible for wilderness.
- The 15,600-acre Mineral King area is accessed by a road; trails leading out of the scenic Mineral King Valley provide access to high-altitude alpine areas. A stock pack station is near the valley trailhead. The area has been determined to have characteristics that make it eligible for wilderness except for the immediate road corridor and existing developments.

Wilderness studies for these areas by the parks could lead to wilderness recommendations that Congress could act on.

The Dillonwood area on the southern boundary of the park totals approximately 1,518 acres, 1,180 of which contain a sequoia grove. Access is provided by a dirt road from the Springville area. The area has been determined not to be eligible for wilderness.

Cultural Resources

HISTORICAL OVERVIEW OF THE PARKS

American Indians

When the present-day Sequoia and Kings Canyon National Parks were first inhabited is unclear. However, the possibility of Paleo-Indians' presence is postulated based on projectile point evidence dating from 12,000 B.C. to 9,000 B.C. By 1,000 B.C. human occupation in the parks is better documented, indicating more intensive use that continued into the historic period. European contact is dated to A.D. 1858 when Giant Forest was first visited by Hale Tharp, the first Euro-American to view the giant sequoia trees of this area.

Archeological evidence includes projectile points and tools of different cultural complexes and periods, pictographs and petroglyphs, small encampments and larger village sites, trade rendezvous places, granite bedrock mortars used to prepare acorns and other seeds, rock shelters associated with habitation sites, and so-called workshops where projectile points were manufactured from materials such as obsidian. In the historic period the Western Mono or Monache and the Eastern Mono or Owens Valley Paiute were known to occupy and frequent the park areas, as well as the Yokuts and Tubatulabal peoples. The Western Mono, who are linguistically related to the Eastern Mono, may have crossed the Sierra Nevada from east to west about A.D. 1500. Prehistorically and historically indigenous peoples used areas at higher elevations in the summer and lower elevations the rest of the year.

Euro-Americans

Euro-Americans first entered the southern Sierra Nevada during the late 1850s and early 1860s, building trails, grazing sheep and cattle, searching for gold and silver, and felling timber. Hale Tharp, who had begun raising cattle in the present-day Three Rivers vicinity, entered the

Giant Forest area in September 1858 — perhaps the first Euro-American to do so and guided by two young Potwishas. By 1861 Tharp had begun using Log Meadow as summer range for horses and later built a trail to the south end of the meadow to be used by his growing cattle herd.

The first record of a Euro-American entering the Kings Canyon area is from 1862, when John Hardin Thomas “discovered” what would later be known as the General Grant Tree. The influx of Euro-American settlers, prospectors, and loggers forced Native Americans to leave the Sequoia and Kings Canyon area by the mid-1860s. In 1870 settlers occupied the Fallen Monarch, a huge hollow log in what would become known as Grant Grove, operating a saloon within its confines.

Shepherders made the first commercial use of the Kings / Kaweah / Kern watersheds during the 1860s and 1870s, but prospectors also participated in the exploration and utilization of the watersheds. After years of futile efforts by prospectors to find valuable minerals, silver was discovered in 1873, touching off a rush to the Mineral King Valley. Prospectors eagerly filed mining claims, and the New England Tunnel and Smelting Company promoted development. Thomas Fowler, a prominent Californian, completed a toll road into the valley in 1879 and built a stamp mill and a tramway to the Empire Mine, but these ventures proved unprofitable. The toll road (the precursor of the present-day Mineral King Road) became public, but only a few summer tourists, attracted by the cool mountain air, continued to visit the valley.

Logging began soon after the first settlers arrived in the San Joaquin Valley; by the 1860s several small mills operated on the most accessible fringes of the coniferous forest. At first the mills served only local communities, but the completion of the Southern Pacific Railroad line in the mid-1870s opened more distant markets. Although pine and fir trees provided most of the lumber, many giant sequoias were cut to provide

shakes, fence posts, and grape stakes. In 1885 colonists associated with the utopian Kaweah Colony, under the leadership of Charles Keller, filed claims to lands in the Giant Forest vicinity and built the Colony Mill Road to provide access for sequoia logging operations. In 1889 log flumes were introduced, opening previously inaccessible timberlands to loggers. In 1890 the Kings River Lumber Company (later reorganized as the Sanger Lumber Company) began to ship timber via a long flume to Sanger, more than 50 miles away. During its operation this one company felled nearly every tree in the Converse Basin, once the finest stand of giant sequoias in existence.

John Muir first traveled into the southern Sierra Nevada in 1873. Two years later he traced the belt of giant sequoias south from the Mariposa Grove, crossing the North and Marble Forks of the Kaweah River and climbing into a “noble forest,” which he named the Giant Forest.

Establishment and Development of the National Parks

Shortly after John Muir’s visit, efforts to save the magnificent sequoias began. In 1880 four sections of the Grant Grove area were suspended from entry, temporarily prohibiting anyone from claiming the land under existing land laws. Sequoia National Park, the nation’s second national park, and General Grant National Park, the nation’s fourth national park, were established by Congress on September 25 and October 1, 1890, respectively. On the latter date, Sequoia National Park was tripled in size. On February 14, 1893, President Benjamin Harrison signed a proclamation establishing the Sierra Forest Reservation, an area of more than 4 million acres stretching from Yosemite National Park in the north to a point well south of Sequoia National Park.

Administration of the new national parks was assigned to the military. On June 7, 1891, Captain J. H. Dorst, Fourth United States Cavalry, established a camp outside the parks at Mineral King and became their first acting superintendent. In 1914 Walter Fry was

appointed as the first civilian superintendent of the two national parks.

During the early 20th century efforts were started to improve access to the national parks and to develop their recreational potential. In 1902 a contract was awarded to John Broder and Ralph Hopping, two local ranchers, to operate the first commercial transportation and camping facilities in Sequoia National Park. That same year a road was constructed to the “Big Trees” in Grant Grove; later this road would be rebuilt with alignment changes to form the Sequoia Lake Road. In 1903 the Colony Mill Road was improved and extended to Round Meadow and Moro Rock in Giant Forest under the direction of Captain Charles Young, the only African-American then holding a regular commission in the U.S. Army, and on May 24, 1904, the first automobile entered Giant Forest. In 1913 the first well-graded approach road to General Grant National Park was constructed, reaching the park from the south.

During the 1910s a simple commercial village developed near Round Meadow in the Giant Forest vicinity. Campgrounds were established at Giant Forest in 1920, and the first winter accommodations, as well as informal winter sports activities, were initiated here in 1922. By the end of the 1920s, a new Giant Forest village had taken shape around the Sentinel Tree, featuring a gasoline station, a lunch room that also served as a winter lodge, a market, and a new photography studio.

In 1926 Sequoia National Park was enlarged to include the Kern Canyon / Mount Whitney area, increasing the park’s area from 252 to 604 square miles. Samuel Pierpont Langley had conducted research on solar heat on the summit of Mount Whitney as early as 1881, and in 1909 the Smithsonian Institution had constructed a stone building on the peak’s summit to conduct solar heat observations.

The 1926 legislation also designated 25 square miles in the Mineral King area as the Sequoia National Game Refuge to protect the area’s wildlife that moved freely in and out of the

surrounding national park lands. The refuge was administered by the U.S. Forest Service.

Road construction during the 1920s and early 1930s made the national parks more accessible to automobile touring. In 1921 construction of Generals Highway began, and it took five years to build 18 miles from Ash Mountain (the site of the new park headquarters at the southern edge of Sequoia National Park) to Giant Forest. In 1932 the General Grant National Park section of the Generals Highway was completed, and in 1934 the picturesque inter-park highway was opened for automobile travel from Grant Grove to Ash Mountain. In 1929 construction started on a state highway from Grant Grove to Kings River Canyon.

In 1933 five Civilian Conservation Corps (CCC) camps were established in Sequoia National Park; later two more were added. Enrollees constructed campgrounds, trails, ranger stations, and other administrative facilities; landscaped roadsides; cut firewood; and controlled forest fires. Some of the notable CCC improvements included structures and trails in Giant Forest and Grant Grove villages, the rock work along Generals Highway, and the stone stairway on Moro Rock. An ice-skating rink at Lodgepole and a ski area at Wolverton were opened in 1934. In 1940 Crystal Cave, discovered by park employees in 1918, was opened to the public after the CCC constructed a trail and lighting system.

After a 50-year struggle Kings Canyon National Park was finally established on March 4, 1940. Its purpose was to protect some 710 square miles of scenic mountain and rugged canyon wilderness on the west slope of the Sierra Nevada, including the former General Grant National Park. Several months later the Redwood Mountain area north of Sequoia National Park was added to Kings Canyon. In 1943 the administration of Sequoia and Kings Canyon National Parks was unified as a wartime economy measure, an arrangement that continues to the present day. In 1965 the Cedar Grove area of the Kings Canyon, described by John Muir as a "rival to Yosemite," and Tehipite Valley were

added to Kings Canyon National Park to protect their valley floors from proposed water development projects for the expanding Los Angeles metropolitan area.

In 1976 Sequoia and Kings Canyon National Parks were among the first American national parks to be designated as international biosphere reserves under the Man and Biosphere Program of the United Nations Educational, Scientific, and Cultural Organization. Each biosphere reserve represents a specific ecosystem; a place for research, monitoring, and education; and a place where government policy makers, scientists, and local persons cooperate to manage land and water resources to meet human needs while conserving natural resources.

In 1978 Congress added the Mineral King area to Sequoia National Park, bringing an end to a 12-year fight. In 1966 the U.S. Forest Service, responding to greater demands for outdoor recreation, had granted Walt Disney Productions a preliminary planning permit for a year-round resort in the Mineral King Valley, which would include a Swiss-style village, ski-lifts to serve 20,000 skiers daily, and parking for 3,600 vehicles. However, the Sierra Club argued that Mineral King's value as wilderness made the valley worthy of national park status, and that development would cause irreversible damage. As a result of litigation that reached the U.S. Supreme Court, the California legislature's refusal to fund improvements of the Mineral King Road, and growing national public opposition to the plans, Disney dropped the resort plans, leading to the legislation adding the area to the park.

Nearly 70 years after John White (park superintendent 1920–1939 and 1941–1947) raised the issue that development was damaging the very sequoias that the parks had been established to protect, all overnight visitor facilities, including many locally significant historic structures, were removed from the Giant Forest area. Replacement facilities and lodging accommodations are being provided at Wuksachi, and the grove's natural setting is being rehabilitated.

On April 15, 2000, President William J. Clinton signed a proclamation creating the Giant Sequoia National Monument, consisting of two parcels of Sequoia National Forest. The northern parcel is bordered by the Kings Wild and Scenic River (authorized on November 3, 1987); the southern parcel by the North Fork of the Kern Wild and Scenic River (authorized on November 24, 1987).

ARCHEOLOGICAL RESOURCES

There are some 260 archeological sites known in the parks. About 4% of the parks' acreage (approximately 35,000 acres out of 864,000) has been surveyed for cultural resources. Most of the survey work has been in the parks' frontcountry, which is more easily accessible and where developments or projects are most often proposed (e.g., roads, campgrounds, overnight accommodations, and prescribed fires). Comparatively fewer backcountry projects have been carried out (excluding historic structure evaluations, trail surveys, and topic-specific research).

Both prehistoric and historic archeological sites can be found in the parks. Twenty-six archeological sites have been recorded that show obsidian fragments. Obsidian tools were highly prized for their sharpness and suggest trade since mineral analysis of the obsidian shows that some of it came from sources far away (Roper Wickstrom 1992). Sites in east-west passes like Taboose Pass in Kings Canyon National Park suggest trade routes, as well as the presence of women with children, because grinding stones have been found as evidence of food preparation. Also, stone structures thought to have served as hunting blinds as well as temporary shelters have been found. At least one site suggests evidence of use over many years because of the range of artifacts, from prehistoric stone tools to 19th century trade beads (1200 B.C. to A.D. 1850).

Human remains have been found in Crystal Cave, which were repatriated according to Native American consultation procedures in accordance with the Native American Graves and Repatriation Act. A newly published book

provides evidence of Yokuts traditional ethnographic interest in Crystal Cave (Despain 2003), which will be pursued as a topic of the parks' ongoing Native American consultations. Archeologically, one prehistoric bedrock mortar site for grinding seeds is located outside the entrance to Crystal Cave. Inside the cave, a charcoal hearth has been found that came "from a tree that died between [A.D] 1600 and 1820 . . . [and the hearth was located] near the largest entrance to Crystal Cave, in an area natural light has its farthest reach into the cave . . . [marking] the best place to start a fire to illuminate the next dark and to light torches for further exploration" (Despain 2003). Other than the historic remnants of CCC stone work at the Crystal Cave's entrance, there are no other known cultural resources associated with caves in the parks.

Two archeological sites are listed on the National Register of Historic Places:

- *Groenfeldt Site* — Listed March 30, 1978. This is a rock shelter of late prehistoric times with considerable human habitation. While the site is between Grant Grove and Giant Forest, it is in such remote and relatively steep terrain that visitors would probably find it only by accident.
- *Hospital Rock* — Listed August 29, 1977. Hospital Rock is a late prehistoric village site with pictographs, pottery, and evidence of human burials. Its historic components continue up to the time of European contact in the mid-19th century. However, any links between the prehistoric and the historic Indians who lived here are not well defined. Located at the point where Generals Highway begins its ascent to Giant Forest, this is a popular spot for visitors to picnic, use the comfort station, and take in the interpretive wayside exhibits.

HISTORIC STRUCTURES, DISTRICTS, AND CULTURAL LANDSCAPES

The wide range of cultural resources in Sequoia and Kings Canyon National Parks reflects the evolution of land use philosophy, from prehistoric human use of natural resources; through

Euro-American settlement, control, and extraction of resources; to the conservation and preservation movements of the late 19th and 20th centuries. According to the NPS thematic framework of American history and prehistory for studying and interpreting historic sites, four of the primary NPS history themes can be related to Sequoia and Kings Canyon National Parks:

- I. *Peopling Places* — human population movement and change through prehistoric and historic times, as well as the evolution and development of communities according to cultural norms, historical circumstances, and environmental contingencies
- III. *Expressing Cultural Values* — expressions of culture — people’s beliefs about themselves and the world they inhabit, as well as the ways that people communicate their moral and aesthetic values
- V. *Developing the American Economy* — ways Americans have worked and the ways they have materially sustained themselves by the processes of extraction, agriculture, production, distribution, and consumption of goods and services
- VII. *Transforming the Environment* — the variable and changing relationships between people and their environment

Historic sites, structures, and landscapes in Sequoia and Kings Canyon National Parks date from the late 19th century and extend to the post-World War II era. Site types include cabins, ranger stations, cattle and sheep camps, ranching sites, logging areas, mines, bridges, hydro-electric dams and flumes, trails, wagon roads, and early automobile roads and highways. Numerous structures relate to the development of the national parks under the direction of the National Park Service.

Historic Properties Listed on the National Register of Historic Places

Authorized by the National Historic Preservation Act of 1966, the National Register of Historic Places is the nation’s official list of districts, sites, buildings, structures, and objects in both public and private ownership that are significant

in American history, architecture, archeology, engineering, and culture. The following 20 historic structures and districts in Sequoia and Kings Canyon National Parks are listed on the national register, along with the date each was listed:

- Ash Mountain entrance sign — April 27, 1978
- Barton-Lackey cabin — March 30, 1978
- Cabin Creek ranger residence and dormitory — April 27, 1978
- Cattle cabin — September 15, 1977
- Gamlin cabin — March 8, 1977
- Generals Highway stone bridges (Clover Creek bridge, Marble Fork bridge) — September 13, 1978
- Giant Forest Lodge Historic District — May 5, 1978. During 1998–99, all structures in this historic district were removed.
- Giant Forest Village / Camp Kaweah Historic District — May 22, 1978. During 1998–99, the majority of the structures in this historic district, with the exception of the district ranger’s residence, the comfort station, and the market, were removed.
- Hockett Meadow ranger station (also includes a barn) — April 27, 1978
- Knapp’s cabin (also known as Artist’s Cabin) — December 20, 1978
- Mineral King Road Cultural Landscape District — October 24, 2003. Includes 52 buildings, 2 sites, and 4 structures that contribute to the district’s significance, along with 19 buildings and 1 structure that do not contribute to its significance. (Preliminary determination of eligibility studies identified mining, resource preservation [logging and early NPS history], recreation, and the modern environmental movement as themes contributing to the significance of the cultural landscape district.)
- Moro Rock stairway — December 29, 1978

- Pear Lake ski hut (also known as Pear Lake ranger station) — May 5, 1978
- Quinn ranger station — April 13, 1977
- Redwood Meadow ranger station (also includes barn) — April 13, 1978
- Shorty Lovelace Historic District — January 31, 1978. Includes Cloud Canyon, Vidette Meadow, Gardiner Creek, Woods Creek, and Granite Pass cabins.
- Smithsonian Institution shelter (also known as Mount Whitney summit shelter, Mount Whitney shelter) — March 8, 1977
- Squatter's cabin — March 8, 1977
- Tharp's Log — March 8, 1977
- Wilsonia Historic District — March 14, 1996. An inholding in the Grant Grove vicinity within Kings Canyon National Park, the historic district is composed of 139 buildings that contribute to the district's significance, as well as 73 non-contributing buildings.
- Lost Grove comfort station — December 8, 1997
- Redwood Mountain residence — December 8, 1997
- Kaweah hydroelectric plant no. 3 — March 21, 1990. Located near Three Rivers, this historic property includes three contributing structures (the powerhouse, the Marble Fork conduit, and the Marble Fork siphon and diversion dam).

Potential National Register Listings

Four historic districts in the parks are under consideration by the National Park Service for evaluation and potential nomination to the National Register of Historic Places. Formal evaluations are yet to be undertaken:

Ash Mountain Historic District — The National Park Service considers 17 buildings or structures as contributing to the significance of the potential historic district, and 38 buildings or structures do not contribute.

Lodgepole Historic District — The National Park Service considers four buildings or structures as contributing to the significance of the potential historic district and two buildings or structures as not.

Sycamore Civilian Conservation Corps Camp Historic District — The National Park Service considers four buildings or structures as contributing to the significance of the potential historic district. Trailers in this area do not contribute to the significance of the area.

Mission '66 Structures — While most historic sites, structures, and landscapes in the parks date from the late 19th century and extend through the 1940s, current studies are examining potentially eligible structures from the NPS Mission '66 construction program in the Ash Mountain, Lodgepole, and Grant Grove areas.

Historic Properties Determined Eligible for Listing on the National Register of Historic Places

Seven historic structures, features, and districts in Sequoia and Kings Canyon National Parks (along with their dates of determination) have been determined eligible for listing on the National Register of Historic Places by the California state historic preservation officer:

- Atwell Mill ranger station and garage — December 8, 1997
- Atwell mill site — 1976
- General Grant National Park Historic District — December 29, 1998. Includes 71 eligible buildings/structures (3 structures not eligible).
- Generals Highway (including Hospital Rock automobile watering stations and stone water fountain, and Tunnel Rock) — June 1992

Structures Determined Ineligible for the National Register

Three historic structures in Sequoia and Kings Canyon National Parks have been determined to be ineligible for listing on the National Register of Historic Places by the California state historic preservation officer. These properties, and the dates of their determinations, are:

- Muir hut (also known as Muir Pass shelter cabin) — September 15, 1976
- Beetle Rock assembly hall — August 5, 1994
- Sycamore Village shoeing shed — December 8, 1997

Historic Districts to be Removed from the National Register

In 1994 the California state historic preservation officer determined that additional resources in the Giant Forest area were eligible for listing on the National Register of Historic Places, including the Pinewood Shelter Camp Historic District, Lower Camp Kaweah Historic District, and various structures in the NPS Highland housing area. However, the National Park Service, the California state historic preservation officer, and the Advisory Council on Historic Preservation had executed a memorandum of agreement on August 21, 1978, providing for the removal of overnight facilities from Giant Forest that adversely affected the internationally significant natural values for which Sequoia National Park had been established to preserve. As previously mentioned, during 1998–99 all buildings (all of which had been determined to have local historical significance) were removed from the Giant Forest area, with the exception of the ranger’s residence, the comfort station, the market, and the Beetle Rock assembly hall. This action was taken pursuant to the memorandum of agreement between the National Park Service and the California state historic preservation officer, and it was accepted by the Advisory Council on Historic Preservation on September 25, 1995. The 1995 agreement was undertaken to provide for the restoration/rehabilitation of the natural conditions of the Giant Forest area

and the preservation of the internationally significant sequoias. The National Park Service intends to initiate actions to remove the Giant Forest Lodge and Giant Forest Village / Camp Kaweah Historic Districts from listing on the National Register of Historic Places.

The Beetle Rock assembly hall is to be retained for use as a center for public education and/or group events.

List of Classified Structures

Currently, 98 structures in the parks are on the parks’ List of Classified Structures (see appendix C). This list is an inventory of all structures with historical, architectural, or engineering significance and in which the National Park Service has or plans to acquire a legal interest. Structures may individually meet the criteria of the national register or may be contributing resources to sites and districts that meet national register criteria. Also included are other structures that have been moved or reconstructed, commemorative structures, and structures achieving significance within the last 50 years. These structures are to be managed as cultural resources because of management decisions made pursuant to the planning process.

CULTURAL LANDSCAPES

To date, one cultural landscape in Sequoia and Kings Canyon National Parks has been listed on the National Register of Historic Places. The Mineral King Road Cultural Landscape District is a historic vernacular landscape, and it was listed on October 24, 2003.

In 1998 the Cultural Landscapes Automated Inventory Management System database indicated that 10 parent landscapes and 13 component landscapes have been identified in the parks at the park reconnaissance survey stage. Studies are underway to identify and inventory additional cultural landscapes. Currently identified landscapes include:

- Ash Mountain Historic District
- Generals Highway

- Hospital Rock automobile watering stations
- Giant Forest
 - Giant Forest Lodge Historic District
 - Giant Forest Village / Camp Kaweah Historic District
 - Lodgepole
- Kern Ranger Station / Lewis Camp Area
 - Kern River Trail
- Mineral King Historic District
 - Early Trails
 - Empire Mine
 - Mineral King cabin community
 - Mineral King Road
 - New England Tunnel and Smelting Company
 - White Chief Mine
- Pear Lake
 - Pear Lake ski hut and ranger station
- Quinn ranger station
- Sycamore Village
- Wilsonia
- Cabin Creek ranger residence and dormitory

The May 2003 “National Park Service Cultural Landscapes Inventory” for Sequoia and Kings Canyon National Parks (NPS 2003c) made the following preliminary determinations about park landscapes:

- Landscapes that have lost their integrity:
 - Lodgepole
 - Hospital Rock
 - General Sherman Tree area
 - Giant Forest
 - Sycamore CCC camp
- Landscapes that have retained their integrity:
 - Generals Highway
 - Ash Mountain
 - Grant Grove
 - Crystal Cave
- Landscapes that may be found significant under the current Mission ‘66 study:

Potwisha campground
Buckeye Flat campground
Buckeye housing area

Because the evaluation process has not been completed, this environmental impact statement has evaluated impacts on all of these cultural landscapes as if they were eligible for listing on the National Register of Historic Places.

ETHNOGRAPHIC RESOURCES AND LANDSCAPES

An ethnographic resource is defined as “a site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (NPS 1997). Certain plants continue to be gathered and used by American Indian tribes near the parks, such as the Wuksachi Tribe; specific gathering spots have not been identified to date. Sites or areas with continuing importance to contemporary Native American groups and individuals include the rock art at the Hospital Rock picnic area and the Potwisha campground. (Federally recognized tribes are listed in appendix D.)

At the time of Spanish and American exploration and settlement in the early and middle 1800s, known Yokuts groups included the Chunut and the Tachi of the Tulare Lake region; the Chukaimina of the Squaw Valley area; the Wukchumni of the upper Kaweah River area, including Lemoncove and Three Rivers; and the Choinimi, Dumna, Kechayi, and Chukchansi of the northern foothills. On the west side of the Sierra were Paiute-related groups, the Western Mono or Monache. They are believed to have migrated over the mountains 400 to 500 years ago. The Monache groups included the Michahai, Wuksachi, Wobonuch, Entimbich, and Potwisha.

The Yokuts as well as Monache groups are known to have seasonally used general areas within the parks, and a newly published book provides evidence of the Yokuts’ traditional ethnographic interest in Crystal Cave. Historic

era contact and intermarriage among Yokuts and Monache groups occurred with some regularity, making the ethnographic picture more complex. Descendants of these groups can be found today on the Tule River Reservation, within the various Paiute reservations and communities of the Owens Valley, and interspersed within the larger communities of the foothills and central valley towns and cities on the west side of the parks. A handful of key ethnographic studies exist for Native American groups (Gayton 1929, 1930, 1948; Latta 1949; and Steward 1933, 1935), but a formal parks-specific ethnographic overview has not been conducted to date.

Ethnographic landscapes generally are larger in area and broader in scope than the vernacular or designed historic landscapes that are often considered under the category of cultural landscapes. No ethnographic landscapes have been identified thus far through consultations with American Indians and other neighbors of the parks.

To date no ethnographic resources have been identified as potentially eligible for listing on the National Register of Historic Places as traditional cultural properties. Ethnographic resources eligible for or listed on the national register are called traditional cultural properties. Such resources may be listed or eligible for listing because of their association with a living community's cultural practices or beliefs that are rooted in that community's heritage and history and because they are important to the continuity of the community's identity.

Consultations with American Indians and other neighbors of the parks will continue to identify possible ethnographic resources and landscapes for further learning and consideration. One such topic for ongoing Native American consultations is indigenous fire management. Possible indigenous fire-management areas could be considered as traditional cultural properties eligible for the national register and could be a topic of mutual interest for both a tribe and the National Park Service to share information about how such areas might best be managed.

The parks have completed their compliance with the provisions of the Native American Graves Protection and Repatriation Act.

MUSEUM COLLECTIONS AND ARCHIVES

Sequoia and Kings Canyon National Parks have maintained museum collections since the earliest days of the National Park Service. The collections support cultural and natural resource management and provide material for research by park staff and outside scholars. At present, the parks' museum collections and archives total approximately 340,000 items. A relatively small number of museum objects (about 200) are on exhibit to the public in the parks' various visitor centers.

Collections

The parks' museum collections document the archeology, biology (including wildlife biology and botany), geology, paleontology, ethnography, and history of the region.

- The archeology collection (some 22,000 artifacts) consists primarily of obsidian tools and debris, and also pottery (relatively rare on the western slope of the Sierra Nevada).
- The largest and most heavily used part of the biology collection (with 10,000 zoological or botanical specimens) is the herbarium, with examples of 1,200 of the 1,400 known plant species. Other collections preserve bird, insect, and mammal specimens. As these collections grow with ongoing inventory and monitoring efforts, they will help establish a baseline for species and their geographic distribution within the parks.
- The geology collection (300 specimens) consists primarily of minerals and formations from area caves.
- The paleontology collection (20 specimens) consists entirely of fossilized sequoia wood. The 17 sequoia fossils are from different parts of the world, such as Norway, Alaska,

and Washington State. The geologic conditions of the parks do not facilitate preservation of fossils.

- The ethnographic collection (30 artifacts) consists of a small but important group of historic, locally produced American Indian baskets.
- The history collection includes nearly 300,000 manuscripts and records associated with Euro-American exploration and settlement, local history, and park history. Other items include period uniforms, photographic albums, maps, and a miner's cache. A collection of 11,000 historic photographs documents both the natural and cultural environment of the parks.

Library

Museum staff maintain the parks' five branch libraries, which make available various scientific, regional, and park-specific works on natural and cultural resources. The libraries provide an opportunity for research and the preparation of visitor-education materials and programs.

Storage Conditions

Today, most of the parks' museum collections are housed in the headquarters at Ash Mountain. This is essentially a research and storage facility, not an exhibit space.

The museum collections storage area is approximately 600 square feet, which is inadequate and limited for the present collections. While temperature and humidity are regularly monitored and recorded, these are controlled by the thermostat for the building-wide heating and cooling

system. Temperature and humidity levels have proven to be fairly constant, and within NPS standards, perhaps, because this end of the building is partially built into an earthen bank.

Security and Fire Suppression Arrangements

The Ash Mountain facility is secure and well protected with keyed entry and an independent alarm system.

A fire suppression system is in place, and the collections and archives environment is closely monitored. This is especially important given that the Sequoia and Kings Canyon ecosystems are thoroughly co-adapted to fire. The primary collections storage area is equipped with an automated fire detection and suppression system employing a halon-substitute (ozone-depletion problems preclude the use of halon). Individual fire extinguishers are kept at other museum storage facilities. No original, irreplaceable objects from the collections are exhibited or stored under conditions not in full compliance with NPS fire-safety standards.

Future Needs

The primary concern for the continued well-being of museum collections is space. Both storage and workspace are at premium in the collections storage area, despite the installation of compressed shelving on movable tracks. The collections are certain to grow, especially with regard to collections linked to ongoing projects (e.g., the herbarium and the records of prescribed burns and wild fires); this will further exacerbate the space shortage. There is also a shortage of adequate workspace for researchers and for the curation of objects.

Transportation and Circulation

ROADWAY NETWORK IN AND AROUND THE PARKS

In 1988 a total of 83 roadways in Sequoia and Kings Canyon National Parks (including some roads to parking areas) were classified and numbered (NPS 1988). The discussion below describes important regional and park roadways.

Two regional highways provide access to Sequoia and Kings Canyon National Parks:

- California Highway 198 provides access from Visalia to the Foothills visitor center at Ash Mountain in Sequoia National Park. At Ash Mountain California 198 becomes Generals Highway, which provides most of the road access to Sequoia's main visitor interest areas. Generals Highway terminates at Kings Canyon Highway about 1 mile south of Grant Grove and east of the Big Stump entrance station.
- California 180 provides access from Fresno to the Big Stump entrance station in Kings Canyon National Park. At Big Stump California 180 continues into the park as the Kings Canyon Highway, leading through Grant Grove to the Cedar Grove area of Kings Canyon.

Kings Canyon Highway and Generals Highway are paved two-lane roads, characterized by 22-foot traveled ways. Shoulder widths vary, but are generally very narrow and unpaved. Both highways also have a fair number of vehicle turnouts at scenic viewpoints. Free-flow speeds on both highways vary from about 20 miles per hour (mph) on steep, winding sections to 35–40 mph on newer, flatter sections. Generals Highway provides access to private inholdings along the Big Meadow road and to USFS special use permit cabins at Hart Meadows. There is a large year-round resort at Montecito-Sequoia, and seasonal lodging and food service at Stony Creek that are accessed directly from Generals Highway. As previously stated, the Generals

Highway has been determined eligible for the National Register of Historic Places.

Mineral King Road intersects California 198 just south of the Ash Mountain entrance station and provides access to the Mineral King trailheads, camping areas, and several private inholdings. The first section of the road is outside the park and is under the jurisdiction of Tulare County; the remainder of the road is within Sequoia National Park. Mineral King Road is paved for 17 miles; the remaining 8 miles are a mix of paved sections around development and unpaved sections away from cabins and campgrounds. All of the unpaved sections are within the park. At higher elevations and within the park, the road is predominantly one lane and unpaved, with a speed limit of 10–20 mph. As previously stated, the Mineral King Road Cultural Landscape District has been listed on the National Register of Historic Places.

Two other roads follow the North and South Forks of the Kaweah River into the western side of Sequoia National Park. Both are two-lane paved roads that provide access to homes and other lands in the Three Rivers area. As the roads near the park, they become one-lane unpaved roads. Both roads terminate inside the park boundary, with a campground at the end of the South Fork road.

Other paved two-lane roads of substantial length within the park connect attractions, including Crystal Cave, Crescent Meadow / Moro Rock, Wolverton, Lodgepole, and Panoramic Point. Of these roads, Crescent Meadow / Moro Rock, Crystal Cave, and Panoramic Point are two-way but are not wide enough to allow a center stripe to demarcate two lanes. Wolverton Road has full 11-foot lanes in both directions and center striping. Other shorter roads to campgrounds, trailheads, viewpoints, and natural features throughout the parks are typically narrow and unpaved, with no shoulders. The Panoramic Point Road and Kings Canyon Highway, as well as portions of Mineral King Road, were paved in 2001. The

Wye, near Grant Grove, was replaced with a T intersection. Some roads were also improved in park developed areas.

The Moro Rock trail and Colony Mill Road (now a trail) have been determined eligible for the National Register of Historic Places. Other roads and trails will be identified, inventoried, and evaluated for listing eligibility.

VISITOR CIRCULATION IN THE PARKS

A comprehensive visitor survey was conducted for the parks in the winter and spring of 1998 and is documented in the “Transportation and Visitor Use Data Summary for Winter / Spring 1998 and Transportation Condition Assessment” (BRW, Inc., and Lee Engineering 1999).^{*} According to this survey, the distribution of visitors between the two primary entry routes was fairly even. About 60% of visitors left via the same gate they entered.

Data on areas visited showed that over 66% of visitors went to only one major activity area; no single activity area was a clear favorite. In fact, 10% of survey respondents had not visited any major activity areas during their stay. Surveys in the summer of 1997 showed slightly longer stays, as well as visits to more major activity areas per stay, than the winter / spring 1998 surveys. This finding is not unexpected, since families with school-age children probably limit their visits to weekends during non-summer months, and many activity areas are not accessible in the winter.

Visitors primarily travel to Sequoia and Kings Canyon National Parks by private vehicle; tour bus use has increased in recent years, but is still limited. Vehicular access is predominantly along the Generals Highway and the Kings Canyon Highway. The Mineral King Road and the North

Fork and South Fork roads also provide access to other park areas. All of these roads wind through foothills and mountainous forest areas and may provide challenging driving experiences for visitors. Vehicle length restrictions and advisories are intended to provide more pleasant experiences for all motorists and safer ones for those with larger vehicles. Roads may be closed due to weather conditions; the Mineral King and Cedar Grove areas are closed from winter through late spring.

TRANSPORTATION SERVICE QUALITY OF PARK ROADS

Road Use and Congestion

Traffic congestion and road use data are expressed here in four ways: length and classification of vehicles in the traffic stream, average daily traffic (ADT) on key road segments, peak-hour volumes and level of service (LOS) on key road segments, and peak-hour volumes and level of service at intersections.

Vehicle Length and Classification

Data on vehicle length and type were collected in 1997 for the “Visitor Use Survey” at the following locations:

1. Big Stump entrance on Kings Canyon Highway, inbound — length and classification
2. Generals Highway at the Giant Forest museum, northbound — length and classification
3. Mineral King entrance, inbound — classification only

Single vehicles on Generals Highway are restricted to a maximum length of 40 feet, and vehicles with trailers may not exceed 35 feet. The Park Service recommends that large vehicles use the Big Stump entrance because the horizontal and vertical curves along the northern portion of Generals Highway are not as sharp as those along the southern portion. Vehicles longer than 22 feet are discouraged from using Generals Highway between the Potwisha

^{*} Visitors were randomly sampled upon exiting the parks about their entry point, visit duration, and use of various roads and major activity areas, such as Giant Forest, Kings Canyon, or Mineral King. More than 1,400 surveys were collected over five days (three days in March and three days in May).

campground and the Giant Forest museum because of the numerous switchbacks. Table 6 summarizes vehicle lengths and Table 7 vehicle classifications.

Average Daily Traffic

Daily traffic volume counts were taken at 19 locations in and near the parks in the summer of 1997 and the winter and spring of 1998, but not all locations were counted in all three seasons. Data represent the daily average for a three-day count period at each location (see Figure 3). The California Department of Transportation (Caltrans) has also published 1997 ADT information for California Highways 180 and 198 showing annual average daily traffic for these highways. On California 180, just west of Kings Canyon National Park, the Caltrans ADT count was 1,400 in 1997, somewhat lower than the average three-day weekend volume reported in the NPS study. On California 198, just south of Mineral King Road, the Caltrans ADT count was 3,450, considerably higher than the count reported for the NPS study. The higher count could include local traffic in the Three Rivers community.

Peak-Hour Roadway Level of Service

Transportation service quality for recreational roads is commonly based on definitions in the Transportation Research Board’s *Highway Capacity Manual*. Uniform standards are used to

define and measure the operational performance of different types of roads by using the level of service (LOS) concept, as defined below:

- *LOS A* — free-flow traffic. Individual users are virtually unaffected by other vehicles on the road. Nearly all drivers are free to select their desired speeds and to maneuver within the traffic stream. The general levels of comfort and convenience for motorists, passengers, and pedestrians are excellent.
- *LOS B* — high-quality, stable traffic flow. The presence of other users begins to be noticeable to individual drivers. The freedom to select desired speeds is relatively high, but the freedom to maneuver within the traffic stream declines slightly from LOS A. The levels of comfort and convenience for individual travelers are somewhat less than at LOS A because the presence of others in the traffic stream begins to affect individual behavior. On a road operating at LOS B, slow-moving vehicles would delay a few drivers, especially on steep grades.
- *LOS C* — the beginning of traffic flow in which individual travelers are substantially affected by other vehicles in the traffic stream. The selection of speed by most users is affected by the presence of other vehicles. Maneuvering within the traffic stream requires substantial vigilance on the part of the driver. At LOS C slow-moving vehicles delay some drivers. The general

TABLE 6: VEHICLE LENGTHS

	Sample Size (veh)	Primary Vehicles			Primary Vehicles with a Trailer			
		<22'	22-30'	>30'	<22'	22-30'	30-40'	>40'
Big Stump Entrance	792	92%	3%	1%	1%	1%	1%	1%
Generals Highway at Moro Rock	649	96%	2%	0%	2%	0%	0%	0%

SOURCE: BRW Inc. and Lee Engineering 1999. Data collected by Traffic Analysis and Research, Inc.

TABLE 7: VEHICLE CLASSIFICATIONS

	Sample Size (veh)	Passenger Cars	Motorcycles	Pickups (w/ Camper), Vans (<22')	RVs (<22')	Commercial Buses	Single Unit Trucks	Semi-Trailers
Big Stump Entrance	792	92%	1%	2%	2%	1%	1%	1%
Generals Highway at Moro Rock	649	96%	0%	4%	0%	0%	0%	0%
Mineral King Entrance	49	98%	0%	2%	0%	0%	0%	0%

SOURCE: BRW Inc. and Lee Engineering 1999. Data collected by Traffic Analysis and Research, Inc.

level of comfort and convenience at this level is noticeably worse than at LOS B, and some park visitors may begin to consider their visitor experience compromised.

- *LOS D* — the upper end of traffic volumes that can be accommodated while maintaining stable traffic flow. Vehicle speeds and the freedom to maneuver are severely restricted for nearly all users. Drivers and pedestrians experience a poor level of comfort and convenience. Other vehicles delay most drivers, and some visitors perceive conditions as crowded.
- *LOS E* — operating conditions at or near the capacity of the roadway. All speeds are reduced to a low but relatively uniform level. There is virtually no freedom to maneuver within the traffic stream; traffic entering the stream usually requires that drivers already on the road voluntarily “give way.” Comfort and convenience levels are extremely poor, and driver frustration is high. Operations at this level are usually unstable, in that small increases in flow or minor disruptions within the traffic stream cause all traffic to stop. Delays and slow speeds create a noticeable negative visitor experience for most visitors.
- *LOS F* — forced flow. LOS F occurs when more traffic attempts to use a road segment than can be accommodated. Flow is extremely unstable. Long queues form in the traffic stream, and operations are characterized by stop-and-go waves, with vehicles perhaps progressing at reasonable speeds for several hundred feet, then stopping in cyclic fashion. At this level the experience is so compromised that many visitors may reconsider their route or destination and make comments about traffic problems to acquaintances or park officials.

The methods, measures, and empirical relationships developed for two-lane rural roads are the most applicable to the roads in Sequoia and Kings Canyon National Parks.

Driving in a park environment (especially where attractive natural scenery is visible from the car)

differs considerably from driving on a typical roadway. Driving in a park can be part of the visitor experience, and traffic often moves at speeds well below the legal limit. As such, the LOS results may understate traffic congestion, because the effects of drivers slowing or stopping in the roadway to look at scenery or read signs are not taken into account. The peak-hour level of service was evaluated for the morning and evening peak hours at all locations and seasons for which data were collected and are shown in Figure 4.

Intersection Level of Service

Level of service for intersections relates to the delays drivers encounter while waiting for an acceptable gap in opposing traffic. LOS estimates are based on information about specific turning movements at each intersection, and the level of service is determined from the total estimated delay for unsignalized intersections.

Four intersections along Generals Highway were analyzed — the Wye on Kings Canyon Highway, Lodgepole road, Wolverton Road, and Crescent Meadow / Moro Rock road. Vehicles were counted at each location in summer 1997 during the morning, midday, and evening peak hours (9–11 A.M., 12 noon–2 P.M., and 3–5 P.M.), and the volumes in the highest hour (four consecutive 15-minute periods) were chosen for analysis. All four intersections operated at LOS A or B (very low delays) in each peak hour.

Traffic Accidents

Traffic accident statistics on NPS roads are compiled in the Systemwide Traffic Accident Reporting System (STARS). The system assists in the compilation and analysis of high-accident locations. The most recent comprehensive study of road accidents was completed in 1995 and covered 1990 through 1993. The study reviewed the progress of the NPS traffic safety program and compared accident records with those from 1982 through 1984. The study identified 20 high-accident locations (18 road segments and 2 intersections) and made detailed recommendations to improve the two intersections. Table 8

shows the 1990–93 accident statistics for road-way segments and Table 9 for intersections.

When Generals Highway was designed and constructed in the 1920s and early 1930s, vehicles were fewer and smaller, so the road width and hairpin turns from Ash Mountain (milepost 1) to the Wolverton Road junction (milepost 19) were not as hazardous for drivers as they are today. Now larger vehicles often need to use part of the oncoming traffic lane to negotiate a turn, creating a safety risk.

Many accidents occurred at or near roadside pullouts and could be attributed to the pullout design and use. Most pullouts are on the fill side of the road, but traffic volumes and use patterns

indicate a need for more pullouts on the cut side of some roads. Poor design or marking creates a potential hazard in terms of sight distance, as well as for bicyclists and pedestrians.

Approximately 225 paved roadside turnout areas are used as slow-vehicle refuge areas, resting places, viewpoints for scenic resources, and winter chain-up areas; 165 of the turnouts are on Generals Highway. Most turnouts are 105–158 feet long and 10–20 feet wide, but some are as short as 52 feet, and less than 10 feet wide. Many more informal pullouts are unpaved shoulder areas created by years of continued use. Recent roadway construction projects have closed some pullouts and “formalized” others.

TABLE 8: HIGH-ACCIDENT ROADWAY SEGMENTS, 1/1/1990 TO 12/31/1993

High-Accident Roadway Segments	Milepost	Length (miles)	Accidents	Density (acc/mile)	Severity Index	Accident Rate (acc/mvmt)*
Generals Highway (Tunnel Rock)**	2.60–2.65	0.05	6	12.0	1.06	97.00
Generals Highway**	3.00–3.50	0.50	3	6.0	1.33	4.85
Generals Highway**	4.15–4.25	0.10	3	30.0	1.38	24.25
Generals Highway**	4.85–5.05	0.20	3	15.0	1.00	12.12
Generals Highway**	6.30–6.40	0.10	5	50.0	1.23	40.41
Generals Highway**	6.55–6.60	0.05	2	40.0	1.13	32.33
Generals Highway**	6.80–7.40	0.60	9	15.0	1.33	12.12
Generals Highway (Commissary Curve)	14.50–14.70	0.20	10	50.0	1.00	6.32
Generals Highway	14.85–15.08	0.20	3	15.0	1.44	10.85
Generals Highway (Buena Vista Point)	15.20–15.30	0.10	5	50.0	1.00	36.15
Generals Highway	15.60–16.40	0.80	6	7.5	1.06	5.42
Generals Highway	16.45–16.60	0.15	8	53.3	1.00	38.56
Generals Highway (Giant Forest)	16.80–17.50	0.70	22	31.4	1.25	21.10
Generals Highway (General Sherman Tree)	18.50–19.30	0.80	9	11.3	1.00	7.55
Generals Highway	24.10–24.90	0.80	2	2.5	1.00	2.38
Generals Highway	29.10–29.60	0.50	3	6.0	1.61	5.72
Generals Highway	45.25–45.40	0.15	2	13.3	1.00	11.51
Grant Tree Road	0.45–0.60	0.15	2	13.3	1.00	29.51

SOURCE: “Traffic Safety Program Review for Sequoia and Kings Canyon National Parks.”

* Road segment accident rates are expressed in terms of accidents per million vehicle-miles traveled.

** Because Generals Highway has been reconstructed from the Ash Mountain entrance to about milepost 11, the conditions at the first seven high-accident locations are no longer the same as during the 1990–93 study period.

TABLE 9: HIGH-ACCIDENT INTERSECTIONS

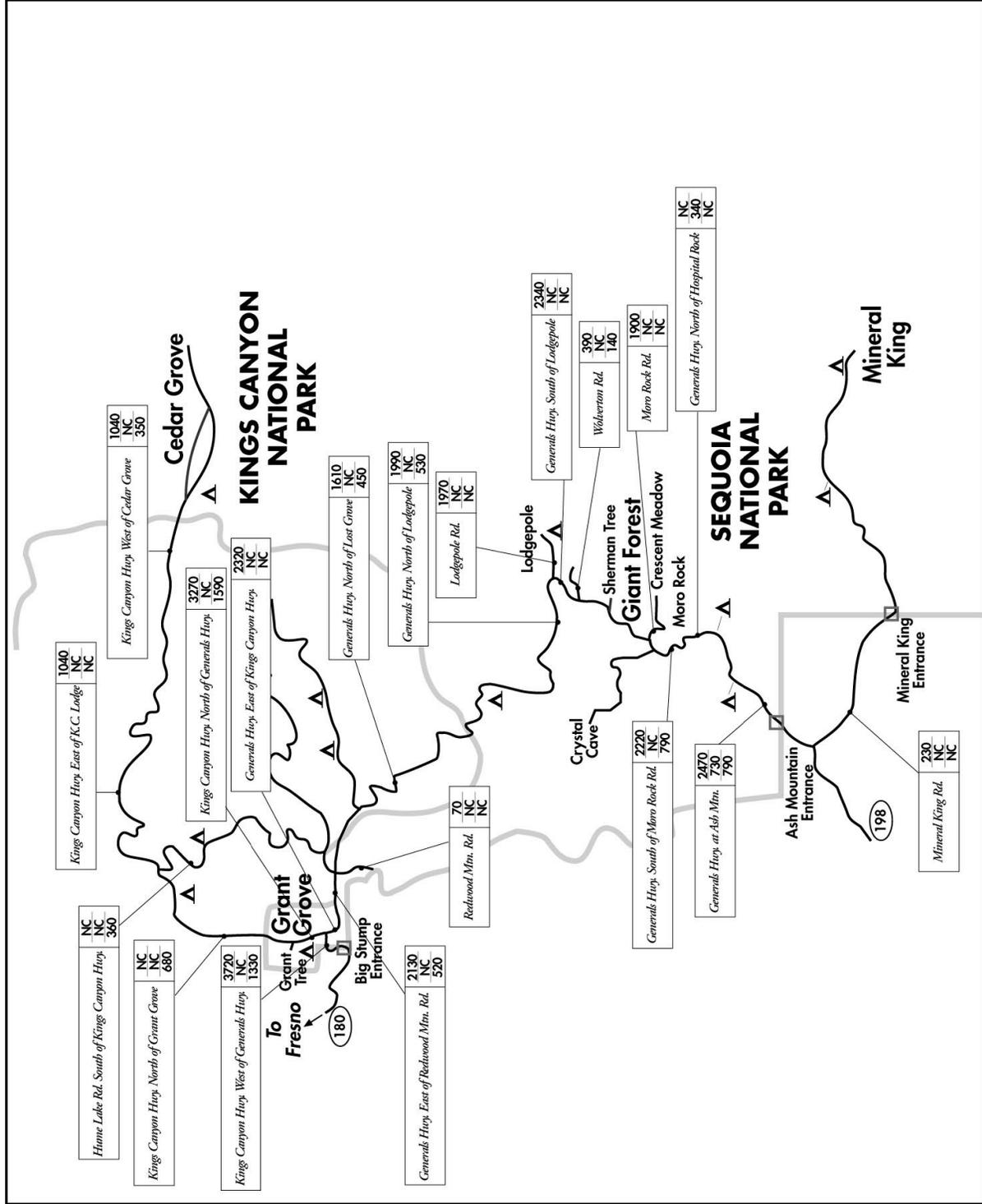
High Accident Intersections	Accidents	Average Daily Traffic	Accident Rate (acc/mve)*
Generals Highway at Lodgepole Campground	7	1,830	2.90
Generals Highway at Grant Grove Road (the Wye)**	9	1,590	4.30

SOURCE: “Traffic Safety Program Review for Sequoia and Kings Canyon National Parks.”

* Intersection accident rates are expressed in terms of accidents per million vehicles entering.

** The Wye intersection was reconstructed in summer 2002 to a new design, so a lower accident rate than observed in the 1990–93 study can be expected.

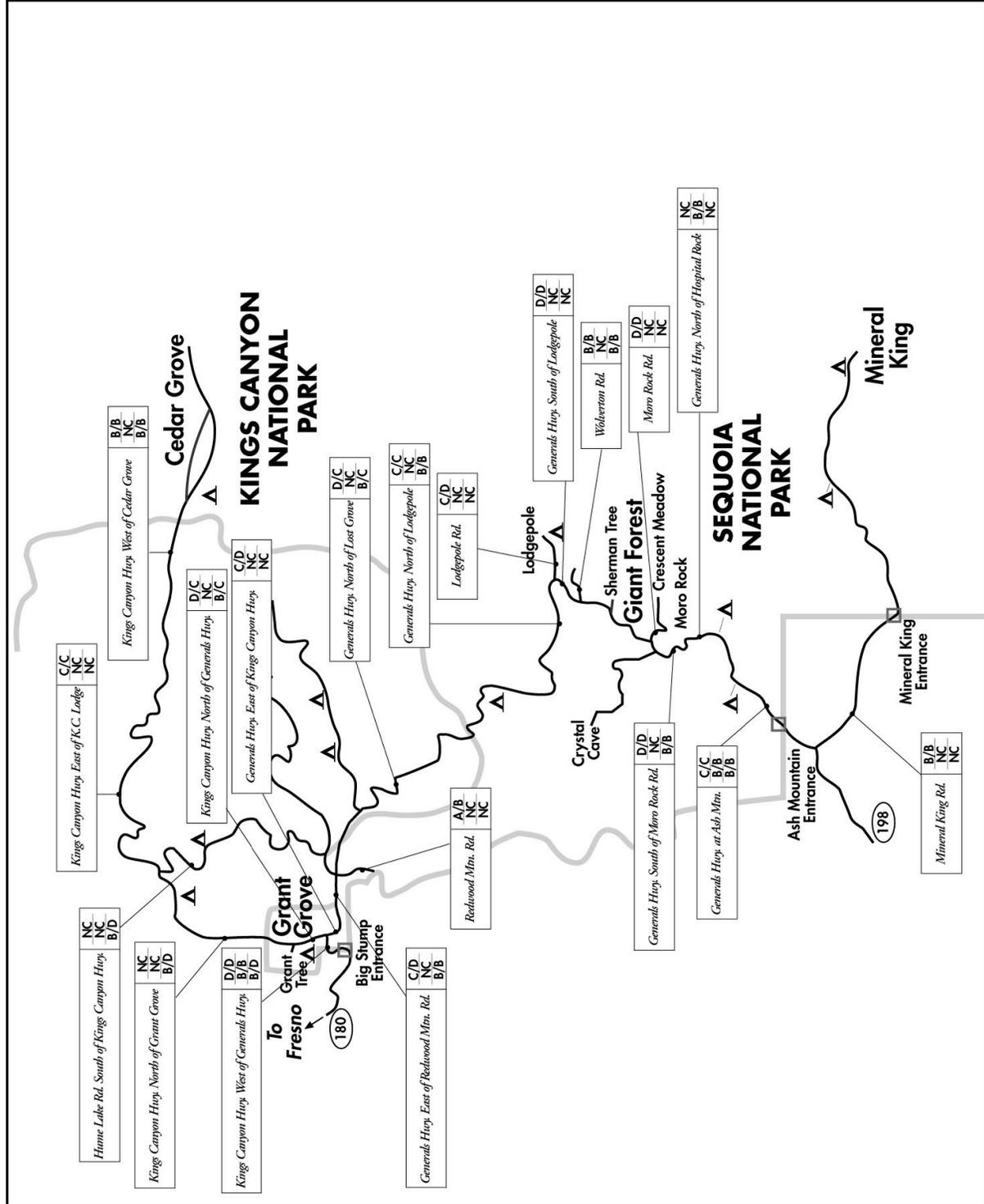
FIGURE 3: AVERAGE SEASONAL DAILY TRAFFIC (FRIDAY-SUNDAY)



Source: Lee Engineering and Traffic Research and Analysis



FIGURE 4: PEAK-HOUR LEVEL OF SERVICE



C/C AM/PM Peak Hour LOS (Summer 1997)
 B/B AM/PM Peak Hour LOS (Winter 1998)
 B/B AM/PM Peak Hour LOS (Spring 1998)
 NC Data Not Collected

LEGEND

- █ PARK BOUNDARY
- ROADS
- ▲ CAMPGROUNDS
- ENTRANCE STATIONS

Source: Lee Engineering and Traffic Research and Analysis



Planned and Ongoing Transportation Improvements

Reconstruction of Generals Highway

To address safety and operational problems, Generals Highway is being reconstructed. The traveled way is being widened to a consistent 22 feet (two 11-foot lanes), with a 1- to 2-foot paved shoulder on the cut side of the roadway, plus other improvements.

The reconstruction project improved several access roads and parking areas along the highway, including the power plant road, Chief Sequoia entrance sign parking area, the Sycamore Drive intersection, the Cammerer Way approach and parking area, and visitor parking areas at the Foothills visitor center. As part of the reconstruction, the one-lane, one-way bypass road at Tunnel Rock was reconstructed as a standard 22-foot road with 1-foot shoulders to accommodate two-way traffic.

The reconstruction project is also removing unsafe pullouts, improving (or formalizing) several existing informal pullouts, and correcting several sight-distance hazards. For pedestrian safety reasons, Generals Highway is scheduled to be rerouted at the General Sherman Tree so that the shuttle stop and the only parking area will be on the same side of the highway as the General Sherman Tree (east of the highway). In addition, the existing aerial power and telephone lines that run along the road are to be placed underground.

Previous pavement overlays have raised the roadbed over existing drainage ditches and catch basin inlets, creating a safety hazard at the edge of the roadway. Certain drainage features are being reconstructed to address this problem.

Other Road Improvements

A structurally deficient bridge at Cedar Grove needs to be replaced.

PARKING

Existing Conditions

Sequoia and Kings Canyon National Parks have at least 37 parking areas. Parking is provided at most major activity areas and attractions, as well as most trailheads. Some areas have recurring capacity problems, and the capacity of some lots is diminished by snow accumulation.

The 1998 “Visitor Use Study” examined occupancy (spaces used at a given time), duration (length of time a single vehicle is parked), and turnover (number of times a space is used in a given time) at 19 lots with an approximate total capacity of 900 spaces (capacity was not measured at two of the lots). Of the lots studied, those at General Sherman Tree (including the roadside pullout), Big Stump, and the Grant Grove visitor center all overflowed at least once during the study period (BRW, Inc., and Lee Engineering 1999). The lot at General Sherman Tree has perhaps the most severe shortage; this lot is scheduled to close (see “Planned and Ongoing Parking Improvements” below).

Parking activity at trailhead locations is characterized by longer stays and lower turnover, as hikers tend to spend more time out of their cars than do other visitors. While parking at Mineral King Valley trailheads exceeds demand on some summer holidays, the rest of the trailhead parking areas do not exhibit capacity problems, even during the busiest summer months.

When parking overflows, safety, resource preservation, and visitor experience problems occur. Visitors unable to find a space in a designated parking area may either park in an undesignated area or leave the area without being able to see the attraction. Undesignated parking creates a safety problem when parked vehicles block traveled ways or access to routes or amenities. Such blocking of travel lanes is a particular problem at roadside turnouts, especially those on the primary roads in the parks. The winding character of these roads limits sight distance, and parked vehicles even partially blocking the road can present a potentially serious hazard. Vehicles parked outside designated areas may

also park on or near sensitive resources and cause damage. Visitors who are unable to experience an attraction or are forced to wait because of parking capacity deficiencies are probably more likely to have negative impressions of their visit.

Planned and Ongoing Parking Improvements

Since the 1998 “Visitor Use Study,” new parking has been planned for the Giant Forest museum parking and museum overflow parking areas. The museum parking area would be open year-round with 107 spaces for cars, 2 spaces for visitors with disabilities, and 10 spaces for buses or RVs. The overflow parking area would be open from late May through September (depending on snowfall) and would accommodate

approximately 71 cars. Additionally, adjacent to the museum are two government vehicle parking spaces and seven spaces for visitors with disabilities. Near General Sherman Tree, all parking is to be removed and a new, larger parking area (called Upper Sherman Tree) is to be provided near Wolverton Road. This area would have 230 vehicle spaces, 5 spaces for visitors with disabilities, and 12 spaces for buses or RVs; a safe pedestrian trail would provide access to the General Sherman Tree. The Pinewood picnic area would have 34 vehicle spaces and 2 spaces for visitors with disabilities.

Wuksachi village was not completed when the 1998 “Visitor Use Study” was undertaken, so parking capacity and occupancy data were not available. All parking to support future buildout at Wuksachi has been completed, and no additional parking is anticipated on the site.

Visitor Experience

Visitor experiences in the parks include many different elements — the character of the parks, the visitation patterns, educational and recreational opportunities, and visitor services, as well as affordability.

PARK CHARACTER

Park character is comprised of both the setting (the natural and built environment) and the human activities that are associated with it. There are rustic, basic, and traditional components of park character at Sequoia and Kings Canyon.

- *Rustic* refers to the character and quality of the built environment (both site and architecture) as maintained by various guidelines. Visitors continue to enjoy park facilities and site elements evoking the CCC era. New public use facilities continue this rustic heritage. Rustic architecture often uses natural materials such as wood and rough, irregular, and occasionally massive stonework. Building forms are generally simple and small, with steeper roof lines, some overscaled and textured elements, as well as informal wrought-iron metal work. Signs, benches, fencing, drinking fountains, walls, overlooks, pavement, bridges, and other site elements may also reflect a rustic character.
- *Basic* character of the parks includes the setting and customary or historical activities (hiking, camping, lodging, backcountry use, and scenic driving through the parks). Other established activities include cave tours, winter recreation, water play, and fishing. Visitors have access to many areas with examples of natural and cultural resources for which the park is significant — sequoia groves, designated wilderness, range of ecosystems and terrain (from foothills to alpine), regionally or locally significant historic structures or districts, wild and scenic rivers, and caves. While basic activities remain, some facilities related to these

established activities may have been moved or modified to improve resource conditions or experiences and to meet newer laws and policy. For example, campgrounds, lodging, and other facilities were removed from the Giant Forest to restore the sequoia grove. Backcountry use permits are required so that use can be dispersed and tracked. More space is being provided between campsites when campgrounds are redeveloped to improve experiences. Some visitor facilities have been made more accessible to users with disabilities.

- *Traditional* patterns of use that date from the late 1890s through the 1960s continue, but in very modified forms. Hiking, stock, and vehicles are still the three primary ways that people enjoy the parks. But in the first half of the 20th century smaller groups visited the parks and stayed overnight for longer periods of time. Since the 1960s new groups of visitors are using the parks. Backcountry use peaked in the 1970s. The regional population has doubled since 1980 and is expected to double again within 10 years. Changing vacation patterns have resulted in shorter and more numerous vacations, more day use, and increased spring and fall use. Overnight visitors stay for shorter periods in both the front- and backcountry. While the backcountry still comprises approximately 97% of the land in the parks, backcountry use accounts for only 2%–3% of the visitation. While virtually all visitors continue to arrive by private vehicles, there has also been an increase in tour buses. Grant Grove is congested during the summer, with driving experiences similar to urban areas. Waits and delays of up to a half hour are common at the Big Stump entrance station during summer. Parking at Lodgepole is inadequate during summer. To protect resources, visitors are no longer permitted to park in sensitive sites such as meadows, so finding a parking spot may be difficult during high-use times. Giant Forest is now a day use area — a significant change from its past

overnight uses. The conversion of Giant Forest to a day-use area has resulted in the replacement of parking; eventually a summer shuttle system will be required. Recreational stock use has declined substantially since 1955 and is more regulated to protect resources. Recreational communities, comprised of privately owned cabins, continue but are subject to land protection plans, easements, and permit conditions.

VISITATION

Visitation is estimated by multiplying the number of vehicles entering by an average number of passengers per vehicle, currently estimated at 2.3. Counting the number of visitors is complicated because there are two parks with multiple entrance stations, and visitors can be double counted or not counted at all. The primary entrances are at Big Stump and Ash Mountain. Other access points by way of local roads do not have entrance stations — North Fork, South Fork, Redwood Canyon, Mineral King, and Dillonwood. In 1992 the counting procedures

were changed to reduce the likelihood of double counting. A further complication is that visitors to the northern unit of Giant Sequoia National Monument and some of Sequoia National Forest areas must pass through the park’s Big Stump entrance station.

As shown in Table 10, annual visitation has fluctuated over the last two decades, reaching a high of 2.2 million in 1987 and 1991. Visitation in 2001 was estimated at 1.4 million. The lowest visitation recorded over the 20-year period was 1.35 million in 1996.

VISITOR USE PATTERNS

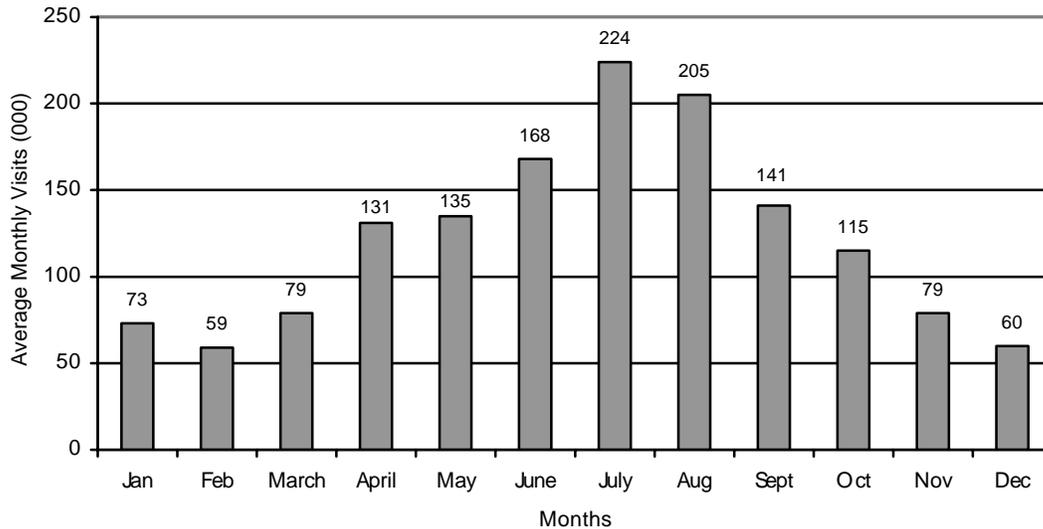
Visitation is heavily seasonal, with most visits occurring in the summer months. Figure 5 shows average visitation trends graphically. July and August are typically the most popular months, followed by June, May, September, and October. Winter use depends on the weather and snow conditions, with the lowest visitation levels in December, January, and February.

TABLE 10: SUMMARY OF ANNUAL VISITATION, 1985–2004

Year	Kings Canyon National Park		Sequoia National Park		Total for Both Parks		Comments
	Actual Use	Percentage Change	Actual Use	Percentage Change	Actual Use	Percentage Change	
1985	874,456		939,486		1,813,942		
1986	1,028,785	17.6%	1,056,527	12.5%	2,085,312	15.0%	
1987	1,081,172	5.1%	1,139,389	7.8%	2,220,561	6.5%	
1988	1,007,695	-6.8%	1,031,129	-9.5%	2,038,824	-8.2%	
1989	1,037,349	2.9%	1,056,020	2.4%	2,093,369	2.7%	
1990	1,062,867	2.5%	1,063,538	0.7%	2,126,405	1.6%	
1991	1,120,278	5.4%	1,120,278	5.3%	2,240,556	5.4%	
1992	637,446	-43.1%	961,095	-14.2%	1,598,541	-28.7%	Counting procedures changed
1993	636,515	-0.2%	1,066,649	11.0%	1,703,164	6.5%	
1994	725,930	14.1%	1,034,133	-3.1%	1,760,063	3.3%	
1995	832,794	14.7%	844,582	-18.3%	1,677,376	-4.7%	Road construction begins on Generals Highway
1996	502,749	-39.6%	838,060	-0.8%	1,340,809	-20.1%	
1997	484,718	-3.6%	1,008,931	20.4%	1,493,649	11.4%	
1998	540,212	11.5%	861,663	-14.6%	1,401,875	-6.1%	Giant Forest Lodge closed
1999	559,534	3.6%	873,229	1.3%	1,432,763	2.2%	
2000	528,987	-5.5%	838,947	-4.1%	1,367,934	-4.5%	
2001	541,787	2.4%	870,327	3.7%	1,412,114	3.2%	
2002	545,420	0.7%	920,292	5.7%	1,465,712	3.8%	
2003	555,987	1.9%	979,297	6.4%	1,535,284	4.8%	
2004	525,035	-5.6%	1,000,177	2.1%	1,525,212	-0.7%	

SOURCE: NPS Statistics Office, 1979–2004 data.

FIGURE 5: AVERAGE VISITS BY MONTH TO SEQUOIA AND KINGS CANYON — 1992–2001



SOURCE: <http://www2.nature.nps.gov/stats/>

Dispersal of Visitation

Frontcountry areas (about 2.5% of the parks) receive around 98% of the use, and backcountry areas about 2%. These roadless areas can only be reached by trails and include designated wilderness. This relationship means that heavily used frontcountry areas are likely to be crowded, especially during the summer. Crowding in the backcountry is a different order of magnitude, and just seeing other backcountry users can be perceived as too many people for some visitors.

Length of Stay

In summer 1997 a survey was conducted to determine the length of visitor stays; visitors were surveyed as they left the park at either Ash Mountain, Big Stump, or Mineral King. A comparable survey of spring visitors was conducted in March and May 1998. About 45% of summer visitors exiting at Ash Mountain, Big Stump, or Mineral King were day visitors who stayed an average of 4.5 hours (BRW and Lee Engineering 1998). About 14.6% stayed two days, and 14% three days. About a quarter of all visitors stayed four days or longer. The overall

average summer length of stays in the parks was 2.6 days. Mineral King visitors tend to stay longer, and more than half stay longer than three days.

Summer use contrasts sharply with use during other times of the year. In spring the majority of visitors (78%) are day visitors, while 19% stay two or three days, and only about 4% four days or longer (BRW and Lee Engineering 1999).

Population growth in the Central Valley and changing visitor populations have resulted in different park uses. Historically park visitors came for longer periods (a week), were predominantly Caucasian, well educated, included smaller size nuclear families or same-age backpacking groups, and were interested in hiking and seeing resources for which the parks are known. Observation and surveys suggest that the visitor mix now includes more diverse racial groups, more multi-generational groups, and larger families. Larger family camping, picnicking, and day use facilities are in demand.

Opportunities for Visitors with Disabilities

Because of the rugged terrain in the parks, all caves, and most alpine areas, natural features, and trails are inaccessible to a great many users with disabilities. Accessible parking is striped/signed at paved parking lots. Projects to make comfort stations and visitor centers more accessible are programmed. At renovated campgrounds sites are being provided that meet new accessibility guidelines. Stock use could provide accessibility for users with disabilities in both the front- and backcountry, and one stock concessioner has made modifications to accommodate disabled users.

VISITOR PROFILE

A 1994–95 visitor use survey revealed the following visitor profile (NPS 1995e):

- Respondents were highly educated: 20% had completed graduate school, another 41% were college graduates, and an additional 20% had completed some college.
- Of the survey respondents 83% listed themselves as white, 9% Hispanic, and 8% other groups.
- Visitors speak a variety of languages — 80% English, 7% German, 6% Spanish, and French more than 1%.
- Families were the predominant group type, with nearly 39% of the respondents visiting as a family with children and 28% as family groups without children. Family and friends groups accounted for almost 14% of the respondents. Groups of friends made up 12% of the total, and people visiting alone were only 5% of the groups.
- About 8.5% of the respondents had some form of impairment (mobility, vision, hearing, other) that limited their visit.
- Visitor origins were as follows: 62% from California; 2% each from New York and Texas; 1% each from Alabama, Arizona,

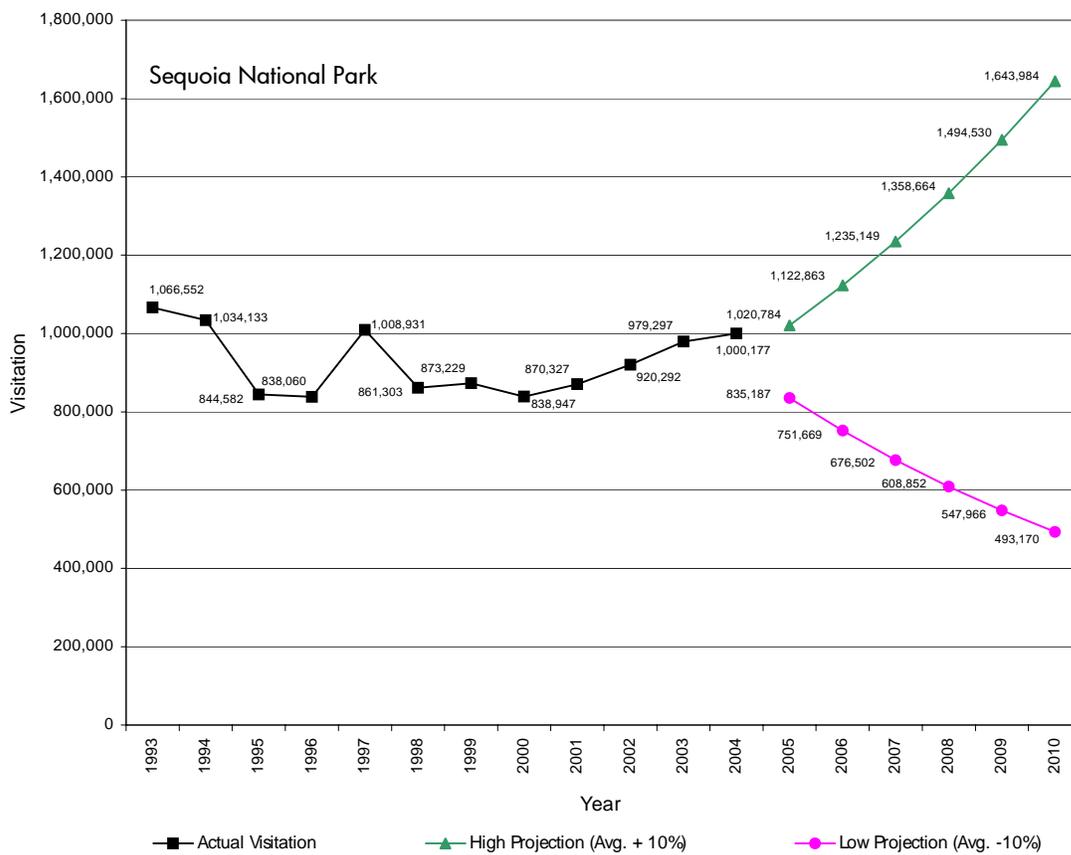
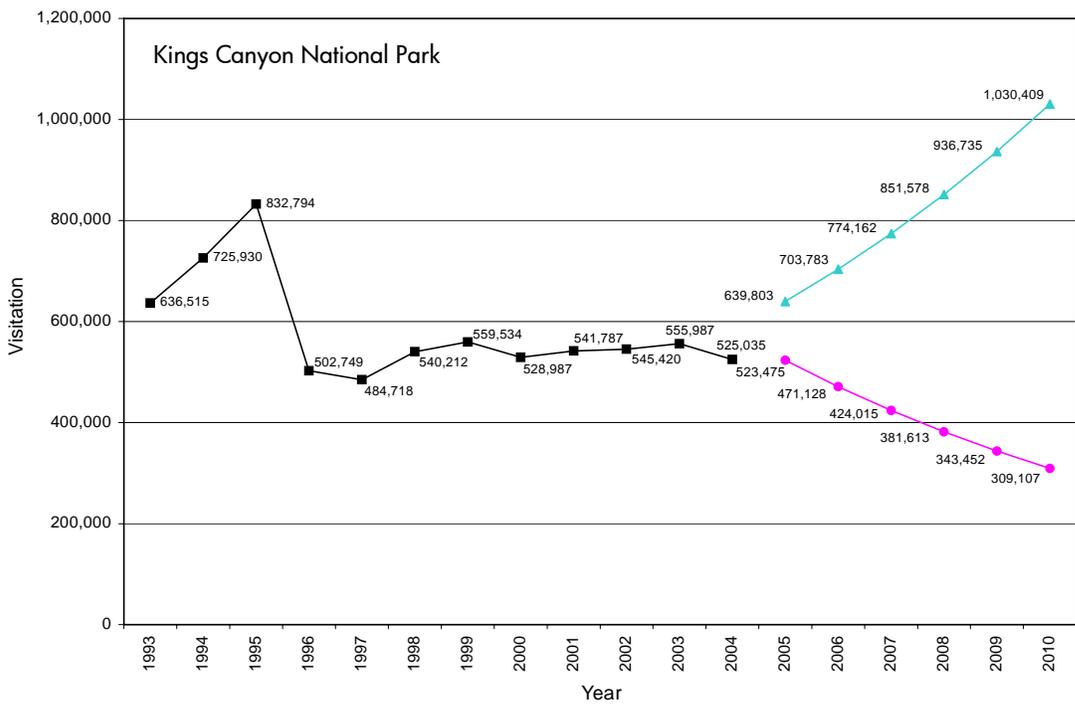
Connecticut, Florida, Illinois, Maryland, Michigan, Missouri, Ohio, New Jersey, Pennsylvania, Utah, Washington, and Wisconsin; 6% came from other states; and 14% from other countries. Regarding the foreign visitors origins: 35 % came from Germany, 16% from the United Kingdom, 12% from Switzerland, 11% from the Netherlands, 13% from other European countries, and 13% from other countries.

- Sequoia and Kings Canyon were the trip destinations for 79% of the respondents.
- First-time visitors were 45% of those interviewed, and the rest were repeat visitors, with 14% having visited the park 10 or more times.
- Of the respondents, 51% entered at Ash Mountain, 46% at Big Stump, 2% at Mineral King, and 1% at other places.

VISITOR USE PROJECTIONS

In 1993 errors in how the parks were counting visitors were corrected. Unreliable traffic counters have been a continuing problem, and caution must be exercised when forecasting future visitor use. Historically, the data show a slight downward trend in visitation: an average of -0.5% for Kings Canyon and -1.0% for Sequoia from 1993 to 2000. For future projections, it was assumed that visitation growth would likely fall within a plus 10% to a minus 10% range (a simple linear projection), and that the average visitation for the past eight years (605,666 for Kings Canyon and 920,762 for Sequoia) were reasonable starting positions. The projections shown in Figure 6 offer a reasonable forecast of visitation one to five years into the future. It is unlikely that visitor use would either rise or fall at a steady 10% rate or remain exactly the same over the next few years. A more likely scenario would be random increases or decreases from year to year averaging 1% to 3% over a five-year period, with extraordinary spikes of plus or minus 10%, much like the patterns of the actual visitor use data.

FIGURE 6: ACTUAL AND PROJECTED VISITATION



SOURCE: Historical data from NPS, Public Use Statistics Office, WASO-TNT.

EDUCATIONAL OPPORTUNITIES

Educational Facilities

Visitor educational facilities interpret different aspects of the parks. The Cedar Grove visitor center provides an information desk and a sales area, but no interpretive exhibits. The Kings Canyon visitor center interprets the cultural and natural history of Kings Canyon National Park. The Lodgepole visitor center focuses on the forests and alpine regions, and the Walter Fry Nature Center at Lodgepole has numerous interactive exhibits, many especially appealing to children. A historic building is being adaptively reused as the Giant Forest museum, with a focus on sequoias. The Beetle Rock education center in the former assembly hall serves group needs. The recently remodeled Foothills visitor center at Ash Mountain focuses interpretation on the foothills environment. The Mineral King visitor contact station interprets a variety of historic stories and natural features.

Interpretation, Waysides, and Exhibits

Educational programs include ranger-led walks, campfire programs, Junior Ranger programs, and exhibits at the Grant Grove, Lodgepole, and Foothills visitor centers, the Mineral King ranger / visitor contact station, and the Walter Fry Nature Center. There are fewer interpretive walks and programs than in the past. Interpretive media include the park newspaper, limited numbers of waysides at park features such as the Sherman and Grant trees, and self-guided literature (the Grant Tree area and the Big Stump Basin near Grant Grove village, and Congress Trail, Hazelwood, and Big Trees Trail at Round Meadow in Giant Forest). Recently, wayside exhibits have been added to explain the move from Giant Forest. The Sequoia Natural History Association also provides educational seminars, guided activities, and overnight trips, as well as running bookstores in park visitor centers and educational tours of Crystal Cave.

Visitor Outreach

The park has a small community outreach program, providing information and programs to those outside the parks. Interpretive staff visit schools and community groups in the region, provide environmental education programs for schools at the parks in the spring and fall, and work with educational partners such as the Heritage Project and the University of California, Merced.

RECREATIONAL OPPORTUNITIES

Recreational opportunities are provided in a range of front- and backcountry settings — foothills, canyons, wild and scenic rivers, granite domes, caves, chaparral, sequoia groves, mountain meadows, pine/fir forests, and alpine areas. While trail-based activities are the most common, other activities are allowed or facilitated.

Historically established activities include hiking, backpacking, horseback riding / pack trips, caving, picnicking, fishing, sightseeing, late season water play in rivers, and some use of nonmotorized watercraft. Several types of guided Crystal Cave tours are available for a fee through the Sequoia Natural History Association. The parks also have three concession-operated stables / pack stations that offer a variety of riding and backcountry packing services. Commercial business permits are issued to service providers of pack operations (horse, mule, llama), backpacking, and guided hiking or ski tour trips.

Additional Activity Information

Stock Opportunities

Stock use is allowed in the parks with regulation, and a monitoring program based on standards and indicators has been established that has allowed both administrative and other stock use to continue at sustainable levels. Stables and corrals where horses or mules may be rented for guided day or backcountry use include Cedar Grove, Grant Grove, and Mineral King. Pack operations at Wolverton were suspended in 2002 due to safety considerations and other uses for the site.

The operation would be relocated if an appropriate site could be found.

Stock use trails may be heavily eroded in some frontcountry areas like Wolverton / Giant Forest. There are three kinds of stock use — commercial, private, and administrative. Monitoring and research are continuing to define the stock carrying capacity of areas (the use an area is capable of supporting without resource impairment). Current regulations open and close meadows based on precipitation, residual forage, and use. Trailhead and backcountry rangers record data on stock use, along with mailback cards available at wilderness permit-issuing stations. Around half of the stock users enter from adjacent USFS areas, so not all stock use may be reported.

Facilities for Stock Use. Many backcountry trails were built and are maintained to standards needed for stock use. Other facilities include hitch posts, drift fences, bridges, and parking sized for stock trailers at trailheads.

Type of Stock. Horses, mules, burros, and llamas are the only stock permitted. No other domestic animals are allowed. Goats are not allowed because bighorn sheep populations are extremely vulnerable to introduced disease.

Winter Use

Cross-country skiing, snow play, snowshoeing, and sledding are popular activities for regional visitors. Both Grant Grove and Wolverton have snow play areas that attract hundreds of users. Cross-country skis and snowshoes can be rented at Grant Grove and Wuksachi, and cross-country ski lessons are provided at Lodgepole. Lower winter use levels mean visitors may find solitude once they are outside the heavily used snowplay areas. Snowmobiles are allowed on private roads for use by inholders and on public roads for permit holders to reach their cabins.

Fishing

Sport fish were stocked in previously fishless backcountry lakes beginning in the 1870s and

have contaminated native fish stocks in the rivers (Knapp 1996). Sport fish are being removed from some areas. Recreational fishing occurs in the Marble and Middle Forks of the Kaweah River and the South Fork of the Kings River, as well as in backcountry lakes and streams. Fishing is highly regulated, but is not supported by any facilities.

Activities on Adjacent Federal and Private Land

Some visitors enjoy activities in the adjacent national forests and Giant Sequoia National Monument. Backcountry trailheads that provide access to the parks include the very popular Mount Whitney trailhead in Inyo National Forest. Boat and bicycle rentals are available at Hume Lake, which is also a popular swimming and fishing location. Boyden Cave provides guided tours for a fee. Montecito-Sequoia Lodge offers a variety of recreational programs, including winter activities and guided programs. Hunting, camping, fishing, and snowmobiling are allowed on USFS land, but hunting and snowmobiling are not allowed in the park. However, most of the national forest was designated as Giant Sequoia National Monument in April 2000, and it is managed under a plan completed in 2003.

Trail Systems

Hiking is the most common recreational activity, with the extensive trail system and opportunities for cross-country exploration attracting hikers from around the world. Because the parks' elevation ranges from 1,300 feet to over 14,000 feet, trails are often very steep, and elevation changes may negatively affect the capability and health of some visitors. There are 89.5 miles of maintained trails in the frontcountry — 42 miles in the low-use frontcountry zone, 40 miles in the high-use frontcountry zone, 2.5 miles in the high-use scenic driving zone, and 5 miles in the development zone (see Table 11 for locations). In very heavily used areas, some frontcountry trails are paved and edged by fencing to protect adjacent soil and vegetation. There are 728 miles of maintained trails in the backcountry, plus an additional 114.4 miles of abandoned and unmaintained trails, for a total of 842.4 miles of backcountry trails. Because of the terrain, very few trails are accessible to visitors with disabilities.

Backcountry Use

Backcountry users hike to their destinations or use horses, mules, burros, and llamas. Commercial operators also carry packs to predetermined campsites while their clients hike in. Fees are charged for overnight backcountry permits (both hiking and stock trips). Permits are issued at five areas (Cedar Grove, Grant Grove, Lodgepole, Ash Mountain, and Mineral King). There are 42 trailheads (25 in the parks and 17 on adjacent USFS lands) that provide 852 parking spaces for backcountry users. The number of visits by backcountry users has declined since 1992, according to backcountry permits, as shown in Figure 7.

In 2001 there were 23,099 users; the average hiker group size was 2.91, and the average

number of people in stock parties was 5. Most of the backcountry is untrailed, and experienced visitors can hike or ride cross-country where permitted. Some high-use backcountry areas have designated campsites with bear-proof food storage boxes and toilets to protect resources and visitors. There is one high Sierra camp at Bearpaw Meadow, a concessioner run tent-hotel that provides food service and showers. August is the most popular month for backcountry use, followed by July and September, June and October.

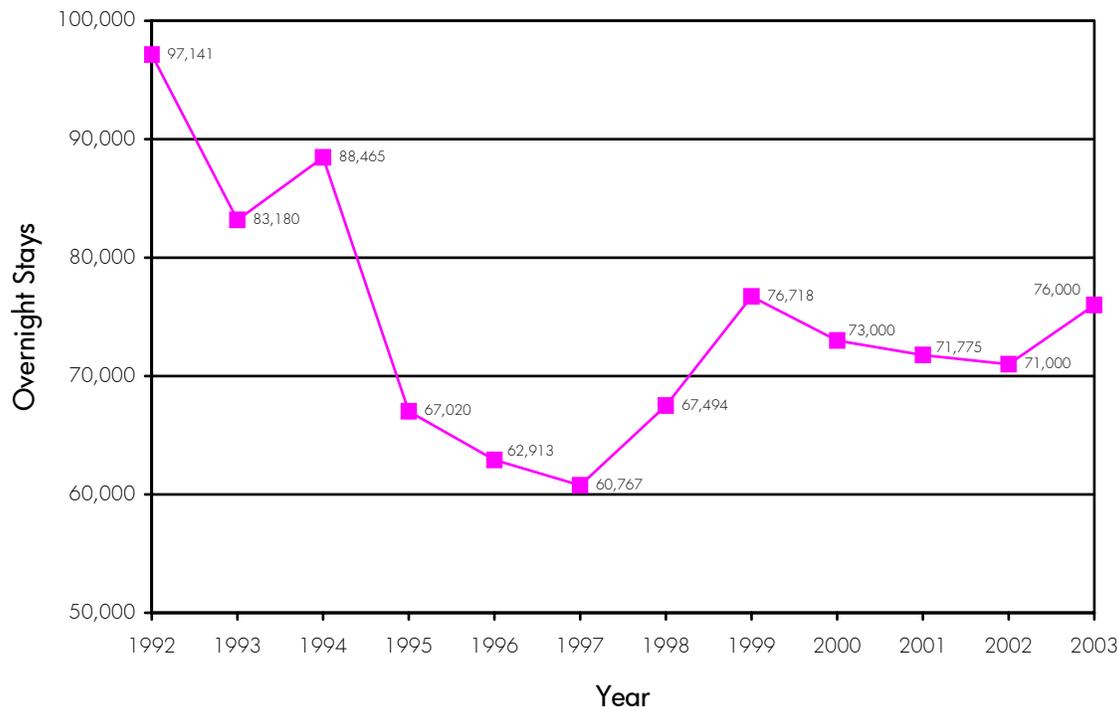
Backcountry Stock Use

Backcountry stock use has decreased from nearly 45,000 stock nights in 1955 to 5,714 in 2000. The amount of stock use stayed near 4% of backcountry use between 1998 and 2000. In 2000 there

TABLE 11: SUMMARY OF TRAILS

Location	Popular Trails / Comments
Kings Canyon National Park	
Backcountry	Pacific Crest trail John Muir trail
Cedar Grove area	Zumwalt Meadow trail
Grant Grove area	General Grant Tree area has paved trails. Big Stump area is 1.5 miles.
Redwood Mountain	10+ miles
Generals Highway	Big Baldy Little Baldy
Sequoia National Park	
Backcountry	Pacific Crest trail High Sierra trail John Muir trail
Dorst area	Muir Grove trail
Wuksachi	
Lodgepole	Tokopah Falls trail — very heavily used (1.7 miles)
Wolverton	Popular backcountry trailhead to Alta peak, Heather, Emerald and Pear Lakes
Giant Forest Trail system being renovated	Large day use trail system (40+ miles) includes: "Big Trees Trail" — a 0.75-mile paved accessible trail. Congress Trail Hazelwood self guided nature trail Crescent Meadow day-use trails Trail center at the Giant Forest museum Trail center at Sherman Tree?
Ash Mountain / Foothills	Marble Falls trail Paradise Creek trail Middle Fork trail
North Fork	Colony Mill Road
South Fork	Ladybug trail Garfield Sequoia Grove trail Trailhead to Hockett Meadow area
Mineral King	Popular day use trails to area lakes Backcountry trailheads to Farewell Gap, Franklin Pass, and Sawtooth Pass
Dillonwood	None

FIGURE 7: BACKCOUNTRY OVERNIGHT STAYS — 1992–2003



SOURCE: Sequoia and Kings Canyon National Parks, 2005.

were 936 stock users, and the number of stock per person in a group averaged 1.5. Stock users stayed on average a little over four days, a half day longer than hikers stayed.

New or Non-established Recreational Activities

New activities are assessed using federal regulations and NPS policy guidelines.

Bicycling is allowed only on park roads and is most common within campgrounds. Bicycling may be dangerous on major park roads, such as Generals Highway, because of narrow shoulders and hairpin curves where vehicles commonly overlap lanes.

Snowmobiling is only allowed on public roads that provide private landholders and permit cabin users access to their cabins or land.

In the last five years, when water conditions are high enough, visitors have kayaked on the Middle Fork of the Kaweah River. The river has class IV conditions, appropriate only for expert kayakers. Use of the Middle Fork inside the park by kayakers is seasonal, but is subject to growth. NPS staff are monitoring use and the associated impacts along the river.

No air tour companies currently operate in the parks, although two companies have applied to the Federal Aviation Administration for operating authority.

VISITOR SERVICES

The parks provide numerous facilities and services for visitors. Both food service and overnight stays can be accommodated within a variety of price ranges.

Campgrounds

Frontcountry Camping

There are 1,284 frontcountry campsites in 14 campgrounds within the parks. All frontcountry campgrounds can be reached by automobile, and the size and character of these campgrounds vary from small and primitive (with 10 sites and pit toilets) to large and developed (over 200 sites with pull-through sites and nearby free RV dump stations). Several campgrounds (Azalea, Lodgepole, Potwisha, and South Fork) remain open year-round, while Dorst, four campgrounds at Cedar Grove, two at Grant Grove, and two at Mineral King are closed from late fall until late spring. Azalea and Lodgepole have winter camping in snow conditions. Public showers are close to campgrounds in Cedar Grove, Grant Grove, Lodgepole, and Mineral King. Laundry facilities are nearby at Lodgepole and Cedar Grove. Prices are comparable to those offered regionally and depend on the location and services provided. A single small campground remains in a sequoia grove at Atwell Mill, which has 21 sites and a few pit toilets. Other camping opportunities in sequoia groves were removed beginning in 1962 to protect visitors since sequoia trees and limbs can fall without notice.

Kings Canyon National Park. There are seven frontcountry campgrounds in Kings Canyon with over 113,000 overnight stays in 2000.* Campground use appears generally consistent but depends on the weather. Overnight stays for 2000 were as follows:

Cedar Grove

- Canyon View (only campground that does not allow RVs, but has group sites) — over 5,900 group overnight stays
- Moraine — over 4,100 overnight stays and more than 700 RV stays
- Sentinel — over 17,200 overnight stays in 2000, and around 6,100 RV overnight stays

* One person staying one night equals one overnight stay.

- Sheep Creek — around 15,000 overnight stays and around 4,000 RV stays.

Grant Grove

- Azalea — around 14,600 overnight stays, and over 4,700 RV overnight stays
- Crystal Springs — around 6,700 overnight stays and over 1,900 RV stays
- Sunset — over 12,500 tent, over 3,700 RV, and 125 group overnight stays

Sequoia National Park. There are seven frontcountry campgrounds in Sequoia National Park that had over 128,000 overnight stays in 2000:

- Dorst — around 32,000 overnight stays, 9,300 RV stays, and 226 group overnight stays
- Lodgepole — around 30,000 overnight stays and 23,000 RV overnight stays
- Buckeye Flat — over 6,500 overnight stays
- Potwisha — over 11,500 overnight stays and over 5,200 RV overnight stays
- South Fork (no RV sites) — around 500 overnight stays
- Atwell Mill (no RV sites) — around 2,000 overnight stays
- Cold Springs (no RV sites) — 8,000 overnight stays

U.S. Forest Service. Additional camping opportunities are provided in the adjacent national forests, with 291 campsites in nine campgrounds

Backcountry Camping

Over 5,000 backcountry permits are issued annually for parties traveling by foot or stock animal. Some heavily used backcountry areas have designated campsites, but in other areas visitors are free to camp where they desire. Designated wilderness campsites exist in the following areas: Paradise Valley, Emerald Lake, Pear Lake, Bearpaw, Kern Hot Springs, Upper Funston, and Lower Funston. Sites are not specifically assigned, but established camping areas are marked, and camping must be confined to these locations.

Lodging

There are over 200 rooms / cabins available in the parks (see Table 12). Concession contracts also allow lodging to be expanded or renovated. Kings Canyon Park Services provides lodging at Cedar Grove and Grant Grove, and Delaware North Parks Services at Wuksachi and Bearpaw Meadow (high Sierra camp).

Types of Facilities

Concession lodging facilities range from the Bearpaw high Sierra camp (a remote backcountry camp with tent-top cabins) to rustic cabins with or without baths, to lodge rooms and suites. Historically, the parks have had small cabins with baths, rustic cabins or tent tops without baths, and medium size lodges. The John Muir Lodge at Grant Grove and three lodge buildings at Wuksachi village offer new medium size facilities that continue the rustic architectural traditions of the parks.

Lodging Availability / Seasonality / Occupancy

Year-round lodging is provided at Grant Grove village in Kings Canyon National Park and at Wuksachi in Sequoia National Park. In July and August occupancy rates are 95% or better, but November through March occupancy rates fall to around 33%.

Cedar Grove has motel lodging, generally from April through October or November. Its annual occupancy rate was 76% to 86% for 1998–2000, averaging 5,000–7,700 overnight stays annually. Grant Grove had an annual occupancy rate of 58% to 66% for 1998–2000, averaging 25,000–36,000 overnight stays annually. Winter season use occupancy at Grant Grove is 20%–40%.

Wuksachi replaced Giant Forest Lodge in 1999. In 2000 Wuksachi had around 51,000 overnight stays, compared to about 120,000 annual stays at the larger Giant Forest Lodge. Non-peak season annual occupancy at Wuksachi averages over 60%, and the winter occupancy rate 20%–40%.

The Bearpaw Meadow high Sierra camp operates from June through September. Occupancy is highest in July and August (typically in the mid 90% range), while occupancy in June and September depends on the weather. Typically there are over 1,000 overnight stays at Bearpaw; in 1996 there were over 2,000.

Non-Park Public Lodging in the Area

Overnight accommodations in the adjacent national forest / monument are offered at Montecito-Sequoia Lodge and Stony Creek Lodge south of Grant Grove; Kings Canyon Lodge on the Kings Canyon Highway; and the Silver City Resort in the Mineral King area. Private organizational camps include the Hume Lake Christian Camp.

TABLE 12: SUMMARY OF LODGING AVAILABLE IN 2000

Location / Quantity	Type	Daily Rate / Comment
Cedar Grove • 20 rooms	Lodge	• \$90
Grant Grove • John Muir Lodge – 30 lodge rooms / suites • 9 cabins with bath • 43 cabins with central bathhouses • Future permitted buildout includes 9 additional cabins and 19 renovated cabins	• Bath cabins • Bath cabin #9 • Remodeled rustic cabins • Rustic cabins • Tent cabins • Lodge • Suite	• \$88 • \$93 • \$55 with central bathhouse • \$45 with central bathhouse • \$38 with central bathhouse • \$128 • \$215
Wuksachi Village • 102 rooms • Future buildout include 312 additional rooms	• Standard room • Deluxe room • Superior Room	• \$120 • \$135 • \$165
Bearpaw Camp (11-mile hike to backcountry camp) • 12 beds	Tent cabins	• \$150 includes breakfast and dinner. Central bathhouse.

Other Visitor Services and Facilities

Food Service

Concession-owned restaurants operate at Grant Grove and Wuksachi (see Table 13); limited food service such as snack bars / market or deli service are available at Lodgepole, Grant Grove, Wolverton (winter only), and Cedar Grove (summer only). Outside the parks, several seasonal and year-round facilities provide various types of food service, including Stony Creek Lodge, Kings Canyon Lodge, Silver City Resort, and Montecito-Sequoia. Hours and days of service may be limited.

Gift Shops, Stores, Supplies, Post Offices, and Gasoline Stations

Supplies may be purchased at Grant Grove, Lodgepole and Cedar Grove. Gift shops are located at Grant Grove, Lodgepole, Cedar Grove, and Wuksachi. There are post offices at Grant Grove and Lodgepole. Limited supplies can also be obtained at Silver City Resort and Stony Creek Lodge (which is outside the parks). Gasoline is no longer available in the parks but may be purchased at Kings Canyon Lodge and Hume Lake, and at Stony Creek along the Generals Highway between Dorst and Quail Flat.

TABLE 13: SUMMARY OF VISITOR FACILITIES

	Cedar Grove	Grant Grove	Dorst / Lodgepole / Wuksachi / Giant Forest	Ash Mountain / Foothills	Mineral King
NPS Facilities					
• Visitor use buildings	2	2	10	4	2
• Visitor centers / museums / education facilities		1	4	1	
• Visitor Contact Station	1				1
• Comfort Stations / Restrooms	24	21	36	5	14
• Picnic Areas		1	2	2	
• Campgrounds	4	3	2	3	

Concession Facilities in the Parks

• Lodging	X	X	X (Wuksachi only)		
• Food Service	X	X	X (Lodgepole, Wolverton [winter] and Wuksachi only)		
• Gift Shops	X	X	X (Lodgepole and Wuksachi only)		
• Store / Supplies	X	X	X (Lodgepole only)		
• Laundry / Showers		X	X (Lodgepole only)		
• Gas / Service Stations					
• Post Office		X	X (Lodgepole)		

Facilities at Inholdings in Giant Sequoia National Monument

(Silver City Resort, Montecito-Sequoia, Kings Canyon Lodge, Stony Creek Lodge)

• Lodging	X
• Food Service	X
• Gift Shops	X
• Store / Supplies	X
• Laundry / Showers	X

Private Land and Special Use Permits on Park Land

National parks are publicly owned lands set aside to protect our nation's most precious natural and cultural resources. In addition to public lands within Sequoia and Kings Canyon National Parks, there are two types of non-public ownership or use — private land (referred to as inholdings) and permitted special park uses (e.g., permits for utilities, non-profit uses, and private cabins at Mineral King). Additionally the adjacent Alley property is considered in the general management plan.

PRIVATE LAND

Kings Canyon National Park — Wilsonia

When General Grant National Park (later Kings Canyon National Park) was established in 1890, a 200-acre area inside the park boundary was privately owned. Later the tract was subdivided and sold and is now known as Wilsonia. The subdivided land contains primarily seasonal use cabins. Grant Grove village is adjacent to the private land in Wilsonia. Wilsonia is hidden from public view since it is off the Kings Canyon Highway and is not within public use areas. Most visitors would not be aware of it. Early in the 20th century a goal was identified to purchase all private inholdings, but that goal was not accomplished. Since then the National Park Service has purchased private land in Wilsonia from willing sellers and managed the area in accordance with a *Land Protection Plan* (NPS 1986c). In many cases multiple generations of families have enjoyed their cabins, in other cases the owners are relatively new. Some seasonal cabins are being converted for year-round use. Current estimated average property value is \$60,000; total property taxes (paid to Fresno County) amount to around \$93,000.

The 1986 *Land Protection Plan* predates Wilsonia's 1996 designation as a historic district, so the National Park Service's stated goal is still to acquire private property from willing sellers in order to restore the land to natural conditions

(NPS 1986c). The *Land Protection Plan* does not allow commercial use of private property. Today private landownership encompasses 190 acres and 56 tracts. The National Park Service owns 92 tracts, 10 of which have a reservation of use and occupancy by the former owner. Some government-owned properties contain structures contributing to the historic district, and those structures have been retained pending the completion of a new land protection plan following approval of the general management plan.

The Grant Grove area has limited water supplies but Wilsonia has no impact on the NPS public water supplies. Water in the Grant Grove area is ultrapure, which results in the leaching of copper from the distribution system. Potable water comes from 11 wells and 8 storage tanks scattered throughout Wilsonia. There is no information about wastewater systems. The Park Service provides utilities to facilities that it owns and maintains.

Snowmobiles are allowed on private land and roads, but a snowmobile trail through the park to what is now Giant Sequoia National Monument is now closed.

Sequoia National Park

Oriole Lake. Oriole Lake is a rare lake in the foothills environment in a remote area of Sequoia National Park; the area is surrounded by designated wilderness. Originally there were eight tracts of privately owned property on 9 acres; currently there are four private landowners and five cabins, and the National Park Service owns four tracts. Access is by way of a primitive narrow dirt road that is gated, restricting public access. The Park Service has negotiated with landowners to provide public pedestrian access to Oriole Lake. At one time there was a small airplane runway, which has been removed and the area returned to more natural conditions.

The 1986 *Land Protection Plan* proposes the purchase of private inholdings at Oriole Lake from willing sellers so that the area can be returned to natural conditions (NPS 1986c). After acquisition and the removal of development, the area could be designated wilderness. The value of each property (land plus improvements) is estimated at \$40,000, and property taxes totaled \$3,000. The Park Service provides minimal services. The condition of water and sewer facilities is unknown.

Silver City. Silver City was one of the earliest settlements along the Mineral King Road, dating from 1884. It evolved from a lumber and mining support community into a seasonal recreation community. The 160-acre area has 35 tracts with approximately 40 cabins, as well as a small resort north of the road with 14 rental cabins, public showers, and a restaurant / store. Silver City is visible to visitors on the Mineral King Road. The National Park Service has acquired four large tracts in Silver City, and it maintains the Mineral King Road and provides emergency response. The road is closed seasonally and gated but residents have keys for access. Snowmobiles are allowed only on the road to provide access to private facilities / land.

The 1984 *Land Protection Plan* does not envision additional purchase of land, and it proposes scenic easements to retain the area's rustic character (NPS 1984). The current estimated value for each lot and improvements range from \$40,000 to \$60,000. About \$39,000 in total property taxes are collected from the area. Silver City has its own water and sewer systems, and electricity for the resort is provided by a generator.

Kaweah Han. Adjacent to and below Silver City is Kaweah Han, a 60-acre privately owned property that straddles the East Fork of the Kaweah River. It was constructed in 1937 and consists of a large Bavarian-style lodge (over 5,000 square feet of living space), a small guest or caretaker's house, and a hydroelectric system using a 3,800-gallon tank. The property is off the Mineral King Road and cannot be seen from the road. Residents have keys permitting access

when the Mineral King Road is closed. Snowmobiles are allowed only on the road to provide winter access to the private facilities.

The 1984 *Land Protection Plan* envisions a continuation of the present residential use of the lodge (NPS 1984). The lodge was purchased by a private owner in 2002 and is expected to remain in residential use.

Mineral King Valley Private Properties. A total of 29 acres in two tracts are privately owned in the Mineral King Valley — the Cedar Point mine and mill site, and No. 1 North on the Empire mill site. Trailhead parking is located on one tract, as well as two cabins with 99-year leases. Residents have keys for access when the Mineral King Road is closed, and as described for Silver City and Kaweah Han, snowmobiles are allowed only on the road to provide winter access. The structures can be seen by trailhead users and constrain access near the trailhead. The property is valued at \$227,461; property taxes are \$2,400.

SPECIAL USE PERMITS ON PARK LAND

Utility Use — Hydroelectric Facilities

In the early 1900s Congress authorized the development of hydroelectric facilities along forks of the Kaweah River adjacent to and within Sequoia National Park. Reauthorization is required every 10 years for the facilities to continue to operate, and the secretary of the interior is authorized to renew the permit until September 8, 2026. Some of the facilities, which are owned, maintained, and operated by Southern California Edison, are eligible for listing on the National Register of Historic Places. Facilities include several hydroelectric plants outside the park that seasonally generate 50,000 kilowatts of power, and the park receives a rebate on its electricity use.

Stone, concrete, and masonry facilities in the park include two dams, flumes, and channels in the Ash Mountain / Potwisha area. Above the Mineral King area are four concrete dams that

have created small lakes — Monarch, Eagle, Franklin, and Crystal Lakes. The lakes are used as camping areas. A 1992 report of these dams classified them as a “significant-hazard facility,” a statement of the potential adverse impact on human life and downstream development if a dam should fail” (NPS 1992b). Failure of these dams “has the potential to jeopardize lives in at least one dwelling in the community of Mineral King” and “the potential to jeopardize lives at Cold Spring Campground” (NPS 1992b).

There are also wood / metal and concrete flumes in and adjacent to Sequoia National Park. Water impoundments outside the park are used for local and park fire fighting. In addition to concerns about the structural integrity of the concrete dams, there are also concerns about introduced sport fish and the impact of fire (both natural and prescribed) and earthquakes on flumes and facilities in remote and difficult-to-reach locations.

Facilities are visible from the Potwisha campground, and campers use the access route to the Potwisha dam for hiking. Motorists driving the Generals Highway are generally not aware of these facilities. Many users in the Mineral King area may not know that the lakes are part of the hydroelectric system and were enlarged by concrete dams.

Nonprofit Use — Camp Wolverton (Sequoia National Park)

Since 1937 the Western Los Angeles County Council of the Boy Scouts of America has operated Camp Wolverton a mile or so from the Generals Highway and adjacent to Giant Forest. The camp is near an old road (now a trail) that connects Lodgepole with the Sherman Tree area of Giant Forest. It covers approximately 2 acres of coniferous hillside and includes a water distribution system, pit toilets, group campsites, and parking. Water use is metered and is billed to the Boy Scouts by the National Park Service (in 2000, 18,000 gallons of water were used at a cost of \$358.20). Garbage collection is provided by contract.

The camp is authorized through an NPS special use permit, renewable every five years, with an annual permit fee of \$100. The council has a written non-discrimination policy in place. The permit conditions state that the camp shall be made available on a space-available basis for non-profit recreational and educational purposes. Boy Scouts and Girl Scouts from the region use the facility 90% of the time. During the rest of the season, Camp Wolverton is used by university researchers and park volunteers. While some visitors using the Wolverton picnic area drive by the location, it is not obvious or visible to the majority of park visitors.

Mineral King Permit Cabins — Cabin Cove, West Mineral King, East Mineral King

The Mineral King area was first opened to public use in 1879 with the construction of a road. Many early visitors were local Tulare County residents escaping summer heat in the Central Valley. Most of the cabins in this area date from the USFS cabin program of the 1920s to 1940s. The 1978 legislation that added the Mineral King area to Sequoia National Park authorized the continuation of permits for cabins on public land but limited the permit extensions to the life of the 1978 permittee of record. Public Law 108-447, passed in 2004, allows permits to be transferred to heirs, successors, and assigns. In 1999 the Mineral King Road Cultural Landscape District was established, with many cabins listed as contributing elements (see the discussion under the “Historic Structures, Districts, and Cultural Landscapes” section, beginning on page 37).

There are approximately 60 active permits in three areas — Cabin Cove, West Mineral King, and East Mineral King. There are also a few cabins that were not removed when the permittee of record died, pending the outcome of the general management plan. Fees for the special use permits consist of a use fee (\$386 in 2001) that is forwarded to the U.S. Treasury and an administrative fee (\$374 in 2001) that remains in the park, for a total fee of \$760 in 2001. The fees were set in a 1994 appraisal and have been

increased annually in accordance with the consumer price index. Tulare County possessory interest taxes paid annually total around \$4,900.

West Mineral King has a potable community water system, developed by the permittees and maintained by the National Park Service; it also supplies Cold Spring campground and the ranger station. Wastewater disposal is provided by individual private systems. In East Mineral King and Cabin Cove, wells or surface water diversions provide water, and individual septic systems provide sewage treatment. Virtually all permittees have toilets, sinks, and showers in their cabins, and many retain an outhouse for emergency use. In some cases wastewater from sinks is thrown into gravel sumps. Most facilities are close to water sources.

No floodplain studies have been done to determine if cabin structures are within the 100-year floodplain.

The Mineral King Road is closed seasonally and gated but permit holders have keys for access. Snowmobiles are allowed only on the road to provide winter access to privately owned facilities.

Many of the privately owned structures are adjacent to the Mineral King Road, making them visible to all visitors, and various signs suggest private land or ownership. The location of some cabins may physically constrain access within the area. Special use permit cabins often bring into question private ownership within park boundaries.

POTENTIAL BOUNDARY ADJUSTMENTS

The Alley property is ranch property along the North Fork of the Kaweah River. The Colony Mill Road trail, which is used for park access, cuts through the property.

Park Management, Operations, and Facilities

STAFFING

In FY 2001 full-time employees (FTEs) numbered about 262, up from around 220 for 1999 and 2000 (see Table 14). Typically during the summer 250 to 300 seasonal employees are brought on, plus over 1,400 volunteers. Additionally there are about 26 cooperating association employees, 45 interagency staff and researchers, and 250 concession employees.

Park Staff Divisions

Park Management and Administration

The superintendent, five division chiefs, and administrative staff comprise park management. Administrative functions are primarily located at the Ash Mountain headquarters.

Division of Interpretation and Cultural Resources Management

The Division of Interpretation and Cultural Resources offers programs and activities and provides staff at visitor centers and contact

stations. While popular with the public, the number of interpretive staff has been reduced as staffing needs for other programs have increased. As a result, the program relies more heavily on volunteers and the cooperating association. The parks have a small staff of cultural resource specialists to manage archeological artifacts, ethnographic resources, historic structures and districts, cultural landscapes, and museum collections, as well as participate in Native American consultations. As part of the parks' cultural resource program, the 1999 *Natural and Cultural Resources Management Plan* called for additional staffing

Division of Fire and Visitor Management

Rangers are responsible for protecting visitors and park resources and for enforcing park rules and regulations. They staff entrance stations, maintain mounted units, provide law enforcement, search-and-rescue, and emergency medical services.

Helicopters are used for fire suppression and monitoring, search and rescue, emergency

TABLE 14: STAFFING SUMMARY 2001

NPS Staff	Number of FTEs	Percentage of FTEs
Park Management	7	2.6%
Park General	13	5.0%
Administration	20	7.6%
Interpretation and Cultural Resources	21	8.0%
Fire Management and Visitor Protection	45	17.2%
Ranger Fees	18	6.8%
Science	22	8.4%
Maintenance Operations	79.2	30.2%
Maintenance SPEC	37	14.1%
Total FTEs	262.2	100%
Estimated Seasonal Staff	290.4	
Estimated Volunteers in the Parks	1,432.8	
Other (Research)	25	NA
Interagency staff (fire crew)	20	NA
Sequoia Natural History Association	26	NA
Concession	100 KCPS 140 DNPS ±24 horse	NA

medical, and snow surveys, and occasionally for supplying backcountry ranger stations. Snowmobiles are used rarely, primarily to facilitate research, snow surveys, and winter search and rescue.

Fires are monitored and managed or suppressed to protect life, private property, and public resources and facilities. In order to restore a natural fire regime, fire history is mapped, and some areas are purposefully burned to improve resource conditions and reduce the likelihood of catastrophic fires. Interagency firefighters are based seasonally in the parks at the Swale fire camp in Grant Grove village.

Division of Natural Resources

Staff in the Natural Resources Division protect and monitor diverse resource conditions. The *Resources Management Plan* and annual work plans guide the work of this division. Staffing has increased as a result of a stronger emphasis on information in the national parks. Tree crews assess the condition of trees in developed areas, and those that pose a public safety hazard are removed on a priority basis. Storms, wind, insects, and disease all cause tree maintenance work. Because sequoia trees have shallow root systems, they have been known to topple without warning, and leaning sequoias are closely monitored.

Division of Maintenance and Construction

The Maintenance Division carries out vital park functions, operating heavy equipment and utility systems and maintaining roads and facilities, as well as providing janitorial services such as cleaning restrooms. Mountainous terrain, aging infrastructure / facilities, and seasonal closures of facilities all affect maintenance operations. Road maintenance, snow removal, and hazard tree removal are time and labor intensive.

Historic Structures. Structures that are eligible for historic recognition are to be maintained according to the “Secretary of the Interior’s Standards” (NPS 1995d). Maintaining historic facilities is expensive and labor intensive, and if

and when they are altered, law requires them to be made accessible to people with disabilities. When a historic facility that provides public services, such as a restroom, cannot be made accessible (possibly due to type of construction and narrow entrances) additional facilities are provided to meet that need.

Utilities. When a system fails or reaches the end of its life cycle, or the demand changes, there may be conflicts between preserving natural and cultural resources and providing services that meet all environmental regulations. Increasingly stringent state codes result in higher operating and maintenance costs and may lead to utility system closures. The National Park Service is responsible for utility systems serving acquired private property. In some areas, due to tighter state standards, terrain, and soil conditions, vault toilets are being used, resulting in increased park maintenance budgets due to pumping and transport expenses.

Frontcountry Facilities. In the frontcountry the Maintenance Division is responsible for approximately 258 miles of paved two-lane roads and about 38 miles of unpaved roads (generally less than two lanes), 26 miles of paved trails, 497 buildings, over 1,400 campsites, 50 picnic sites, 23 water systems, 5 wastewater systems, and approximately 60 septic systems, as well as signs and benches. Special measures are taken to protect sequoia trees (fencing, paving, and armoring path edges to contain the impacts of pedestrian trampling) and to minimize human/bear encounters (providing bear-proof storage boxes in frontcountry campgrounds, along with maintaining bear-proof refuse containers and dumpsters).

Backcountry Facilities. In the backcountry the Maintenance Division is responsible for over 842 miles of unpaved trails. Trail maintenance supplies and equipment are transported by stock and helicopter to remote locations, and some mechanized equipment is used to provide the maximum amount of public access by reducing the amount of time and labor required to keep up the trail system. Bear-proof storage boxes have been installed in popular backcountry areas.

Backcountry toilets have been provided in some areas to protect resources, requiring routine maintenance and periodic relocation or replacement.

Administrative Stock Use. The parks have established a monitoring program based on standards and indicators to allow both administrative and other stock use to continue at sustainable levels. NPS administrative stock use comprised 38% of total stock use in 2003 (the percentage of use has gradually increased as commercial stock use has fallen). Administrative use includes stock-supported ranger stations (Roaring River, Kern, and Hockett) and trail crew use. The administrative pasture at Ash Mountain may have up to 90 horses and mules grazing at any one time. Most administrative stock winter outside the park. The effect of seasonal grazing at Ash Mountain is moderate.

Administrative Helicopter Use. Helicopters are used by staff for deliveries of backcountry supplies and crews. At times they are considered the minimum tool necessary for trail maintenance activities.

PARTNERS AND OTHER ENTITIES

Sequoia Natural History Association

The association runs bookstores, educational events, and cave tours.

Concessioners

There are two primary concessioners in the parks. Kings Canyon Park Services provide lodging and other facilities in Kings Canyon National Park. Delaware North Parks Services in Sequoia runs facilities at Wuksachi, Lodgepole, and Wolverton, as well as the Bearpaw Meadow high Sierra camp. Two other concessioners provide day rides and pack operations at Cedar Grove, Grant Grove, Wolverton, and Mineral King. Concessioner facilities are further discussed beginning on page 75.

Partners and Volunteers

Over 1,400 volunteers serve in the parks in a variety of capacities.

Commercial Permit Holders

Approximately 60 commercial or incidental business permit holders provide services for visitors. Most of these permits are for bus tours, backpacking services, horseback riding, guiding services, llama packing, and skiing services. These enterprises use park resources to offer recreational opportunities to the public that otherwise may not be available, and they must comply with park regulations.

Inholder and Permit Holder Groups

Groups of inholders and permit holders provide some educational services and help maintain and operate some utility systems.

PARK FACILITIES

Utilities

Water

Water supply and treatment facilities are provided for park developments and some backcountry areas. Water supply depends on annual precipitation, and local recharge may be limited for the water systems at Grant Grove, Lodgepole (including Wuksachi, Wolverton, and Giant Forest), Ash Mountain, Silver City, and Mineral King. (Water use and wastewater data are summarized in appendix E.)

Water usage depends on the type of plumbing fixtures. In facilities with older fixtures an estimated 64 gallons of water are used per day by each overnight visitor. In areas with low-flow fixtures, demand falls to about 42 gallons per overnight visitor. Day use demand is about 10 gallons per person. In campgrounds water use is in-between.

Wastewater / Sewer

The Cedar Grove wastewater treatment facility was replaced in 1998. The Giant Forest facility has been relocated to the Clover Creek wastewater treatment plant near Wuksachi. A few areas cannot be easily connected to wastewater treatment plants, and appropriate conditions for sewage leachfields may not exist. In such cases they are being replaced by vault toilets, which require regular pump out and increased sewage handling expenses.

Electrical Power

Overhead power lines have been replaced in most areas or are scheduled to be replaced. An underground route through Giant Forest, which is difficult to maintain because it goes directly through the grove, is scheduled to be replaced by the longer but more accessible route that follows the road system. Solar and wind power are used at some of the more remote locations, such as the government pack station in Cedar Grove, the Lookout Point entrance station in Mineral King, and Dorst campground. Generators are used at other remote locations, such as the Cold Spring ranger station and Crystal Cave.

Telecommunications

All frontcountry areas have phone systems. There are radio repeaters and microwave equipment in the frontcountry and backcountry.

Gas

Propane is used in all frontcountry development areas. Often screening is used to reduce the visual impact of tanks in more public areas.

Roads

There are around 258 miles of paved two-lane roads in the parks and about 38 miles of unpaved roads (generally less than two lanes). Generals Highway is being rebuilt, continuing the two-lane width, which limits the number of people who can access the parks. Road character guidelines have been developed for the reconstruction.

Giant Forest construction projects have reduced the number of parking spaces inside the sequoia grove, but a similar number of parking spaces overall are being provided at other locations outside the grove. The limited parking that remains in the grove is in previously disturbed areas.

Cedar Grove is closed at the end of November and reopened in early April. Mineral King is closed at the first of November and reopened on Memorial Day, snow conditions permitting. Unpaved portions of the Mineral King Road require heavy annual maintenance. The higher elevations of the Generals Highway are periodically closed by snow; however, roads are opened as soon as possible.

Parking

Table 15 shows the location of the approximately 2,600 public parking spaces (excluding campgrounds); the majority of public parking spaces are in year-round paved areas.

The Ash Mountain headquarters area has parking for staff and other needs. A total of 87 striped staff spaces at Ash Mountain are supplemented by additional paved and unpaved areas in residential and operational areas to meet the needs of small offices, motor pools, maintenance yards, delivery areas, and storage areas. Staff parking at headquarters is insufficient, and carpooling is encouraged.

Other developed areas have similar residential, operational, and concession parking needs.

NPS Non-Residential Facilities

There are numerous public, administrative, and operational facilities in the parks (see Table 16). Most park use is seasonal, requiring extensive preparation to open facilities and to close them down for the winter. Many park facilities have outlived their expected life. Facilities eligible for historic status require special care.

TABLE 15: SUMMARY OF VEHICULAR PARKING AREAS

Location	Public Parking / Trailheads	Lodging Areas (not campgrounds)	Road Pullouts	Staff Parking
Cedar Grove (seasonal)	335 (8 accessible)			
Grant Grove	370 (9 accessible)	33 (including accessible)		
Lodgepole Area* <ul style="list-style-type: none"> • Lodgepole • Giant Forest / Sherman Tree • Wolverton • Crescent Meadow / Moro Rock • Crystal Cave 	109 497 (33 accessible, 22 RV / bus) 300 108 141			
Wuksachi		258		
Generals Highway (including North and South Fork areas)			60	
Ash Mountain	154		35	112 (including 25 at recreation hall)
Mineral King (seasonal)	92 (all gravel)			
Totals	2,106	291	95	112

NOTE: Accessible means accessible for people with disabilities.
* Includes unofficial spaces.

Historic Facilities

Rental cabins at Grant Grove are maintained by the concessioner.

The Giant Forest market and the Beetle Rock assembly hall are being adaptively reused as a museum and classroom. The Giant Forest restroom has been renovated. Historic features (such as

Tharp’s Log, the Moro Rock stairs, Cattle cabin, restrooms, and benches at Giant Forest; the fishing cabin at Cedar Grove; the Gamlin cabin and log at Grant Grove) have regular preventive maintenance.

Some buildings in Wilsonia provide additional seasonal housing. Five NPS-owned facilities at Wilsonia are in poor to fair condition.

TABLE 16: SUMMARY OF NPS FACILITIES

Type of Facility	Cedar Grove (seasonal)	Grant Grove	Lodgepole Wuksachi Wolverton Giant Forest	Ash Mountain	Mineral King (seasonal)	Total
Visitor Use	3	3	13	5	3	27
Comfort Stations	25	21	36	5	14	100
Administration	7	7	2	23	6	45
Maintenance	17	28	25	27	12	109
Garages	7		4	16	1	27
Fire Stations / Lookouts	Fire station	Fire station Swale interagency fire camp lookout	Fire station	Fire station	Fire station lookout	5 fire stations 2 lookouts
Campgrounds	4	3	2	2	2	13
Campsites <ul style="list-style-type: none"> • Tent only • Tent or RV • RV only • Accessible 	37 314 <u>1</u> 352	17 262 20* <u>6</u> 305	168 84 72 <u>9</u> 333	28 52 <u>1</u> 81	61 <u>61</u>	1,132

* Self-contained RVs only.

Historic facilities in the Ash Mountain area include structures from a CCC camp at Sycamore.

At Mineral King, the cultural landscape district includes seven contributing NPS-owned facilities (two garages, one ranger station foundation, three water troughs, and the roadbed itself).

Backcountry ranger cabins and other historic facilities receive preventive maintenance.

Natural Resource Protection

Fence lines and other work at the Grant and Sherman trees have facilitated sequoia grove and meadow restoration. To date, 231 acres of sequoia grove in Giant Forest have been restored, and over 1 million square feet of asphalt have been removed.

NPS Residential Facilities

By Department of the Interior policy, housing is provided only when (1) personnel are required on site to provide essential services, (2) housing is not available in the local market, or (3) no housing is available within a reasonable commuting distance. As a result, former residences within the parks have been converted to office, multi-purpose, and storage spaces, sometimes detracting from a cohesive residential character, especially in the Ash Mountain headquarters area. Grant Grove has the most unified residential area, with housing between the visitor cen-

ter, maintenance operations, and Wilsonia. The housing area at Lodgepole has some park operations facilities and is close to campgrounds and visitor use areas. Often housing is tucked into available space, so a picnic area at Cedar Grove became a concessioner trailer housing area. Concession housing is usually separate from NPS housing. Housing is summarized in Table 17.

An inadequate housing supply makes hiring seasonal staff and volunteers difficult. In the summer 2001 there were over 80 requests for 40 seasonal park housing units, and it is often difficult for seasonal staff and volunteers to find affordable housing in local communities. Concession housing is also limited, with around 30% of staff having to commute from the outside.

Gateway communities provide services for park staff, but local real estate values make housing too expensive for some staff. While road access to the parks has been improved, the commute to Lodgepole / Wuksachi is still long and arduous. Mineral King is not considered within a reasonable commute distance due to the terrain and road conditions. Carpooling is used to ease parking demand and the lack of onsite housing.

Estimated average daily water requirements for residential use is 64 gallons per day for older plumbing fixtures and 42 gallons per day for low-flow fixtures. Estimated average daily wastewater capacity for housing is similar for overnight and day use.

TABLE 17: SUMMARY OF RESIDENTIAL FACILITIES IN THE PARKS

	Cedar Grove	Grant Grove	Lodgepole / Giant Forest	Ash Mountain	Mineral King	Backcountry
National Park Service						
• Permanent	NA	18	21 15*	20	NA	
• Seasonal	21	23	31	26	7	32
Concessioners		±70	±107			
Inholdings		190 92**			±40 Silver City 8 Oriole Lake	
Permit Cabins (active)					62	
Total (783)	21	±393	±174	46	±117	32

* RV optional concession.
** NPS-owned tracts.

TABLE 18: SUMMARY OF CONCESSION AND PRIVATE FACILITIES

Kings Canyon National Park	Kings Canyon Park Services	Horse / Mule Pack Station, Horse Riding Station — Loverin
Cedar Grove	21-room, 3-story lodge Snack bar / market 4 trailers (housing), 1 comfort station 1 public shower / restroom / laundry	Cedar Grove Pack Station <ul style="list-style-type: none"> • 9 buildings (including 1 residence, 2 staff cabins, 2 bunkhouses with bath) • 1 public restroom
Grant Grove	30-rooms, two-story lodge Market / post office Gift shop / restaurant 9 cabins with bath 43 cabins with two central bathhouse / shower buildings 4 storage buildings / canopies 1 public comfort station 1 employee comfort station 3 office buildings	Grant Grove Stables <ul style="list-style-type: none"> • 3 buildings (including residence and bunkhouse, each with bath)
Staffing (100 employees; housing for about 70)	15 employee cabins with central bathhouse (2–3 employees each) 8 dorm rooms with shared bath 10 employee trailers with baths Personal RV spaces as needed	
Sequoia National Park	Delaware North Parks Services	Horse / Mule Pack Station, Horse Riding Station — Page
Lodgepole	Market/food service Public laundry and showers 1 service station (currently not in service)	
Wuksachi	3 two-story lodges with 102 rooms 1 two-story restaurant / kitchen / administration / gift shop	
Wolverton	1 storage facility 1 snack bar Equipment rental building	
Staffing (140 employees; housing for about 107)	30 rooms (duplex cabins w/central baths) — 2 people / unit 13 dorms w central baths housing — 2–3 people / unit 2 apartments (each for 2–4 people) RV spaces as needed 15 staff live in Three Rivers area and commute	
Bearpaw Meadow Camp	6 guest tents 3 toilets / showers Kitchen / dining tent Storage cabin	
Mineral King	Silver City Resort (privately owned)	Mineral King Pack Station <ul style="list-style-type: none"> • 1 public restroom • 1 residence • 1 tack shed

CONCESSION FACILITIES

Concessioners in the parks are listed in Table 18. Kings Canyon Park Services operates in Kings Canyon National Park, and Delaware North Parks Services in Sequoia National Park. The concession permits for day rides and pack operations do not require or authorize an expansion of services or the construction of new facilities. Silver City Resort is a private inholding in the

Mineral King area that offers visitor accommodations, food, and supplies.

Kings Canyon Park Services

The Kings Canyon Park Services contract runs through October 1, 2011. Contractual obligations require the concessioner to accomplish the following (common to all alternatives because of contractual requirements):

Grant Grove

- Removal of 19 tent-top cabin units
- Construction of 28 cabins with bath
- Replacement of the bathhouse at Meadow Camp
- Construction of employee housing and recreation facilities, as needed
- Construction of a maintenance facility
- Renovation of assigned historic buildings

Cedar Grove

- Construction of employee housing and recreation facilities, as needed

Delaware North Parks Services

The Delaware North Parks Services contract runs through October 31, 2028.

At Wuksachi construction of housing for 12 employees has been recently completed. Additional phases could allow up to 312 lodging units, additional restaurant space, and employee housing.

Other projects that are not included in the contractual obligations include the renovation of the Lodgepole market and the possible use of the Lodgepole gas station building as a food service outlet.

Socioeconomic Environment

Sequoia and Kings Canyon National Parks are entirely contained within Fresno and Tulare counties, California, and most visitors pass through these two counties because of relatively easy access on California 180 from Fresno and on California 198 from Visalia.

Inyo County borders the parks on the east. This side of the parks is much farther from population centers and more difficult to get to because road access through the Sierra Nevada is limited. A small proportion of visitors access the park for wilderness trips from Inyo County but only by foot or horse after passing through Inyo National Forest and the John Muir Wilderness.

The parks' commercial and economic influence on the local environment is heavily skewed toward Fresno and Tulare counties. For these reasons the description of economic and social impacts related to this planning effort focus on these two counties.

DEMOGRAPHIC CHARACTERISTICS

Population

In 2000 California was the most populous state in the United States (see Table 19). Fresno County, one of the 58 counties in California,

ranked 10th in population in 1999. From 1980 to 1990 this county grew by nearly 29.8%, slowing to about 19% in the 1990s. Tulare County ranked 21st in population in 1999. Its growth was about 26.9% during the 1980s, slowing to about 17% during the 1990s. The growth rates for both counties exceeded that for California and the United States. In 2000 the combined population of the two counties was 1,167,428.

Income

Total personal income for Fresno County increased by nearly 103.1% during the 1980s (see Table 20), and it further increased by nearly 41.8% in the 1990s. In 1999 total personal income accounted for 1.6% of the state total, and the county ranked 13th in the state.

During the 1980s total personal income for Tulare County nearly doubled and grew another 48.7% by 1997. The county's total personal income ranked 24th in the state in 1999 and made up 0.7% of the state total.

In the 1980s California's total personal income increased by 129%, compared to 111% for the entire country. From 1990 to 1999 state total personal income increased by 51% and national personal income by 59%.

TABLE 19: POPULATION

	1980	1990	2000
Fresno County	517,679	671,709	799,407
Tulare County	247,426	313,907	368,021
California	23,800,800	29,925,531	33,871,648
United States	227,224,719	249,438,712	281,421,906

SOURCE: Bureau of Economic Analysis and U.S. Census

TABLE 20: TOTAL PERSONAL INCOME

	1980	1990	1999
Fresno County	\$5,603,436,000	\$11,380,484,000	\$16,135,625,000
Tulare County	\$2,331,687,000	\$4,661,069,000	\$6,928,875,000
California	\$286,228,598,000	\$655,567,167,000	\$989,590,237,000
United States	\$2,313,921,000,000	\$4,885,525,000,000	\$7,784,137,000,000

SOURCE: Bureau of Economic Analysis.

To get a better perspective on the population and income situation, per capita personal income figures are displayed in Table 21. Over the years both counties have lagged far behind the state in terms of per capita personal income. Fresno County's 1999 per capita personal income ranked 41st in the state; it was only 71% of the state average and 74% of the national average. For the same year, Tulare County's per capita personal income ranked 48th in the state; it was only 65% of the state average and 68% of the national average. Relatively low per capita income in these two counties in a state that has a history of outperforming the national average indicates a less than robust local economy.

TABLE 21: PER CAPITA PERSONAL INCOME

	1980	1990	1999
Fresno County	\$10,824	\$16,944	\$21,146
Tulare County	\$ 9,424	\$14,849	\$19,329
California	\$12,029	\$21,889	\$29,856
United States	\$10,183	\$19,584	\$28,546

SOURCE: Bureau of Economic Analysis.

Major Industries by Earnings

Fresno County earnings increased from \$7.4 billion in 1989 to \$11.3 in 1999, an average annual growth rate of 4.3%. In 1989 the largest sectors were services (20.7% of total earnings), state and local government (14.8%), and farming

(11.2%). Over the next 10 years the services and state/local government sectors gained in importance, and farming declined. As shown in Table 22, the largest economic sectors for Fresno County in 1999 were services (23.5% of total earnings), state/local government (16.4%), and retail trade (10.3%).

In Tulare County the average annual growth rate for earnings from 1989 to 1999 was 5.5%. Total earnings increased from about \$2.7 billion to \$4.6 billion. The three largest economic sectors in 1989 were state and local government (19.2%), services (15.3%), and farming (13.6%). The situation for farming had improved by 1999, as the largest industry sectors were state and local government (19.7%), services (16.3%), and farming (15.3%).

The \$15.9 billion in earnings in the two counties is a substantial economic force. Other economic indicators described below provide additional insight into the functioning of this economic area.

Major Industries by Employment

In 1999 the economy of Fresno County provided 406,823 full- and part-time positions and Tulare County 173,455 total positions (see Table 23). Together this local area provided 580,278 jobs.

TABLE 22: EARNINGS BY INDUSTRY (1999)

Industry Sectors	1999 Earnings			
	Fresno County		Tulare County	
Farm	\$639,565,000	5.66%	\$699,030,000	15.33%
Agricultural Services, Forestry, & Fishing	\$597,736,000	5.29%	\$340,324,000	7.47%
Mining	\$15,614,000	0.14%	*	—
Construction	\$735,035,000	6.50%	\$259,171,000	5.69%
Manufacturing	\$1,049,730,000	9.28%	\$445,477,000	9.77%
Transportation & Public Utilities	\$720,477,000	6.37%	\$257,086,000	5.64%
Wholesale Trade	\$635,316,000	5.62%	\$177,968,000	3.90%
Retail Trade	\$1,160,647,000	10.26%	\$491,261,000	10.78%
Finance, Insurance, & Real Estate	\$709,237,000	6.27%	*	—
Services	\$2,660,734,000	23.53%	\$740,912,000	16.25%
Federal Government	\$508,751,000	4.50%	\$65,825,000	1.44%
Military	\$22,774,000	0.20%	\$9,148,000	0.20%
State & Local Government	\$1,851,879,000	16.38%	\$898,332,000	19.71%
Total	\$11,307,495,000	100.00%	\$4,558,793,000	100.00%

SOURCE: Bureau of Economic Analysis.

* Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

TABLE 23: EMPLOYMENT BY INDUSTRY (1997)

Industry Sectors	Number of Full- and Part-time Jobs			
	Fresno County		Tulare County	
Farm	35,944	8.84%	25,689	14.81%
Agricultural Services, Forestry, & Fishing	39,858	9.80%	21,954	12.66%
Mining	441	0.11%	(D)	–
Construction	20,188	4.96%	7,520	4.34%
Manufacturing	29,759	7.31%	13,268	7.65%
Transportation & Public Utilities	16,002	3.93%	5,795	3.34%
Wholesale Trade	16,490	4.05%	5,104	2.94%
Retail Trade	61,243	15.05%	25,254	14.56%
Finance, Insurance, & Real Estate	27,357	6.72%	(D)	–
Services	100,133	24.61%	32,611	18.80%
Federal Government	9,590	2.36%	1,244	0.72%
Military	1,535	0.38%	689	0.40%
State & Local Government	48,283	11.87%	25,325	14.60%
Total	406,823	100.00%	173,455	100.00%

SOURCE: Bureau of Economic Analysis.

For both counties the service and the retail trade sectors provided the most jobs. Fresno County had more than 100,000 jobs in services (nearly 25% of the total), 61,000 jobs in retail trade (over 15%), more than 48,000 jobs in state and local government (11.9%), and 40,000 jobs in agricultural services, forestry, and fishing (9.8%). In Tulare County the service sector provided more than 32,600 jobs (18.8% of the total), the farming, state and local government, and retail trade sectors each accounted for over 25,000 jobs (14.5% each).

Unemployment

Unemployment is another indicator of the health of an economy. In Fresno County the unemployment rate was twice as high as the national average in 1990 and 1996, and three times as high in 2000 (see Table 24). An increasing unemployment rate and increasing population means that even greater numbers of individuals in the workforce were unable to find work in 2000 than in 1990. In Tulare County the situation has been relatively worse.

TABLE 24: UNEMPLOYMENT RATES

	1990	1996	2000
Fresno County	11.7%	13.0%	14.3%
Tulare County	11.8%	15.9%	15.4%
California	5.8%	7.2%	4.9%
U.S.A.	5.6%	5.4%	4.0%

SOURCE: U.S. Bureau of the Census.

Unemployment went from 11.8% in 1990 to 15.9% in 1996 and then fell slightly to 15.4% in 2000. Compared to the California average rates of 5.8% in 1990 and 7.2% in 1996 and 4.9% in 2000, unemployment rates are twice as high as the state levels and 2½ to three times the national level, indicating that the local economy was performing relatively poorly.

Poverty

For 1989, 1993, and 1995, Fresno and Tulare counties had poverty rates that significantly exceeded the state and national averages (see Table 25). In 1995 both counties had poverty rates that exceeded one person in four living below the poverty line. A quarter of the population living below the poverty rate and high unemployment indicate that this is an economically and socially depressed area.

TABLE 25: ESTIMATED PERCENT OF PEOPLE OF ALL AGES IN POVERTY

	1989	1993	1995	1997	2000
Fresno County	21.4%	28.1%	25.2%	25.6%	na
Tulare County	22.6%	28.2%	28.2%	27.9%	na
California	12.5%	17.4%	11.3%	16.0%	12.9%
U.S.A.	13.1%	15.1%	13.7%	13.3%	11.3%

SOURCE: U.S. Bureau of the Census.
na – not available.

PARK BUDGET AND PARK EMPLOYMENT

In 1999 the budget for Sequoia and Kings Canyon National Parks was approximately \$10.9 million. In 2000 the budget increased to approximately \$11.4 million (the 4.8% increase was just enough to cover increased labor costs.) The budget covers the goods and services (including staff labor) necessary to manage the parks. Infrastructure improvements, new construction, and major maintenance items are not included. As is true of most units of the national park system, the parks have a backlog of needs for many infrastructure items such as housing, water system improvements, and other utility upgrades.

In FY 2001 the parks employed approximately 262 permanent staff. In the summer 250–300 seasonal employees are added. The parks also have an extensive volunteer program, with over 1,400 unpaid volunteers in 2001. The parks’ 500–600 permanent and seasonal positions are 0.1% of the total two counties’ employed work force of 552,661 (1997 data).

MINERAL KING SPECIAL USE PERMITS ON PARK LAND

In Mineral King there are some 60 permits for private cabins on public land in three areas. Each cabin permit holder pays a use fee based on the appraised value of the privilege (\$386 for 2001) and the administrative cost based on the park’s labor costs associated with administering the permits (\$374 for 2001); fees are escalated each year for inflation by the consumer price index. In 2001 the annual fee was \$760, for a total of \$47,120. Tulare County receives approximately \$4,900 annually for unsecured property tax on the cabins owned by the permit holders.

Local Property Taxes

Inholders, Mineral King cabin permit holders, and concessioners pay real estate taxes to Fresno and Tulare counties for land and/or buildings

that they own or use within the parks. Table 26 shows the approximate taxes paid.

TABLE 26: LOCAL PROPERTY TAXES

	Fresno County	Tulare County
Silver City		\$ 39,000
Oriole Lakes		3,000
Disney		2,400
Mineral King Special Use Permits		4,900
Wilsonia		93,000
Delaware North (1999)		150,400
Kings Canyon Park Services (1999)	\$22,650	16,160
Total	\$22,650	\$308,860

SOURCE: Fresno and Tulare counties.

REGIONAL COMMUNITIES

Three Rivers

Three Rivers is the gateway community just outside the Ash Mountain entrance to Sequoia National Park. This community offers food (grocery stores and several restaurants), lodging at motels and bed-and-breakfast inns, gasoline, and other goods and services. The community is growing, supported by its proximity to the park.

Squaw Valley and Dunlap

Squaw Valley is a small community on California 180 about 23 miles from Grant Grove. A library, post office, and about 10 other small businesses offer limited services, including food, groceries, some lodging, and a doctor’s office.

A half-dozen businesses (e.g., grocery store, mobile home park, etc.) are found closer to the park near Dunlap. The USFS Hume Lake ranger district office in Dunlap is about 16 miles from the Big Stump park entrance.

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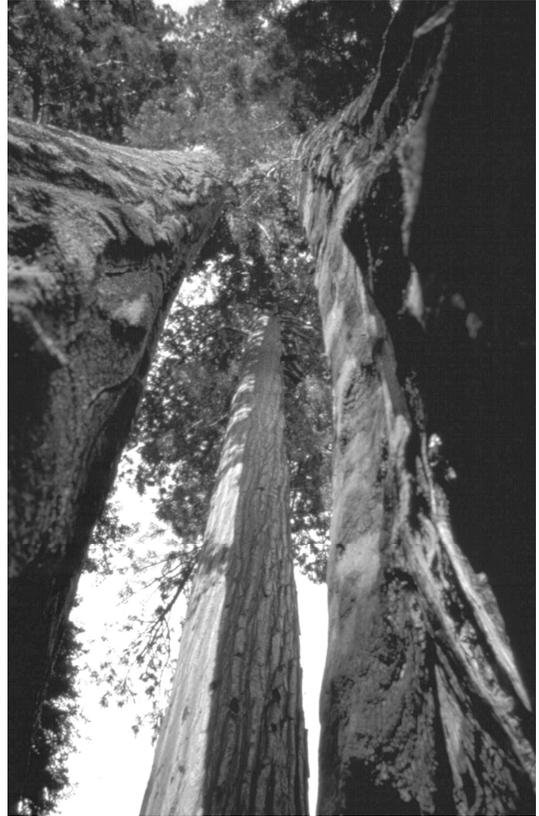
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Environmental Consequences



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Introduction

This part of the document analyzes the potential effects of the five management alternatives on natural resources, wild and scenic rivers, wilderness, cultural resources, transportation, visitor experiences, private land and special use permits, park operations, and the socioeconomic environment. These effects provide a basis for comparing the advantages and disadvantages of the alternatives.

The alternatives provide broad management directions; therefore, the environmental consequences can only be analyzed in qualitative terms. Thus, this environmental impact statement should be considered a programmatic analysis. Prior to undertaking specific developments or other actions as a result of the approved general management plan, park managers will have to determine the need to prepare more detailed environmental documents, consistent with the provisions of the National Environmental Policy Act.

The methodologies used in the impact analysis are described, including the definition of terms. The alternatives are then analyzed in the order they appear in the “Alternatives” chapter. Each impact topic describes the beneficial and adverse effects of the alternatives, as well as cumulative effects, if any. For the analysis of impacts, the planning team assumed that mitigating measures described in the alternatives, such as implementing measures to protect sensitive cave resources, would already have been taken.

At the end of the impact analysis is a discussion of unavoidable adverse effects, effects from short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources. (The matrix at the end of the “Alternatives” chapter compares and summarizes the impacts of each alternative.)

GENERAL METHODOLOGY FOR ANALYZING IMPACTS

The following definitions were used to evaluate the context, intensity, duration, and cumulative nature of impacts associated with project alternatives:

- *Context* — Context is the setting within which an impact is analyzed. In this environmental impact statement the intensity of impacts is evaluated within a local and parkwide context, while the intensity of the contribution of effects to cumulative impacts are evaluated in a regional context (i.e., for the Sierra Nevada region).
- *Impact Intensity* — The impact intensity is the degree to which a resource is positively or negatively affected. Specific thresholds are defined for each impact topic. Unless otherwise stated in the impact analysis, all impacts are assumed to be adverse.
- *Impact Duration* — Impact duration describes how long an impact would last. For the purposes of this document, the planning team used the following terms to evaluate the natural resource, visitor experience, and socioeconomic topics in the alternatives:

Short term — The impact would last less than one year, or it would be transitional, such as impacts associated with construction.

Long term — The impact would last more than one year and could be permanent, such as loss of soils and vegetation within the footprint of a building.

CUMULATIVE IMPACTS

Cumulative impacts on the environment result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such actions. Cumulative impacts

can result from individually minor but collectively significant actions taking place over a period of time. The purpose of this analysis is to evaluate (1) whether the resources and human community have already been affected by past or present activities, and (2) whether other agencies or the public have plans that could affect resources in the future.

For this planning effort, actions within the parks or by others that have occurred within the region or that would occur in the foreseeable future were identified. For natural resources, findings from the Sierra Nevada Ecosystem Project were used to provide the overall regional context for cumulative effects. Specific actions that could affect natural resources within the parks and in their vicinity were also considered. For example, air quality impacts affecting the parks result from actions throughout the entire airshed, so the cumulative impact area for this topic is the airshed including the San Joaquin Valley.

Likely future actions in the park and surrounding lands were determined by reviewing the plans and activities of local counties and communities, federal agencies such as the U.S. Forest Service, and the Bureau of Land Management, and the National Park Service within Sequoia and Kings Canyon National Parks. From these, a list of projects and plans was developed for consideration in determining cumulative impacts.

NPS Plans and Programs

Giant Forest. A 1980 *Development Concept Plan* (NPS 1980a) and the 1996 *Interim Management Plan* (NPS 1996a) called for removing concession and NPS facilities from the Giant Forest and relocating them to Wuksachi so the sequoia forest could be restored to more natural conditions. During 1998–99 hundreds of structures in two historic districts were removed in accordance with an agreement with the California state historic preservation officer. The project has also included removal of hundreds of concession lodging buildings, roads, and 18 parking lots. Historic buildings that are being adaptively reused include the market which is now the Giant Forest museum (opened in 2002)

and the Beetle Rock assembly hall, which is being reused as a community building. Other historic buildings (ranger residence and restrooms) have been rehabilitated. Museum exhibits, waysides, and trail centers have been built. Area trails are being improved, and comfort stations replaced. Replacement parking is located outside the grove, and visitation to the area will depend on a shuttle system to be developed over the next several years.

Grant Grove Lodging. Concession facilities include the 30-room John Muir Lodge, which was constructed in the 1990s. Contractual obligations allow the replacement of 28 cabins with bath, the replacement of the bathhouse, and the construction of employee housing and a maintenance facility. Work will take place in previously disturbed areas.

Wuksachi Village / Red Fir. Facilities were constructed in the 1980s and 1990s in a red fir forest to replace those removed from Giant Forest, based on the 1980 *Development Concept Plan* (NPS 1980a). Recent NPS facilities include the Red Fir maintenance building, wastewater treatment plant, seasonal housing, bathhouse for concession use, road system, utilities, permanent staff housing, parking lots, propane fuel area / distribution system, and a firehouse. Concession facilities already built include three lodges with 102 rooms, a restaurant/store/administration building, a bathhouse, and staff cabins. Concession contracts call for 312 additional lodging units plus employee housing.

Wolverton. A water treatment plant to support the Wuksachi development was constructed. Visitor parking for Giant Forest is being built nearby, and the shuttle system light maintenance facility will be located at the site of a stable.

Generals Highway. The reconstruction of the historic Generals Highway has been going on since the 1980s, starting near Three Rivers. This project is being phased over many years; work has been completed from Ash Mountain to Big Fern Springs.

Campgrounds. Campgrounds are being gradually renovated throughout the parks. Dorst Creek was completely redeveloped by 1990. At Lodgepole campsites are being renovated in phases, sites within the 100-year floodplain are being relocated out of the floodplain, and an internal circulation system is likely to be redesigned. The Cedar Grove campgrounds are also being redeveloped, and sites are being moved out of the floodplain. The Buckeye campground has been recently renovated.

Small Projects. New exhibits have been installed at the Foothills visitor center and are being planned for Grant Grove and Cedar Grove.

Utility system replacements have occurred throughout the parks (Cedar Grove, Ash Mountain, Giant Forest) to bring aging systems up to state standards.

Private Land within the Parks

Wilsonia. Some seasonal cabins in the historic district are being remodeled and converted for year-round use. The county has zoned the land as residential, and the NPS *Land Protection Plan* (NPS 1984) limits expansion to no more than 25% based on square footage. There are small lots and individual water and wastewater systems. Wilsonia is a historic district on the National Register of Historic Places, with a majority of the cabins as contributing elements. Sale prices on cabins have been increasing.

Silver City. Silver City is essentially built out, with almost all privately owned lots now occupied by summer residences. Little change is expected in this area in the near future.

Kaweah Han. The Kaweah Han property was purchased in 2002 and will remain as a private residence for the foreseeable future.

Oriole Lake. Four private properties and a number of facilities have been removed. The area is surrounded by wilderness.

Plans and Programs of Other Federal Agencies

Wilderness Management Plans. Adjacent wilderness areas include John Muir, Monarch, Jennie Lakes, and Golden Trout. These areas will remain in an undeveloped state.

Lake Kaweah (Terminus Reservoir). The Army Corps of Engineers raised the reservoir on the lower Kaweah River west of Three Rivers by 20 feet, increasing storage by 42,000 acre-feet. NPS staff are not aware that this project will have any direct effect on the parks.

Sierra Nevada Framework for Conservation and Collaboration. The Sierra Framework provides general guidance for all national forest lands in the Sierra Nevada. All USFS land that immediately adjoins Sequoia and Kings Canyon is either designated wilderness or is part of Giant Sequoia National Monument.

Giant Sequoia National Monument. Giant Sequoia National Monument now surrounds the entire Grant Grove section of Kings Canyon National Park, including both sides of the Redwood Canyon / Redwood Mountain parklands corridor that connects Grant Grove to Sequoia National Park. Generals Highway passes through national monument lands between the two parks. California Highway 180 east of Grant Grove passes through monument lands on its way to Cedar Grove and Kings Canyon National Park. National monument lands also adjoin Sequoia National Park in the Stony Creek area and south of Sequoia National Park.

There are a number of visitor destinations and facilities in Giant Sequoia National Monument — Montecito-Sequoia Resort (provides year-round programs), Hume Lake Christian Camp, Stony Creek Lodge, Kings Canyon Lodge, and Boyden Cave. Portions of California 180 will be rehabilitated in the area, improving access to the Hume Lake and the Cedar Grove area. Giant Sequoia National Monument and Kings Canyon National Park are both entered by way of California 180, with impacts on Grant Grove village.

In January 2004 the Forest Service issued the *Sierra Nevada Forest Plan Amendment* to improve the protection of old forests, wildlife habitats, watersheds, and communities in the Sierra Nevada and the Modoc Plateau (USFS 2004). The new plan will reduce the number of acres burned by severe wildfires by more than 30% within the next 50 years. It will double the acres of large old-growth trees and California spotted owl nesting habitat over the next 50 years. Around communities, fuels will be reduced on about 700,000 acres over the next 20 years, helping to protect them from severe wildfires.

Local Plans and Programs

Three Rivers. The current local planning document for Three Rivers is the 1981 *Community Plan*. This plan forecast that the community would grow from 1,645 persons in 1980 to 3,445 in 2000; however, the 2000 census reported that Three River's population was only 2,248. As an unincorporated community, Three River's growth has been incremental, consisting of many small projects, each with its own utility infrastructure, since there are no community water or wastewater systems. In recent years, one large (100+ rooms) national chain motel has been constructed, adding to the dozen or so motels that provide visitor lodging. Otherwise, commercial development within the community remains small-scale. Most development is in the form of upscale residential homes, with new residences occupying multi-acre tracts. Generally, Three Rivers is one of the most prestigious and expensive places to live in Tulare County. A spa has been under development for several years, a local winery has been established, and there is a golf course. Seasonal river rafting has been introduced, diversifying recreational opportunities.

A new community plan is being drafted by a volunteer group of Three Rivers residents, but it will not be approved until the Tulare County plan has been finished. A preliminary draft has been released for public review, and it envisions Three Rivers as an amenity-based residential community, with the natural environment as the

primary amenity. Before it becomes official, however, the plan will need to be approved by the Tulare County Planning Department and the Board of Supervisors. This process has yet to be completed, and no date for completion has been made public.

Squaw Valley. Squaw Valley in Fresno County is the most clearly defined community along California 180 as it approaches Kings Canyon National Park from the west, but it is less clearly defined than Three Rivers. According to the 2000 census, it had a population of 2,691, but the level of commercial development is much less than Three Rivers. There is no significant tourist development in the Squaw Valley area, and it appears that the community does not depend on tourist traffic for its livelihood.

Fresno and Tulare Counties. Regional growth continues to be very strong in both Fresno and Tulare counties, growing at rates exceeding 10% per decade, with resulting demands on roads and services. According to the 2000 census, Fresno County had a population of 799,407, and Tulare County, 368,021. The current planning document for the foothills area of Tulare County is the 1981 *Foothills Growth Management Plan*.

California Department of Transportation (Caltrans) The November 2002 *California State Transportation Improvement Plan* proposes a number of projects that are related to the future of Sequoia and Kings Canyon National Parks:

- California Highway 180, which leads to the Big Stump entrance in Kings Canyon National Park, is slated for improvement. The project will widen the highway to a six-lane freeway to Centerville and to a four-lane expressway to the foot of the Sierra east of Minkler. At this time the following four segments have been funded: (1) Chestnut Avenue to Clovis Avenue, scheduled for the summer of 2005; (2) Clovis Avenue to Temperance Avenue (which would connect the freeway to Kings Canyon Road), summer 2007; (3) Temperance Avenue to Academy Avenue, summer 2008; and (4) Academy Avenue to Trimmer Springs Road (four lanes), summer 2008. The

segment from Trimmer Springs Road to Frankwood has not yet been funded, but could occur in 2010.

- California Highway 65 from Bakersfield is slated for improvements to divert traffic from California 99. Caltrans has held scoping meetings about extending California 65 to the north along the foothills as far as Madera County. This “Sierra Foothill Freeway” could greatly increase access and development west of the parks.
- Increased train service has been proposed between central California, Los Angeles, and the San Francisco Bay area (Caltrans 2002a). High-speed rail transit service would connect central California with both San Francisco and Los Angeles. A *Final Environmental Impact Report / Environmental Impact Statement* for the project was released in August 2005 (California High-Speed Rail Authority and the Federal Railroad Administration 2005).

IMPAIRMENT OF PARK RESOURCES OR VALUES

The National Park Service is prohibited from impairing park resources and values by its Organic Act. The NPS *Management Policies 2001* (section 1.4.5) state “an impairment . . . is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values.” In addition, the *Management Policies* state “whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.”

The determination of impairment is closely tied to the outcome of the resource impact analysis. This determination is also made with a parallel consideration of the park’s legislative mandates (purpose and significance), and resource man-

agement objectives as defined in its general management plan or other relevant plans.

NPS managers must always seek ways to avoid or minimize to the greatest degree practicable adverse impacts on park resources and values. However, the laws do give NPS managers discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute an impairment of the affected resource and value. However, the authority given to NPS managers is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. However, as stated in the *Management Policies*, an impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the parks’ general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing park resources, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. A determination of impairment is made for each impact topic for natural and cultural resources, because these are the resources and values that could be impaired for future generations.

Natural Resources

CAVE RESOURCES

Context

The two parks contain some of the most extensive and least impacted caves in the western United States. Many caves are in isolated areas and are not well known to the general public. Crystal Cave is the only cave now open to guided cave tours, and improvements have been made to facilitate visitation and resource protection (e.g., paved walkways, lighting, railings). Crystal Cave tours are the only opportunities for the general public to experience and learn firsthand about cave environments. Present management programs control visitor-related impacts, localizing effects such as dust and lint accumulation. Several caves, including Clough Cave (which was formerly used commercially), have been affected by past use. However, rubble removal and other restoration efforts are underway.

Impacts of the No-Action Alternative

Analysis. Public access to Crystal Cave would continue, and the development that supports cave tours would remain. Long-term alterations of the natural cave environment in the portion that is developed for visitor use would continue. Existing management programs to control impacts (e.g., designated trails, visitor education on the fragility of caves, guided/supervised tours) would help avoid or minimize additional impacts that could occur, such as trampling or the breaking or touching of speleothems (NPS 1992a).

Public use of a limited number of other caves would continue. The potential for impacts from trampling or disturbance to fauna and habitat, destruction or damage of cave formations, deposition of dust and lint, and degradation of water quality would be minimal. Most of the parks' other caves are not well known and are not visited by the general public, and existing cave management plans and protective measures would help protect the integrity of these cave

Impact Thresholds for Cave Resources

Negligible — The impact would be at the lower levels of detection or not measurable.

Minor — A cave feature or environment might suffer some slight alteration that would be noticeable.

Moderate — Cave features or the environment would be obviously altered, or a number of features would show changes.

Major — Impacts on cave features or the environment would result in the permanent loss of an important cave feature or in highly noticeable, widespread changes in many cave features or the environment.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the parks' enabling legislation,
- key to the natural or cultural integrity of the parks or to opportunities for enjoyment of the parks, or
- identified as a goal in this general management plan or other relevant NPS planning documents.

resources. Restricting access to many features, including bat colonies, invertebrate populations, delicate cave formations, archeological sites, and paleontological materials, would help protect these resources. Set numbers of permits and requirements for qualified trip leaders would limit access to caves with delicate features, and caves with particularly sensitive features and fauna would remain closed to recreational use. Other existing management provisions to protect resources include (1) no camping, removal of cave features, or depositing of human wastes; (2) guidelines to minimize disturbance to cave-

dwelling animals; (3) inventorying and monitoring of resource conditions, along with identifying impacts and mitigation; and (4) gating of entrances. Consequently, most caves would remain unaffected; a few caves could sustain localized negligible to minor, adverse, long-term impacts from limited and highly regulated recreational use.

Cumulative Impacts. Most caves in the parks retain their natural character and have not been altered. Varying degrees of disturbance from past use have occurred in some caves, particularly the larger and more accessible caves, such as Crystal, Clough, White Chief, and Soldiers. Past damage includes broken speleothems, trampled invertebrates, compacted soils, sediment transport on clothes, litter, deposits of toxic spent carbide, and the alteration of airflow and microclimates due to digging. Crystal Cave and the formerly commercialized Clough Cave contain extensive areas of disturbance from past trail construction and blasting. Rubble deposits from blasting create unnatural habitats and alter microclimates, and fragile cave features have been broken. Management provisions to maintain and improve conditions over the long term would continue (e.g., removing rubble, cleaning dispersed sediments, gating). No future development of caves is proposed. Most caves would remain unaffected and in good condition, and restoration efforts would continue, so the cumulative impacts for all caves in the parks would be beneficial, minor to moderate, and long term.

Conclusion. At Crystal Cave limiting use and pursuing existing management programs to control impacts would not result in any additional long-term impacts, which would remain negligible. A few caves could sustain localized negligible to minor, adverse, long-term impacts from limited recreational use. Most of the parks' other caves, including those with particularly sensitive resources, would remain unaffected.

Most caves in the parks retain their natural character and have not been altered. The cumulative effects on all park caves (including those that would be open to recreational use) would be minor to moderate, beneficial, and long term.

In accordance with the criteria for impairment of resources, the no-action alternative would not impair park resources or values associated with caves.

Impacts of the Preferred Alternative

Analysis. As described for the no-action alternative, the vast majority of caves within the parks would remain in good condition and would retain their natural integrity, protected by their isolation and existing cave management plans. Permitted use in a few caves would be limited, but it could result in long-term damage to cave resources as described for the no-action alternative (such as trampling or disturbing of fauna and habitat, destroying or damaging cave formations, depositing dust and lint, and degrading water quality). With continued implementation of management provisions to protect resources, such as access restrictions and requirements for qualified trip leaders, any adverse impacts to caves where limited recreational use was allowed would be localized and negligible to minor in extent.

As described for the no-action alternative, the long-term alteration of the natural cave environment in the portion of Crystal Cave developed for visitor use would continue. Existing management programs to control impacts (e.g., designated trails, visitor education on the fragility of caves, guided/supervised tours) would help to avoid or minimize additional impacts that could occur, such as trampling, breaking, or touching speleothems.

Cumulative Impacts. As described under the no-action alternative, varying degrees of disturbance from past use have occurred in some caves (for example, Crystal, Clough, White Chief, and Soldiers). Management programs to minimize and repair damage would continue, resulting in improved conditions over the long term. However, most caves in the parks retain their natural character and have not been altered. No future development affecting caves within the parks is proposed, most caves would remain unaffected and in good condition, and restoration efforts would continue, so the cumulative

impacts for all caves in the parks would be minor to moderate, beneficial, and long term.

Conclusion. The preferred alternative would provide a high degree of protection for the vast majority of high-quality caves in the parks, with a standard of visitor use for the others that would ensure protection of their natural integrity. Most caves, including those with particularly sensitive resources, would remain unaffected. Limiting use and undertaking management programs to control impacts would continue in Crystal Cave, and any additional long-term impacts would be negligible. In other caves where limited recreational use was allowed, impacts would be localized, negligible to minor, and long term.

Most caves in the parks retain their natural character and have not been altered. The cumulative effects on all park caves would be minor to moderate, beneficial, and long term. The preferred alternative would contribute a localized minor, adverse impact to the overall cumulative effects in only a few select caves.

The preferred alternative would not impair park resources or values associated with caves.

Impacts of Alternative A

Analysis. The vast majority of the parks' caves would continue to remain in good condition and retain their natural integrity, protected by their isolation and more restrictive access provisions. Use in a limited number of caves would be restricted to specialists, which would help reduce some long-term damage to cave resources (such as trampling or disturbance to fauna and habitat, destruction or damage of cave formations, deposition of dust and lint, and degradation of water quality). Compared to the no-action alternative, impacts would be reduced and would be negligible to minor, beneficial, and long term.

While the portion of Crystal Cave developed for public tours would continue to be open to visitors under alternative A, present programs and measures would ensure that any future impacts were negligible.

Cumulative Impacts. While some caves have varying degrees of disturbance from past use, management programs to minimize and repair damage would improve conditions over the long term. Most caves retain their natural character and have not been altered. No future projects affecting caves within the parks are proposed. The overall cumulative effect would be minor to moderate, beneficial, and long term for caves in the parks.

Conclusion. Impacts would be similar to the no-action alternative. Limiting use and undertaking management programs to control impacts would continue at Crystal Cave, and any additional long-term impacts would be negligible. In other caves where use would be restricted to specialists, impacts would be reduced compared to the no-action alternative and would be localized, negligible to minor, adverse, and long term. Most of the parks' caves, including those with particularly sensitive resources, would remain unaffected.

Most caves in the parks retain their natural character and have not been altered. The cumulative effects on all park caves would be minor to moderate, beneficial, and long term. Alternative A would contribute a minor beneficial effect to the overall cumulative effects.

There would be no impairment of park resources or values associated with caves.

Impacts of Alternative C

Analysis. As under the no-action alternative, long-term alteration of the natural cave environment in the portion of Crystal Cave developed for visitor use would continue. As a result of continued management actions to limit the potential for additional impacts (e.g., designated trails, visitor education on the fragility of caves, guided/supervised tours), any additional long-term impacts would be negligible.

Providing guided public tours of additional caves under this alternative would increase the potential for adverse impacts. As under the no-action alternative, recreational use in other caves

could result in long-term damage to cave resources (e.g., trampling or disturbing fauna and habitat, destroying cave formations, depositing dust and lint, and degrading water quality). To minimize impacts, additional tours would occur only after an evaluation of cave resources, an analysis of the impacts of such access, and the identification of protective measures. Only more resilient caves (those with less sensitive or unique features and fauna) would be considered for tours.

In general, the parks' caves would remain in good condition and would retain their natural integrity, protected by their isolation and existing cave management plans and protective measures. Consequently, most caves would remain unaffected, although a few could sustain localized, negligible to minor, adverse, long-term impacts from increased recreational use.

Cumulative Impacts. As described under the no-action alternative, varying degrees of disturbance from past use have occurred in some caves, particularly in the larger, more accessible ones (Crystal, Clough, White Chief, and Soldiers). Programs to minimize and repair damage would improve conditions over the long term. However, most caves in the parks retain their natural character and have not been altered. No future projects affecting caves within the parks are proposed. Even though increased recreational use in a few caves could result in negligible to minor, adverse impacts, the overall cumulative effect would be minor to moderate, beneficial, and long term.

Conclusion. Limiting use and controlling impacts at Crystal Cave would ensure that any additional long-term impacts would be negligible. Providing guided public tours of additional caves would increase the potential for adverse impacts, but a careful selection process would ensure that only the more resilient caves (those with less sensitive or unique features and fauna) would be candidates for tours, resulting in minor, long-term impacts. Most of the parks' other caves, including those with particularly sensitive resources, would remain unaffected. Impacts would be negligible to minor, adverse,

and long term from limited recreational use, including guided tours.

Most caves in the parks retain their natural character and have not been altered. The cumulative effects on all park caves would be minor to moderate, beneficial, and long term. Alternative C would contribute a localized, minor, adverse impact to the overall cumulative effects.

There would be no impairment of park resources or values associated with caves.

Impacts of Alternative D

Analysis. This alternative would allow more tours within the developed portion of Crystal Cave. However, existing management programs to control impacts (e.g., designated trails, visitor education on the fragility of caves, guided/supervised tours) should avoid or minimize additional impacts, such as trampling, breaking, or touching speleothems. Consequently, long-term adverse impacts would be negligible.

Providing guided public tours of additional caves as proposed under this alternative would increase the potential for adverse impacts, such as trampling or disturbing fauna and habitat, destroying or damaging cave formations, depositing dust and lint, and degrading water quality. To minimize impacts, additional tours would occur only after cave resources were evaluated, impacts of increased access analyzed, and protective measures identified so that only the more resilient caves, those with less sensitive or unique features and fauna, would be selected.

Most of the parks' caves would remain in good condition and would retain their natural integrity because they are isolated and because existing cave management plans and protective measures would minimize further impacts.

Cumulative Impacts. As described under the no-action alternative, varying degrees of disturbance from past use have occurred in some caves, particularly in the larger, more accessible caves (Crystal, Clough, White Chief, and Soldiers). Programs to minimize and repair damage

would improve conditions over the long term. However, most caves in the parks retain their natural character and have not been altered. No future projects affecting park caves are proposed. Even though providing guided tours of additional caves could result in minor, adverse impacts to cave resources, the overall cumulative effect would be minor to moderate, beneficial, and long term.

Conclusion. At Crystal Cave use would continue to be limited and impacts controlled; any additional long-term impacts as a result of increased use would be negligible. Providing guided public tours of more caves would increase the potential for adverse impacts, but a careful selection process would ensure that only the more resilient caves would be opened for tours, with minor, long-term impacts. Most of the parks' other caves, including those with particularly sensitive resources, would remain unaffected. Impacts from limited recreational use, including guided tours, would be negligible to minor, adverse, and long term.

Most caves in the parks retain their natural character and have not been altered. The cumulative effects on all park caves would be minor to moderate, beneficial, and long term. Alternative D would contribute a localized, minor, adverse impact to the overall cumulative effects.

There would be no impairment of park resources or values associated with caves.

WATER RESOURCES

Regional Context

Water quality in the Sierra Nevada region has been adversely affected downstream from urban centers, mines, and intensive land-use zones. Other impacts include the accumulation of near-toxic levels of mercury in low and middle elevation reservoirs of the western Sierra Nevada; widespread biological contamination by human pathogens; increased salinity in eastside lakes; and widespread excessive sediment yield into streams. Water quality impacts from regional development include increased contaminants,

such as heavy metals, pesticides, and petroleum products from larger impervious surfaces and runoff and higher risk of ground and surface water contamination from septic effluent disposal. Water diversions and dams have also highly altered natural water flows and hydrology, indirectly changing the biological resources. Beneficial effects are expected from some actions to address ecosystem management issues on lands adjacent to the parks (including the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

Park Context

Within the parks the primary threat to water quality is air pollution from external sources. Surface waters within the parks are quite pure and may be at risk if air pollution and acidic deposition increased in the future, particularly the highly oligotrophic, poorly buffered, higher elevation waterbodies. Loss of natural fire has also affected water characteristics such as nutrients and sediments. The parks' fire management program has reestablished fire as a natural component of the ecosystem.

Localized effects within the parks are associated with park facilities and the use and operation of hydroelectric facilities. Infrastructure that supports park facilities includes the withdrawal of water and the discharge of treated effluent that locally affects hydrology, biology, and nutrient levels immediately downstream. Kaweah hydroelectric plant no. 3 on the Middle Fork of the Kaweah River just outside Sequoia National Park draws water from the Middle and Marble Forks by means of a diversion dam on each fork and flumes. Seasonal minimum release requirements have been established for each fork to prevent diversions when flows decrease below seasonal minimum levels. The Kaweah no. 1 generating facility draws its water below the park but uses four storage dams above Mineral King.

Impact Thresholds for Water Resources

Negligible — The impact would be at the lower levels of detection or not measurable.

Minor — Changes in water resources would be measurable and localized to specific stream reaches, and they would involve sources of pollution that do not persist in the environment.

Moderate — Changes in water resources would be clearly detectable, would cause an appreciable change in water resources in a localized area, and would involve sources of pollution that are persistent in the environment.

Major — Changes in water resources would occur on a regional or watershed scale and would involve sources of pollution that are persistent in the environment.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the parks’ enabling legislation;
- key to the natural or cultural integrity of the parks or to opportunities for enjoyment of the parks; or
- identified as a goal in this general management plan or other relevant NPS planning documents.

Impacts Common to All Alternatives

Small-scale, historic hydroelectric facilities on the Marble and Middle Forks of the Kaweah River and four dams in Mineral King that feed the East Fork of the Kaweah River will continue, if permitted by the secretary of the interior, to operate in accordance with the conditions imposed by Congress in Public Law 108-447, with no additional effects on water resources.

Requiring Mineral King permit cabin owners to meet state and local wastewater regulations when special use permits are renewed would

eliminate possible localized sources of pollution, thus decreasing potential impacts to water quality and biological communities. This would be a minor, beneficial, long-term effect.

Impacts of the No-Action Alternative

Analysis. Slight increases in levels of sediment, fuels, turbidity, and nutrients in park waters from greater use of facilities, parking areas, roads, picnic areas, and trails would result in localized, indirect effects on water quality. Vehicle use along roads and parking areas would deposit petroleum products that could be washed into nearby waters. Increased soil compaction, vegetation trampling, and loss of vegetation in some areas could lead to greater erosion and the addition of sediment to nearby waters. Water pollution (e.g., elevated nutrient or bacterial levels or reduction in biological oxygen demand) would also occur from trash or human/stock wastes deposited in or near streams. With increased use along some streams, particularly more popular day use areas associated with river access (e.g., the Middle Fork of the Kaweah River), some localized decreases in water quality would likely occur as a result of visitors causing soils to erode and disturbing stream bottom sediments. Mitigation would help minimize visitor impacts (e.g., visitor education programs, placement of sanitation facilities, setbacks from water for camping, washing, and human waste disposal). Impacts on water quality would be localized, minor, and adverse over the long term.

Beneficial effects on water quality would result from redesigning some developed areas (e.g., rebuilding portions of the Lodgepole campground, redesigning/relocating bridges over the South Fork of the Kings River) and removing facilities (e.g., structures on inholdings that were purchased from willing sellers). Beneficial effects would result from reduced understory trampling and compaction and subsequent soil erosion, and from more opportunities to revegetate disturbed areas and to restore more natural conditions. The operating status of private septic systems (Wilsonia, Mineral King) are unknown; however, eliminating septic systems associated with the private inholdings acquired from will-

ing sellers in the Mineral King area and Wilsonia would eliminate a potential localized source of pollution. These actions would affect a few, relatively small sites within the parks, reducing but not eliminating use and development in the areas and resulting in localized, minor, beneficial effects to water quality over the long term. Moderate, localized, adverse effects might occur if private waste disposal did not meet state water quality standards.

Park wastewater treatment facilities need to be upgraded to minimize potential impacts and to meet new state effluent disposal regulations. Environmental constraints such as adequate soils, slopes, and distance to waterbodies may preclude the expansion of some disposal operations. Even with proper waste disposal, elevated nutrient levels and conductivity above natural background levels would continue within the immediate downstream reaches. A minor increase in these effects might occur if disposal operations were expanded because of increased visitor use within the parks.

Based on existing floodplain information, relocating campsites more than 100 feet from the river would leave only a small portion of the Cedar Grove and Cold Spring campgrounds within the 100-year floodplains. Localized impacts to floodplain characteristics such as water recharge capacity and flood dissipation would be negligible. The redesign or relocation of bridges over the South Fork of the Kings River would have localized, minor to moderate, benefits on hydrological processes, increasing the free-flowing condition of the river. Additional minor alterations to natural hydrology and biological communities of some streams would occur as water diversions increased over time with more visitation. Moderate, adverse impacts could occur to some river reaches during drought periods. Water conservation actions would still be implemented during drought or low-flow periods to minimize withdrawals and impacts. Downstream impacts would decrease because more tributaries augment streamflow below the point of withdrawal.

Cumulative Impacts. Cumulative effects on water resources are based on an analysis of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with the potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on a regional scale, this alternative's contribution to those effects would be incremental and localized.

As described in the "Context" section, there have been major water quality impacts in the Sierra Nevada region from various causes. Within the parks some ongoing and future restoration projects (e.g., the Giant Forest development area) and proposed development projects (e.g., expanded visitor facilities at Grant Grove and Wuksachi village per the concession a contract, and construction related to the Giant Forest transit system) would contribute to both beneficial and adverse effects. Water usage would be substantially reduced as a result of removing development at Giant Forest, more than offsetting expected increases in water use from future development at Wuksachi. Some localized, minor impacts such as erosion or sedimentation from construction would be mitigated by using best management practices (such as sediment fences and revegetation). Also, actions by the U.S. Forest Service that would address ecosystem management issues on adjacent lands could have cumulative beneficial effects by reducing water resource impacts from such activities as logging (e.g., the Sierra Nevada Framework for Conservation and Collaboration, management plans for adjacent wilderness areas, and a Giant Sequoia National Monument management plan).

Even though some actions would have beneficial, long-term effects in the parks and region, there would continue to be major, adverse, cumulative water resource impacts in the Sierra Nevada region from various causes, with the greatest impact to waters within the park posed by regional air pollution. The no-action alternative would contribute a minor to moderate, adverse increment to these effects over the long term as a result of accommodating increased use, but it would contribute a minor to moderate,

beneficial, long-term impact because some facilities would be removed or redesigned.

Conclusion. The no-action alternative would have minor to moderate, beneficial effects as a result of removing and redesigning facilities. Continued use and development, along with increased visitation, would have localized, minor to possibly moderate, adverse, long-term impacts on water quality, hydrologic processes, and biological communities.

On a cumulative basis, even though the no-action alternative would result in localized, minor to moderate, beneficial effects, and some minor adverse impacts, the net major impact on regional water resources would be adverse and long term, primarily because of impacts from land use and development outside the parks.

In accordance with the criteria for determining impairment, there would be no impairment of park resources or values.

Impacts of the Preferred Alternative

Analysis. Under the preferred alternative no increase would be allowed in existing net average water withdrawals during the low-flow season to support park development and use. Facilities would be limited in some areas to those that can be sustained by current water supply (e.g., Grant Grove and Ash Mountain), and water conservation programs would be expanded to limit and reduce water demand. Compared to the no-action alternative, the preferred alternative would have minor to moderate beneficial effects to the natural hydrology and biological communities of some streams, depending on the extent that water flow diversions would be reduced.

Providing better located and designed trails and defining river access points, particularly along the South Fork, Marble Fork, and Middle Fork of the Kaweah River near major developed areas, along with concentrating use in specific areas, would have localized, minor, beneficial effects on water quality. The intent would be to decrease impacts such as soil compaction, vege-

tation trampling, and loss of vegetation that leads to erosion and the addition of sediment to nearby waters. In addition, a number of actions would reduce the localized indirect effects from runoff containing sediments, fuels, or nutrients. Actions would include limiting backcountry use in some areas, relocating facilities such as the Mineral King pack station to improve resource conditions, and possibly expanding the shuttle system and reducing private vehicle use. These actions would result in minor, beneficial, long-term, primarily localized effects on water quality.

As under the no-action alternative, increased use of facilities, parking areas, roads, picnic areas, and both frontcountry and backcountry trails would continue to have localized, minor, adverse effects from sediment, fuels, turbidity, and nutrients. However, under the preferred alternative actions such as modifying backcountry use and relocating facilities like the Mineral King pack station to improve resource conditions, as well as possibly expanding shuttle systems to reduce vehicle use, would reduce those impacts, resulting in a minor, beneficial effect compared to that under the no-action alternative. New facility construction would affect vegetation and soils in the vicinity, resulting in temporary water quality impacts (e.g., erosion-induced sedimentation and turbidity). Mitigation would help minimize visitor impacts (e.g., visitor education programs, placement of sanitation facilities, setbacks from water for camping, washing, and human waste disposal). Impacts would be localized and negligible to minor in intensity after mitigation.

The operating status of private septic systems in Wilsonia is unknown. Eliminating septic systems associated with private inholdings acquired from willing sellers would eliminate possible localized sources of pollution, thus decreasing potential impacts to water quality and biological communities. This would be a minor, beneficial, long-term effect, although moderate beneficial effects would result if water quality standards were exceeded. The possibility of water pollution is related to a number of environmental constraints such as adequate soils, slopes, and

distance to waterbodies, as well as to the adequacy of the design, operation, and maintenance of the septic or other disposal systems.

As described for the no-action alternative, park wastewater treatment facilities need to be upgraded to meet new state effluent disposal regulations and expanded to process increased wastewater loads under this alternative. Environmental constraints (adequate soils, slopes, and distance to waterbodies) could preclude expanding some disposal operations. Even with proper waste disposal, elevated nutrient levels and conductivity above natural background levels would continue within the immediate downstream reaches. A minor increase in the extent of this effect could occur due to the disposal of additional treated wastewater.

No new or relocated facilities would be placed within currently mapped 100-year floodplains, and no impacts to floodplains are expected. More detailed floodplain analyses would be completed prior to any new construction or property acquisition to confirm that facilities were sited outside the floodplains. Redesigning or relocating bridges over the South Fork of the Kings River would have localized, minor benefits on hydrological processes, with resulting benefits to biological communities. Adverse impacts from facility removal would result in short-term, minor, adverse impacts, such as bank disturbance and increased erosion potential. The extent and duration of these impacts would be minimized by careful design and timing of facility removal, temporary erosion control measures, and follow-up restoration efforts.

Cumulative Impacts. Cumulative effects on water resources are based on an analysis of past, present, and reasonably foreseeable actions in the Sierra Nevada region in combination with the potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on the regional level, this alternative's contribution to those effects would be incremental and localized.

As described in the "Regional Context" section, there have been various causes of major water

quality impacts in the region. Within the parks some ongoing and future restoration projects (e.g., the Giant Forest development area) would contribute beneficial effects. Water usage has been substantially reduced by removing development at Giant Forest, more than offsetting an expected increase in water use from future development at Wuksachi. Proposed projects (e.g., expanding visitor facilities at Grant Grove and Wuksachi village, and constructing the Giant Forest transit system and associated facilities) would cause localized, short-term impacts such as erosion or sedimentation during construction, which would be mitigated by using best management practices such as sediment fences and revegetation. Also, actions by the U.S. Forest Service that would address ecosystem management issues on adjacent lands could have cumulative beneficial effects by reducing water resource impacts from such activities as logging (e.g., the Sierra Nevada Framework for Conservation and Collaboration, management plans for adjacent wilderness areas, and a Giant Sequoia National Monument management plan).

Even though some actions would have beneficial, long-term effects in the parks and region, there would continue to be major, cumulative water resource impacts in the greater Sierra Nevada region, with the greatest impact to waters within the park posed by regional air pollution. The preferred alternative would contribute minor to moderate, beneficial, long-term effects as a result of limiting, replacing, or redesigning facilities, and precluding increased water withdrawals. It would also contribute negligible to minor, short-term, adverse effects as a result of limited new development.

Conclusion. The preferred alternative would result in minor to moderate, beneficial effects to water quality, the free-flowing condition of the South Fork of the Kings River, floodplains, and biological communities. Contributing factors include no increased water withdrawals, better located and designed trails and river access points, improved backcountry conditions, and redesigned or relocated facilities. Site-specific, construction-related impacts would be minor, adverse, and short term.

On a cumulative basis, this alternative would primarily contribute minor to moderate, beneficial cumulative effects. Adverse cumulative impacts within the parks would be localized, short term, and minor. In conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts on water resources in the region, primarily from land use and development outside the parks.

Similar to the no-action alternative, there would be no impairment of park resources or values.

Impacts of Alternative A

Analysis. In general, overall reductions in use and development and the elimination of stock use and pack stations would reduce erosion, sedimentation, nutrients, bacteria, and turbidity associated with human and stock use. As a result, opportunities for revegetation and stream-bank restoration would be increased. Lower use levels and concentrating trails and campsites throughout the backcountry would reduce the risk of changes to water quality resulting from sediment transport or improper waste disposal and would reduce impacts to sensitive shoreline resources, including herbaceous meadow communities and amphibian populations.

Reduced use and fewer access points along rivers (South Fork, Marble Fork, and Middle Fork,) near major developed areas would help reduce the extent of visitor degradation of stream-banks and channels, which in turn affects water quality and habitat for biological communities.

Elevated nutrient levels and conductivity of nearby streams below existing wastewater sprayfields should be reduced in extent. These actions would result in localized, minor, beneficial, long-term effects on water quality and biological communities, particularly where facilities or high-use areas near streams were reduced or eliminated (e.g., campgrounds at Lodgepole and Cedar Grove, and the Mineral King pack station).

Expanding the Cold Spring campground would add to visitor-related impacts such as erosion and sedimentation, although the campground would remain relatively small and use low. Impacts would likely be negligible to minor.

Temporary adverse effects on water quality (e.g., erosion, sedimentation, turbidity) and biological communities would occur within the parks as a result of removing facilities, constructing limited new facilities, or expanding existing facilities, and outside the parks as a result of relocating facilities. These effects would be localized and would be mitigated to the extent possible. Impacts would be minor and short term.

A small portion of the Cedar Grove campground would be reduced or removed from within the 100-year floodplain, a localized negligible benefit to floodplain characteristics like water recharge capacity and flood dissipation. Redesigning or relocating bridges over the South Fork of the Kings River, and incrementally decreasing water diversions would have localized, minor to moderate benefits on hydrological processes and biological communities because free-flowing conditions would be reestablished on some rivers and tributaries.

Cumulative Impacts. Cumulative impacts on water resources are based on an analysis of past, present, and reasonably foreseeable actions in the Sierra Nevada region in combination with the potential effects of this alternative. This alternative's contribution to those effects would be incremental and localized.

As described in the "Regional Context" section, there have been various causes of major water quality impacts in the Sierra Nevada region. Within the parks ongoing and future restoration projects (e.g., the Giant Forest development area) would contribute beneficial effects. Water usage would be substantially reduced by removing development at Giant Forest, more than offsetting expected increased water use as a result of future development at Wuksachi.

Proposed development projects (e.g., expanded visitor facilities at Grant Grove and Wuksachi village, and construction of the Giant Forest transit system) would cause some localized, short-term impacts during construction, such as erosion or sedimentation, which would be mitigated by using best management practices (e.g., sediment fences and revegetation). Also, actions by the U.S. Forest Service to address ecosystem management issues on adjacent lands could have cumulative beneficial effects by reducing water resource impacts from such activities as logging (e.g., the Sierra Nevada Framework for Conservation and Collaboration, management plans for adjacent wilderness areas, and a Giant Sequoia National Monument management plan).

Even though some actions would have beneficial, long-term effects in the parks and region, there would continue to be major, cumulative water resource impacts in the greater Sierra Nevada region, with the greatest impact to waters within the park posed by regional air pollution. Alternative A would contribute a minor to moderate, beneficial, long-term effect as a result of limiting, replacing, or redesigning facilities, and precluding increased water withdrawals. It would also contribute a negligible to minor, adverse, short-term increment to these effects as a result of limited new development.

Conclusion. Alternative A would result in minor to moderate, beneficial, long-term effects on water quality, floodplains, biological communities, and hydrological processes as a result of removing facilities, and reducing high-use areas near streams or lakes. Adverse impacts from limited new development and facility removal would be minor and short term.

On a cumulative basis, even though alternative A would result in an incremental beneficial impact, when combined with past, present, and reasonably foreseeable actions, there would be a net major, adverse, long-term impact on regional water resources, primarily from land use and development outside the parks. This alternative would contribute minor to moderate beneficial effects to the overall cumulative impact. Ad-

verse incremental impacts in the parks would be localized, minor, and short term.

As described for the no-action alternative, there would be no impairment of park resources or values.

Impacts of Alternative C

Analysis. Increased levels of sediment, fuels, turbidity, and nutrients would be associated with the increased use of facilities, parking areas, roads, picnic areas, and trails, with continued indirect, localized effects on water quality. Vehicle-related petroleum deposits on roads and parking areas could be washed into nearby waters. Increased soil compaction, vegetation trampling, and loss of vegetation in some areas could lead to greater erosion and addition of sediment to nearby waters. Water pollution would also occur from trash or human/stock wastes deposited in or near streams. Mitigating measures (e.g., visitor education, placement of sanitation facilities, setbacks from water for camping, washing, and human waste disposal) would help minimize visitor-related impacts. New facility construction would result in site-specific impacts to vegetation and soils, with temporary adverse effects on water quality (e.g., erosion, sedimentation, turbidity). In general, increased use and new development in the parks would result in localized, minor, adverse impacts on water quality over the long term.

Alternative C would also have negligible to minor localized benefits to water quality. The expansion of shuttle services would decrease private motor vehicle use on some park roads, potentially decreasing the deposition of petroleum products and potential pollutant runoff. Better locating and designing trails and river access points, particularly along the South Fork, Marble Fork, and Middle Fork near major developed areas, would concentrate use in specific areas. This would decrease the current extent of impacts such as soil compaction, vegetation trampling, and loss of vegetation that lead to erosion and the addition of sediment to nearby waters. Dispersing use and reducing the extent of areas that allow more concentrated human and

stock use in the backcountry would pose less risk of water quality changes due to sediment transport or improper waste disposal and would reduce impacts to sensitive resources, including herbaceous meadow communities and amphibian populations.

As described for the no-action alternative, park wastewater treatment facilities need to be upgraded to meet new state effluent disposal regulations and expanded to process increased wastewater loads generated under this alternative. Environmental constraints such as adequate soils, slopes, and distance to waterbodies could preclude the expansion of some disposal operations. Even with proper waste disposal, elevated nutrient levels and conductivity above natural background levels would continue within the immediate downstream reaches. The extent of this effect could increase incrementally with the disposal of additional treated wastewater.

Based on floodplain information, no new or relocated facilities would be located within 100-year floodplains, and no impacts to floodplains are expected. More detailed floodplain analyses would be completed prior to new construction or property acquisition to confirm that facilities were outside floodplains. Redesigning or relocating bridges over the South Fork of the Kings River would have a minor to moderate, localized benefit on hydrological processes and biological communities as a result of increasing free-flowing conditions. Minor, incremental effects to the natural hydrology and biological communities of some streams would continue due to increased water diversions. Downstream impacts would decrease as more tributaries augmented streamflow below the point of withdrawal.

Cumulative Impacts. As described in the “Regional Context” section, major water quality impacts in the Sierra Nevada region have various causes. Within the parks some ongoing and future restoration projects (e.g., the Giant Forest development area) would contribute beneficial effects by reducing water usage, more than offsetting an expected increase in water use from future development at Wuksachi.

Proposed development projects (e.g., expanded visitor facilities at Grant Grove and Wuksachi village, and the construction of the Giant Forest transit system) would contribute some localized, short-term impacts from erosion or sedimentation, which would be mitigated by using best management practices (e.g., sediment fences and revegetation). Also, ecosystem management actions by the U.S. Forest Service could have cumulative beneficial effects by reducing water resource impacts from such activities as logging.

Even though some actions would have beneficial, long-term effects in the parks and region, major, cumulative water resource impacts in the greater Sierra Nevada region would continue, with the greatest impact to waters within the park posed by regional air pollution. Alternative C would contribute a long-term, minor to moderate, beneficial effect as a result of limiting, replacing, or redesigning facilities, and precluding increased water withdrawals. It would also contribute a negligible to minor, adverse increment over the short term to these effects as a result of limited new development.

Conclusion. Alternative C would result in minor beneficial effects on water quality, the free-flowing condition of the South Fork of the Kings River, and biological communities as a result of providing better located and designed trails and river access points, expanded shuttle systems, and less concentrated backcountry use. Increased use and development over the long term would have localized, minor, adverse impacts on water quality and biological habitat. Minor, short-term, site-specific impacts would occur from construction activities. Minor, incremental adverse effects to the natural hydrology and biological communities of some streams would occur due to increased water diversions.

On a cumulative basis, alternative C would contribute minor to moderate, beneficial impacts; adverse impacts within the parks would be minor, localized, and short term. In conjunction with past, present, and reasonably foreseeable actions, there would be major, adverse, long-term, cumulative impacts on water resources in the region, primarily from land use and develop-

ment outside the parks, similar to the no-action alternative.

There would be no impairment of park resources or values.

Impacts of Alternative D

Analysis. Increased levels of sediment, fuels, turbidity, and nutrients would be associated with greater visitor use of facilities, parking areas, roads, picnic areas, and trails, resulting in indirect, localized effects on water quality and biological communities. Petroleum products deposited on the surfaces of roads and parking areas by vehicles could be washed into nearby waters. Increased soil compaction, and vegetation trampling and loss in some areas could lead to greater erosion and the addition of sediment to nearby waters. Water pollution would also occur from trash or human/stock wastes deposited in or near streams. In general, increased front-country use and new development in the parks would result in localized, minor, adverse, long-term impacts on water quality.

In popular backcountry areas alternative D could have minor to moderate, adverse, long-term impacts to localized water quality and sensitive shoreline resources as a result of concentrating use and expanding the extent of use areas. In areas of more intensive use, the risk of impacts to water quality would be greater as a result of sediment transport or improper waste disposal, and herbaceous meadow communities and amphibian populations could be affected by trampling. Mitigating measures (e.g., visitor education, placement of sanitation facilities / backcountry toilets, setbacks from water for camping, washing, and human waste disposal) would help minimize impacts.

Facility construction would result in impacts to nearby vegetation, soils, and aquatic resources, with temporary adverse effects on water quality (e.g., erosion, sedimentation, turbidity) and biological communities. Impacts would be mitigated to the extent possible, and the effects would be minor, localized, and short term.

Alternative D would have negligible to minor localized benefits to water quality. Expanding shuttle services would decrease private motor vehicle use on some park roads, potentially decreasing the deposition of petroleum products and pollutant runoff. Providing better located and designed trails and river access points, particularly along the South Fork, Marble Fork, and Middle Fork near major developed areas would concentrate use in specific areas. This would decrease the current extent of impacts (such as soil compaction, vegetation trampling, and loss of vegetation) that lead to erosion and the addition of sediment to nearby waters.

As described for the no-action alternative, park wastewater treatment facilities need to be upgraded to meet new state effluent disposal regulations and expanded to process greater volumes of wastewater loads under this alternative. Environmental constraints such as adequate soils, slopes, and distance to waterbodies could preclude the expansion of some disposal operations. Even with proper waste disposal, elevated nutrient levels and conductivity above natural background levels would continue within the immediate downstream reaches. The extent of this effect could increase incrementally with the disposal of additional treated wastewater.

Based on floodplain information, no new or relocated facilities would occur within 100-year floodplains, and no impacts to floodplains are expected. More detailed analyses would be completed before any construction or property acquisition to confirm that facilities were outside floodplains. Redesigning or relocating bridges over the South Fork of the Kings River would increase free-flowing conditions, resulting in minor, localized benefits on hydrological processes and biological communities. Minor, incremental effects to the natural hydrology and biological communities of some streams would continue due to increased water diversions. Downstream impacts would decrease as more tributaries augmented streamflow below the point of withdrawal.

Cumulative Impacts. As described in the “Regional Context” section, major water quality

impacts have been caused throughout the Sierra Nevada region. Within the parks some ongoing and future restoration projects (e.g., Giant Forest) would contribute beneficial effects by reducing water usage, more than offsetting expected increased water use from future development at Wuksachi. Proposed developments (concession facilities at Grant Grove and Wuksachi village, the Giant Forest transit system) would contribute some localized, short-term, construction-related impacts such as erosion and sedimentation. Also, U.S. Forest Service actions to address ecosystem management issues on adjacent lands could have cumulative beneficial effects by reducing water resource impacts from activities such as logging.

Long-term impacts under alternative D would be minor to moderate and both adverse and beneficial. In conjunction with past, present, and reasonably foreseeable actions throughout the region, there would continue to be major, adverse, long-term, cumulative impacts to regional water quality, hydrology, and biological communities.

Conclusion. Alternative D would result in minor to moderate beneficial effects to water quality, the free-flowing condition of the South Fork of the Kings River, and biological communities as a result of providing better located and designed trails and river access points, and expanded shuttle systems. Increased front-country use and development and more concentrated backcountry use would have minor, adverse, long-term impacts on water quality and biological habitat in localized areas, while construction activities would have minor, short-term, site-specific impacts. Minor, incremental adverse effects to the natural hydrology and biological communities of some streams would occur due to increased water diversions.

On a cumulative basis, long-term impacts within the parks under alternative D would be minor and both adverse and beneficial. In combination with past, present, and reasonably foreseeable actions, there would be major, adverse, long-term, cumulative impacts on water resources in the region. This would primarily be a result of development actions outside the parks.

Similar to the no-action alternative, there would be no impairment of park resources or values.

GENERAL VEGETATION AND SOILS

Regional Context

Regional vegetation and soil resources have been historically altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use. Regional population growth, development, air pollution, and possibly global warming, have also adversely affected vegetation communities. However, beneficial effects are expected from some actions to address ecosystem management issues on lands adjacent to the parks (including those taken in conjunction with the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

Park Context

While many of the parks' native vegetation communities are considered to be intact (with the exception of the foothills herbaceous component), most have been altered to some degree by post-settlement disturbance. This includes logging in some areas in the 1800s, domestic sheep and cattle grazing in all areas during the same period, and cattle grazing into the 1970s in a few areas. Soils and vegetation have been locally altered or lost at various locations as a result of development and concentrated visitor use, including a number of abandoned sites where soils have been disturbed.

Air pollution, historic loss of natural fire regimes, and invasion by exotic pathogens and plant species have also altered and shaped the parks' native vegetation at the landscape scale (see "Ecosystem Stressors" at the beginning of "The Affected Environment" chapter). In more recent times, vegetation and fire management efforts within the parks are restoring more natural vegetation patterns and processes. The parks have been leaders in aggressive fire man-

<p style="text-align: center;"><i>Impact Thresholds for Vegetation</i></p> <p>Negligible — The impact would be at the lower levels of detection or not measurable.</p> <p>Minor — The impact would be detectable and could affect the abundance or distribution of individuals in a localized area, but it would not affect the viability of the local population or overall community size, structure, or composition.</p> <p>Moderate — The impact would be clearly detectable and could have an appreciable effect on the resource. This would include impacts that affect the abundance or distribution of local populations, but not the viability of the regional population. Localized changes to community size, structure, or composition and ecological processes could occur.</p> <p>Major — The impact would be severely adverse or exceptionally beneficial. Impacts would have a substantial, highly noticeable, or widespread influence, affecting the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Community size, structure, or composition and ecological processes would be highly altered, and landscape level changes could be expected.</p> <p style="text-align: center;"><i>Impact Thresholds for Soils</i></p> <p>Negligible — The impact would be at the lower levels of detection or not measurable.</p>	<p>Minor — The impact would be detectable, and there could be changes in soil characteristics (e.g., soil profile, productivity) in a relatively small area, but the change would not increase the potential for erosion of additional soil.</p> <p>Moderate — The impact would be clearly detectable and could have an appreciable effect on the resource. Topsoil characteristics in a small area could be lost or altered. The change would increase the potential for erosion to remove small quantities of additional soil.</p> <p>Major — The impact would be severely adverse or exceptionally beneficial. Impacts would have a substantial, highly noticeable, or widespread influence. The action would result in a permanent loss or alteration of soils in a relatively large area.</p> <p style="text-align: center;"><i>Criteria for Determining Impairment</i></p> <p>An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is</p> <ul style="list-style-type: none"> • necessary to fulfill specific purposes identified in the parks’ enabling legislation, • key to the natural or cultural integrity of the parks or to opportunities for enjoyment of the parks, or • identified as a goal in this general management plan or other relevant NPS planning documents.
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agement and reestablishing fire as a natural component within the parks’ ecosystems.

Impacts of the No-Action Alternative

Analysis. Increased visitor use such as hiking, camping, and horseback riding would contribute to adverse impacts on park soils and vegetation (such as soil compaction, erosion, trampling and loss of vegetative cover, and introduction and spread of nonnative species). However, increased use would most likely occur in areas that already experience high to moderate levels of activity. Limits on overnight backcountry use would not change. Because management pro-

grams to minimize impacts would continue to be used (e.g., visitor education on the impacts of off-trail use, site hardening, trail paving, placement of fences to direct visitor use, designated trails and campsites, higher standard trails where stock use is prevalent, and restoration of impacted sites), any additional impacts from increased use would likely be negligible to minor. These impacts would become more extensive or moderate in intensity if use increased in lightly used or undisturbed areas or where trails were in poor condition or not clearly defined.

Trampling of vegetation could lead to the development of informal trails, resulting in vegetation

loss and soil compaction and erosion, particularly in areas where soils are on slopes or are easily erodible or saturated, or in areas where vegetation is less resistant or resilient. Increased use could also spread exotic species from seeds carried in on vehicles, clothing, or stock, affecting local plant populations. However, most park areas would remain undeveloped and without trails; they would receive little, if any, use.

Developed areas would total about 1,745 acres (0.2% of total park acreage) under the no-action alternative. Some developed areas would be redesigned or reduced in scale (e.g., rebuilding portions of the Lodgepole campground, potentially removing structures on inholdings that were purchased from willing sellers). Such actions would reduce understory trampling, compaction, and soil erosion associated with the use of these facilities, allowing for the revegetation and restoration of more natural conditions. These actions would affect a limited number of sites within the parks, reducing but not eliminating use and development in larger developed areas, with minor, beneficial, long-term effects to vegetation and soils within the montane forest and chaparral communities.

Cumulative Impacts. Cumulative effects on vegetation and soils are based on an analysis of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with the potential effects of this alternative. Whereas widespread, more intensive impacts have occurred throughout the region, this alternative's contribution to those effects would be incremental and localized.

As described in the "Regional Context" section, lands within the greater Sierra Nevada region have been and will likely continue to be altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use, as well as regional population growth and air pollution. Impacts on regional native vegetation patterns and soils have been long term, major, and adverse because of displaced vegetation, reduced plant species diversity and density, introduced exotic species,

fragmented habitats, and widespread erosion and sedimentation.

Within the parks some ongoing and future restoration (e.g., the Giant Forest area), as well as continued vegetation and fire management programs, would benefit resources by restoring more natural vegetation patterns and processes. Proposed development (e.g., expanded concession facilities at Grant Grove and Wuksachi village, the Giant Forest transit system) would have minor, short-term impacts related to construction that would be mitigated through best management practices (e.g., erosion and sediment controls and revegetation). Other beneficial effects are expected from some actions to address ecosystem management issues on lands adjacent to the parks (including the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

Even though some actions in and around the parks could have beneficial effects, long-term cumulative impacts on regional vegetation and soils would continue to be major and adverse because the regional ecosystems in the greater Sierra Nevada have been highly impacted by past and continuing land use and development. The no-action alternative would contribute both beneficial and adverse localized and primarily minor impacts to the cumulative impacts.

Conclusion. The no-action alternative would continue to have negligible to possibly moderate, localized, adverse, long-term impacts on vegetation and soils, primarily in existing areas of concentrated use and development.

On a cumulative basis, the no-action alternative would contribute localized, incremental, minor to moderate, adverse effects and minor beneficial effects on vegetation and soils. In conjunction with past, present, and reasonably foreseeable future actions, there would be major, adverse, long-term, cumulative impacts to vegetation and soils throughout the region because of vegetation displacement, reduced plant species diversity and density, exotic species, habitat

fragmentation, and widespread erosion and sedimentation.

In accordance with the criteria for determining impairment, there would be no impairment of park resources or values.

Impacts of the Preferred Alternative

Analysis. Under the preferred alternative there would be increased visitation and some additional development, primarily in the parks' frontcountry. Development zones would increase by 142 acres, to a total of 1,887 acres, an 8% parkwide increase compared to the no-action alternative, but only about 0.2% of the total park acreage. The construction and use of new facilities would result in the compaction and displacement of soil and the loss of vegetation at the proposed construction sites. Short- and long-term adverse impacts would likely be minor because these developments would affect limited areas, would be located primarily within existing developed areas or previously disturbed sites, and would be mitigated to the extent possible through the use of best management practices.

Increased use would most likely occur in developed areas, along existing higher use trails, and on the expanded frontcountry trail system. Resulting use impacts would be localized and would include soil compaction, erosion, and trampling, resulting in vegetation loss. Because most of these areas already receive high to moderate levels of use, and because measures to minimize impacts (e.g., site hardening, fencing, designated trails and campsites, higher standard trails where stock use is prevalent, and visitor education) would continue to be taken, additional impacts would likely be negligible to minor and primarily associated with an expanded trail system.

Limiting overnight backcountry use as needed to protect resources, along with refining the commercial stock use permit system, should result in fewer impacts to soils and vegetation. Localized benefits to soils and vegetation would be negligible to moderate; the most improved conditions would occur in more heavily impacted areas

where use was curtailed. An additional high Sierra tent camp would be assessed. If added to the Hockett Plateau area, it would likely result in localized, moderate, long-term impacts in the camp area, but related additional use on the plateau would be widely dispersed, with minor, adverse impacts.

Cumulative Impacts. Whereas widespread, more intensive impacts have occurred regionally, this alternative's contribution to those effects would be incremental and localized.

As described in the "Regional Context" section, lands in the greater Sierra Nevada region have been and will likely continue to be altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use, as well as regional population growth and air pollution. Impacts on regional native vegetation patterns and soils have been major, adverse, and long term because of vegetation displacement, reduced plant species diversity and density, exotic species, habitat fragmentation, and widespread erosion and sedimentation.

Within the parks some ongoing and future restoration (e.g., the Giant Forest area), as well as continued vegetation and fire management programs, would benefit resources by restoring more natural vegetation patterns and processes. Proposed development projects (e.g., expanded concession facilities at Grant Grove and Wuk-sachi, and the Giant Forest transit system) would have minor, site-specific, short-term, construction-related impacts that would be mitigated through best management practices (e.g., erosion and sediment controls and revegetation). Beneficial impacts are also expected from some actions to address ecosystem management issues on lands adjacent to the parks (including the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

While some actions in the parks and region could have beneficial, long-term effects, overall impacts of past, present, and reasonably foresee-

able actions throughout the region in conjunction with the impacts of the preferred alternative would result in major, adverse, long-term cumulative impacts. Over the long term the preferred alternative would contribute a minor to moderate, beneficial effect by limiting, replacing, or redesigning facilities, and by precluding increased water withdrawals. It would also contribute a negligible to minor, adverse, short-term increment to these effects as a result of limited new development. Increased development and dispersal of backcountry use under the preferred alternative would have a minor, adverse, long-term contribution to cumulative effects, while improving the trail system and reducing the extent of high-use backcountry areas would have a minor, beneficial, long-term effect.

Conclusion. Limiting backcountry use to improve resource conditions would result in minor to moderate, localized, beneficial, long-term effects. The construction and use of new facilities would result in minor, site-specific, adverse, short- and long-term impacts. The development zone would increase by 142 acres, an 8% increase, compared to the no-action alternative.

On a cumulative basis, the preferred alternative would contribute minor to moderate beneficial effects from improved conditions within the parks, as well as some site-specific, minor, facility-related adverse impacts. In conjunction with past, present, and reasonably foreseeable actions, there would be a continuation of major, adverse, long-term, cumulative impacts throughout the region because of displaced vegetation, reduced plant species diversity and density, exotic species, habitat fragmentation, and widespread erosion and sedimentation.

As described for the no-action alternative, there would be no impairment of park resources or values.

Impacts of Alternative A

Analysis. Alternative A would reduce use and development within the parks, as developed zones would decrease by approximately 435 acres, for a total of 1,310 acres (0.15% of total

park acreage); this decrease would represent approximately a 25% decrease in development compared to the no-action alternative. The removal of some facilities, along with reduced trampling of understory vegetation, and less soil compaction and erosion associated with facility use and maintenance, would allow for the restoration of landforms, soils, and vegetation in site-specific areas (primarily montane forest and foothills communities and to a lesser extent alpine vegetation communities). Redesigning most campgrounds and some parking areas would result in similar benefits. Compared to the no-action alternative, these actions would have minor to moderate, long-term benefits to soils and vegetation in localized areas. Because these benefits would be limited in extent, they would be negligible.

Facility removal, as well as limited new construction on previously disturbed sites, would disturb vegetation and soils in localized areas, but with mitigating measures as described in the “Alternatives” chapter, impacts would be minor and short term.

The extent and intensity of impacts from relocating NPS and concession operational facilities outside the parks would depend on site-specific conditions and project design, but with careful siting and facility design, along with mitigating measures to minimize long-term impacts, impacts would be site-specific and minor to moderate in intensity. Further environmental analysis would be completed prior to construction.

Reduced use and fewer trails in developed areas and in the backcountry would result in fewer impacts to soils and vegetation compared to the no-action alternative. Banning firewood gathering and campfires in the backcountry would increase sparse woody material, benefiting high-elevation soils and plant communities through increased soil nutrients and microhabitats for plants. Localized benefits to soils and vegetation would be negligible to minor, with some of the most improved conditions occurring where high-use trails and use were removed.

Stock use would be prohibited under this alternative. The use of horses and mules causes

relatively more impacts on trails and campsites than comparable use by humans — for example wider trails, much larger campsites, and greater exposures of bare mineral soils, greater compaction and loss of organic matter, and slower infiltration rates (Cole 1989; McClaran and Cole 1993). Consequently, the extent of impacts such as trampling, root shearing, compaction, and erosion would be reduced where stock campsites were removed. The introduction of invasive plants from animal feed, pack equipment, and the animals themselves would also be eliminated. Minor, beneficial, long-term impacts would result primarily at pack stations, corrals, areas popular with stock users (such as the Hockett Plateau, the floor of the Kern Canyon, Rock Creek, Crabtree Meadows, Roaring River, Bubbs Creek, Monarch Divide, Evolution Basin, and LeConte Canyon), and administrative stock use areas (such as Lewis Camp, Hockett Plateau, Horseshoe Meadow, Kern Bridge Camp, and upper Rattlesnake Canyon).

Cumulative Impacts. As described in the “Regional Context” section, lands within the greater Sierra Nevada region have been and will likely continue to be altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use, as well as regional population growth and air pollution. Impacts on regional native vegetation patterns and soils have been major, adverse, and long term because of displaced vegetation, reduced plant species diversity and density, exotic species, fragmented habitats, and widespread erosion and sedimentation. Beneficial impacts are expected from some actions to address ecosystem management issues on lands adjacent to the parks (including the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

Even though the actions of this alternative in conjunction with other actions outside the parks would contribute beneficial, long-term effects in the region, overall there would be a net major, adverse, long-term, cumulative impact on vegetation and soil resources.

Conclusion. Alternative A would result in localized, minor to moderate, beneficial, long-term impacts from a reduction in use and development within the parks. The development zone would be reduced by 435 acres (25%). Facility removal and limited new development would result in minor to moderate, adverse, short-term impacts.

With regard to cumulative impacts, alternative A would result in incremental beneficial impacts within the parks. Regionwide, however, there would continue to be major, adverse, long-term, cumulative impacts on vegetation and soil resources.

Similar to the no-action alternative, there would be no impairment of park resources or values.

Impacts of Alternative C

Analysis. Alternative C would expand overnight use and associated development, primarily within the parks’ frontcountry developed areas, resulting in increased use. Development zones would increase by 241 acres, encompassing approximately 1,986 acres (approximately 0.23% of the total park acreage); this would be a 14% increase in the development zone compared to the no-action alternative. New facility construction and use would cause soil compaction and displacement, as well as vegetation loss. However, short- and long-term adverse impacts would likely be minor because limited areas would be affected, present developed areas or previously disturbed sites would be used, and mitigating measures would be taken.

Soil compaction and erosion, along with vegetation trampling and loss, would likely increase in developed areas and to a lesser extent along other frontcountry trails and easily accessible backcountry areas. However, there would be a greater focus under this alternative on improving existing trail conditions, including measures to minimize impacts (e.g., site hardening, fencing, designated trails and campsites, higher standard trails where stock use is prevalent, visitor education, and restoration of disturbed areas). Localized impacts and the potential for social trails to

form would be slightly reduced compared to the no-action alternative, a negligible to minor benefit.

In the backcountry alternative C would reduce the amount of major trail corridors that allow higher, more concentrated human and stock use. This would reduce long-term, site-specific, adverse effects such as trampling, compaction, and erosion that are associated with these uses, a minor localized benefit. This alternative would also disperse use, which would likely result in more widely dispersed impacts of lower intensity over a larger portion of the backcountry. Dispersed use would result in the creation of new campsites, accompanied by soil loss, compaction, and erosion. More cross-country travel could also result in the unintended development of new user-created trails. However, low use levels, smaller party size, emphasis on low-impact practices, educating visitors to select resistant camping surfaces, or other possible management techniques would help minimize impacts. It is likely that new sites would not have more than minor, adverse, localized impacts, and that disturbance at existing sites would not increase beyond what is present now. Parkwide impacts to vegetation and soils from backcountry use would be negligible.

Cumulative Impacts. As described in the “Regional Context” section, lands within the greater Sierra Nevada region have been and will likely continue to be altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use, as well as regional population growth and air pollution. Impacts on regional native vegetation patterns and soils have been long term, major, and adverse because of displacement of vegetation, reduction in plant species diversity and density, introduction of exotic species, fragmentation of habitats, and widespread erosion and sedimentation. Beneficial effects are expected from some actions to address ecosystem management issues on lands adjacent to the parks (including the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

Alternative C would contribute a minor, beneficial, long-term impact by improving the existing trail system and reducing the extent of high-use backcountry areas. Increased development and dispersal of backcountry use would contribute a minor, adverse, long-term increment to cumulative effects. In conjunction with past, present, and reasonably foreseeable future actions, there would continue to be long-term, major, adverse impacts on regional vegetation and soils.

Conclusion. Some negligible to minor, beneficial, long-term impacts would occur as a result of improving the frontcountry trail system. Reducing the extent of high-use backcountry areas would result in minor to moderate, localized, long-term benefits. New facilities, as well as increased frontcountry use and dispersed backcountry use, would result in minor, site-specific, long-term impacts. The development zone would increase by 241 acres, or 14%, compared to the no-action alternative.

On a cumulative basis, alternative C would contribute a long-term, minor, beneficial effect by improving the existing trail system and reducing the extent of high-use backcountry areas. Increased development and dispersal of backcountry use would contribute a minor, adverse, long-term increment to cumulative effects. Combined with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts on regional vegetation and soil resources.

Similar to the no-action alternative, there would be no impairment of park resources or values.

Impacts of Alternative D

Analysis. Alternative D would expand development within the parks, primarily within frontcountry developed areas. Development zones would increase by approximately 388 acres, for a total of approximately 2,133 acres (approximately 0.25% of total park acreage); this would be a 22% increase in development compared to the no-action alternative. New facility construction and use would cause localized soil compaction and displacement and loss of vegetation.

Because new development would be located primarily within existing developed areas and at previously disturbed sites, and because impacts would be mitigated to the extent possible, short- and long-term adverse impacts would be minor.

Constructing a Grant Grove bypass would likely require extensive cut-and-fill earthwork and vegetation removal. The degree of impact would be related to the location of the roadway alignment and the site-specific conditions along the road corridor. The extent of adverse impacts would be minimized through careful design (e.g., siting to avoid sensitive plant communities and to follow existing road corridors wherever possible) and the application of mitigating measures during construction (e.g., slope stabilization / erosion control measures, revegetation). Adverse short-term impacts (during construction) and long-term impacts (direct displacement of resources by pavement) would likely be minor to moderate in intensity along the road corridor. Further environmental analysis would be completed prior to construction. The construction of a bypass within Giant Sequoia National Monument could be incompatible with the presidential proclamation establishing the national monument.

More visitors in developed areas, along higher use trails (including an expanded frontcountry trail system), and at additional pulloffs on Generals Highway would result in increased localized soil compaction and erosion, plus vegetation trampling and loss. Most of these areas already experience moderate to high levels of use, and measures to minimize impacts (e.g., site hardening, fencing, designated trails and campsites, higher standard trails for stock use, visitor education) would continue to be employed, so additional impacts would likely be negligible to minor. Most additional impacts would be associated with an expanded trail system and pulloffs on Generals Highway.

Greater use in the backcountry due to allowing more concentrated human and stock use (i.e., on major trail corridors), as well as allowing larger groups in these high-use areas, would not substantially increase impacts on soils and vegeta-

tion because most campsite impacts occur at low levels of use (Cole 1989). However, larger parties in general increase resource impacts since the rate and extent of impacts tends to increase with party size (Hammitt and Cole 1998). It is likely that backcountry impacts would increase to a negligible to minor degree. Establishing new high-use trail corridors and campsites to disperse use, educating users about more resistant camping surfaces, maintaining higher standard trails, and providing facilities like toilets and fire rings in high-use areas would help minimize and contain impacts, resulting in long-term, minor, adverse localized impacts. Adding a high Sierra camp in the Hockett Plateau area would likely result in long-term, localized, moderate impacts at the camp area; subsequent increased use throughout the plateau would be widely dispersed, with minor to moderate impacts. Separating trails and camping areas for stock and hikers should reduce impacts to a negligible to minor extent because horse and mule parties cause more impacts to soils and vegetation than humans on a per individual basis. Parkwide, impacts to vegetation and soils from backcountry use would be negligible.

Cumulative Impacts. As described in the “Regional Context” section, lands within the greater Sierra Nevada region have been and will likely continue to be altered by timber harvest, grazing, agriculture, mining, development, water diversions, loss of fire regime, and recreational use, as well as regional population growth and air pollution. Impacts on regional native vegetation patterns and soils have been long term, major, and adverse because of displacement of vegetation, reduction in plant species diversity and density, introduction of exotic species, fragmentation of habitats, and widespread erosion and sedimentation. Beneficial effects are expected from some actions to address ecosystem management issues on lands adjacent to the parks (including the Sierra Nevada Framework for Conservation and Collaboration, as well as management plans for adjacent wilderness areas and for Giant Sequoia National Monument).

Alternative D would contribute a negligible to moderate, adverse, long-term effect to cumulative

effects on vegetation and soils in the region. Combined with past, present, and reasonably foreseeable actions throughout the region, there would continue to be major, adverse, long-term impacts on vegetation and soils.

Conclusion. Constructing new facilities, including trails, would have negligible to minor, site-specific, long-term impacts; however, constructing a Grant Grove bypass road (if allowed) could have moderate impacts, depending on site-specific conditions and project design. The bypass could be incompatible with the purposes of Giant Sequoia National Monument. Concentrating use and allowing higher levels of use in the backcountry would result in an incremental increase in minor, long-term, localized impacts (e.g., compaction, erosion, trampling, loss of vegetation), primarily in new high-use areas. Adding a high Sierra camp in the Hockett Plateau area could result in moderate impacts as use increased. Designating a few trails for foot-traffic only should reduce impacts associated with stock use to a negligible to minor level. The development zone would increase by 388 acres, or 22%, compared to the no-action alternative.

On a cumulative basis, alternative D would contribute negligible to moderate adverse impacts on vegetation and soils. In conjunction with past, present, and reasonably foreseeable actions throughout the region, there would continue to be major, adverse, long-term impacts on vegetation and soil resources.

Similar to the no-action alternative, there would be no impairment of park resources or values.

GIANT SEQUOIA GROVES

Regional Context

As a species, giant sequoias have been particularly affected by the loss of the natural fire regime since frequent fire reduces competition for scarce resources and prepares the conditions needed for giant sequoia reproduction. Due to fire suppression over the past century, giant sequoia reproduction has virtually ceased in unburned groves. The ingrowth and accumula-

tion of shade-tolerant, but fire-intolerant species, such as white fir, have resulted in conditions hospitable to widespread, intense, and damaging fire events. The alteration of natural grove conditions in many groves outside the parks (both previously logged and non-logged) are at risk due to the lack of giant sequoia regeneration and hazardous fuel buildup, resulting in a major adverse effect. Management goals to protect, restore, and conserve giant sequoia ecosystems should reduce the threat of intensive fires and improve ecological conditions over the long term.

About 30% of all naturally occurring sequoia groves have been logged, with the heaviest logging (including most or all of the large sequoias) occurring between 1880 and 1920. As the result of recent policy changes, the U.S. Forest Service and the National Park Service, which collectively manage just over three quarters of all sequoia groves, now share similar sequoia management goals to protect, restore, and conserve giant sequoia ecosystems.

Other continuing and future threats to sequoia ecosystems include air pollution, unnatural effects of pathogens, and anthropogenic climate change. These threats have the potential to result in major adverse impacts, such as the decline of several tree species that are part of the giant sequoia grove structure, foliar injury to sequoia seedlings, failure in sequoia reproduction, and increased mortality from prolonged droughts (NPS 1999d; SNEP 1996).

Park Context

Prior to being added to the parks, the Atwell Mill, Big Stump, Squirrel Creek, Redwood Mountain, and Dillonwood groves were partially logged. Initial NPS efforts to preserve the groves, particularly individual specimen trees, included protection from damage by natural processes such as fire. Since the advent of ecologically based management in the 1960s, the giant sequoia groves have been managed as integral to the ecosystem, and natural processes are allowed to shape the communities. Prescribed fires for both fuel and ecosystem management have led to

Impact Thresholds for Giant Sequoia Groves

Negligible — The impact would be at the lower levels of detection or not measurable.

Minor — The impact would be detectable, but it would not affect the viability of the local population or overall community size, structure, or composition.

Moderate — The impact would be clearly detectable and could have an appreciable effect on the resource. This would include impacts that affect the abundance or distribution of local populations, but it would not affect the viability of the regional population. Localized changes to community size, structure, or composition and ecological processes could occur.

Major — The impact would be severely adverse or exceptionally beneficial. Impacts would have a substantial, highly noticeable, or widespread influence, affecting the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Community size, structure, or composition and ecological processes would be highly altered, and landscape level changes could be expected.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the parks' enabling legislation,
- key to the natural or cultural integrity of the parks or to opportunities for enjoyment of the parks, or
- identified as a goal in this general management plan or other relevant NPS planning documents.

reduced threats from damaging fire, and the condition of giant sequoia groves has been improved where fires have occurred. In the 1980s the National Park Service began the removal of

lodging and other commercial facilities from the Giant Forest grove.

Ground and surface water conditions are critical to the reproduction and maintenance of sequoias, particularly during the late summer and fall (Rundel 1972; NPS 1986a). If stressed by drought, sequoia seedlings along the margins of groves may die, and the crown foliage of mature trees may brown. High mortality rates of first-year seedlings can be attributed to desiccation during the summer. Groundwater investigations have been proposed to determine potential effects of groundwater levels or water withdrawals on sequoia groves. Water withdrawals have been occurring for many decades, and the effects on the viability or failure rates among sequoias are not evident, although effects could be subtle and could take decades or more to become evident.

Impacts of the No-Action Alternative

Analysis. Giant sequoia groves would continue to be managed as integral to the ecosystem, and natural processes would be allowed to shape the communities. A number of large specimen trees (e.g., the General Grant and General Sherman trees) and other sequoia snags, stumps, and logs (e.g., Tunnel Log, Tharp's Log) would continue to be managed to perpetuate their condition and appearance. To achieve these goals, fire fuels, understory growth, and nearby viewsheds in localized areas would continue to be managed, and there would be no additional impacts.

Roads, parking areas, campgrounds, and trails associated with sequoia groves would not change, except that facilities would continue to be removed from Giant Forest. Prescribed fires would continue to be used to preserve the groves' ecological integrity, to reduce the threat of damaging fires caused by high fuel buildup, and to stimulate giant sequoia reproduction. One campground within a sequoia grove would continue at Atwell Mill. Visitor use would continue to be managed in high-use areas to minimize impacts from trampling and soil compaction (e.g., paved trails, fencing in areas of heavy foot traffic). These impacts have already occurred to varying degrees, with disturbance more preva-

lent in higher use groves (e.g., Giant Forest, Grant Grove, Big Stump). Overall, impacts from increasing use are expected to remain localized and negligible to minor.

Surface and subsurface water withdrawals would continue at Grant Grove and Atwell Mill. As described under the “Context” section, ground and surface water conditions are critical to the reproduction and maintenance of sequoias, particularly during the late summer and fall. Water consumption is relatively low at Atwell Mill (approximately 18,600 gallons/year) and is not expected to change under the no-action alternative. Water withdrawals at Grant Grove average 33,500 gallons per day during the peak season. Withdrawals are from the Sequoia Creek, Mill Flat Creek, and Abbott Creek drainages; the primary water source for the Grant Grove developed area is Round Meadow, which drains into Abbott Creek. There is no verified groundwater connection between Abbott Creek and the Mill Flat and Sequoia Creek drainage systems. However, if these drainage systems were connected, then water withdrawals from Round Meadow could affect groundwater in the Grant Grove and sequoia groves to the south (NPS 1988).

Current programs to minimize impacts to the hydrology at Grant Grove and potential impacts to other groves would continue. Passive conservation measures (e.g., low-flow fixtures) have been installed as facilities have been replaced or constructed. Active conservation measures (e.g., closing public showers and laundry facilities) might have to be employed during drought years. Continued replacement and rehabilitation of leaking water lines would also reduce usage. Based on these factors, peak-season water consumption at Grant Grove under the no-action alternative is not expected to increase.

Cumulative Impacts. Cumulative effects on sequoia groves are based on an analysis of past, present, and reasonably foreseeable actions in the Sierra Nevada region. Whereas widespread, more intensive impacts have occurred on the regional level, this alternative’s contribution to those effects would be incremental and localized.

As described in the regional and park context sections, giant sequoia groves in the park as well as the region will continue to be affected by various cumulative impacts. Ongoing threats include air pollution, unnatural effects of pathogens, and anthropogenic climate change. Fire suppression over the past century has especially affected sequoia reproduction and led to an unnatural build-up of forest fuels. Current ecosystem management goals for groves under the jurisdiction of the U.S. Forest Service and the National Park Service should reduce the threat of intensive fires and improve ecological conditions over the long term.

Over 1,800 acres in the Dillonwood Grove were added to the park in 2001, and experimental management techniques would be continued, which would also support expanding knowledge about sequoia management. Also, the creation of Giant Sequoia National Monument under the U.S. Forest Service would further protect sequoia groves and their ecosystem.

In the 1980s the National Park Service began to remove overnight lodging and other commercial facilities from Giant Forest in order to restore more natural conditions. This restoration program, which will continue day use in the area, will continue through about 2005. The result should be a long-term, major benefit to the ecological integrity of Giant Forest.

The expansion of overnight concession facilities at Grant Grove is continuing in accordance with the 1988 *Grant Grove and Redwood Mountain Development Concept Plan and Final Environmental Impact Statement* and subsequent concession contract. The John Muir Lodge was completed and opened in 2000. Full development includes additional rustic cabins and lodges. No construction would occur within the grove; however, projected Grant Grove peak water consumption is expected to increase to approximately 53,650 gallons per day with full buildout. Existing water withdrawals (averaging 33,500 gallons/day during the peak use season), plus 1.2 million gallons of stored water, should be sufficient to meet demand. The storage tank is filled during the peak runoff period (January to April),

thus avoiding increased water withdrawals from Round Meadow during the peak use season. While the storage tank is being filled, water flow into Abbot Creek is reduced by about 10%, with negligible impacts. Water withdrawals would not be increased beyond 35,500 gallons per day, and conservation efforts to minimize consumptive uses would be implemented if water was insufficient to meet demand. Additional active conservation measures would likely be necessary during drought years. Consequently, no additional hydrological impacts are expected during the peak use months (also the dry season).

Overall, past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have major, beneficial, long-term effects due to reduced fire threats and improved ecological conditions. However, past actions have altered groves throughout the region, making them more prone to intense wildfires and other threats, such as regional air pollution and anthropogenic climate change. The resulting impacts of these actions are long term, major, and adverse. The no-action alternative would contribute a minor, adverse, long-term effect to the overall cumulative impact.

Conclusion. Giant sequoia groves would continue to be managed as integral to the ecosystem. Grove conditions within some high-use groves would continue to be manipulated or altered to maintain specimen trees or to accommodate visitor use and development but would not result in additional impacts. Some risk and danger to users of the Atwell Mill campground would continue due to the potential for falling trees and limbs. Impacts associated with future visitor use increases would be mitigated to the extent possible, and impacts would be negligible to minor, localized, long term, and adverse. Present water withdrawals at Atwell Mill, Redwood Mountain, and Grant Grove may be contributing to moisture stress within sequoia groves within affected drainages; however, there is no direct evidence of impacts at present. Water consumption is relatively low at Atwell Mill and Redwood Mountain, and it is not expected to change under the no-action alternative. More day use at Grant

Grove would raise annual water consumption; but water management and conservation measures should preclude higher summer water withdrawals, with no additional impacts.

Because of the uncertainty of the impacts on giant sequoia systems, no increased water withdrawals would occur until future studies had been completed and a monitoring program implemented to determine impacts. Water system modifications or other mitigating measures to reduce or eliminate potential impacts would be investigated.

On a cumulative basis, the addition of the Dillonwood Grove to the park and the creation of Giant Sequoia National Monument under the U.S. Forest Service have increased the overall protection of sequoia groves throughout the region. The no-action alternative would contribute incrementally to minor, adverse, long-term impacts on a cumulative basis because of increased use within some groves. Most of the adverse cumulative impacts to sequoias throughout the region have resulted from past activities, such as logging and fire suppression, that have caused widespread alteration of groves. Consequently, groves are more prone to intense wildfires and other major threats (e.g., regional air pollution and climate change) that could result in major adverse effects. Present programs such as prescribed burning would continue to improve grove conditions.

While the effects that water withdrawals may have on hydrologic systems within sequoia groves and on the trees themselves are not known, there is no current evidence of major effects. There would be no impairment of park resources or values.

Impacts of the Preferred Alternative

Analysis. Giant sequoia groves would continue to be managed as integral to the ecosystem; natural processes would be allowed to shape the communities. Because of the uncertainty of water withdrawal impacts on giant sequoia systems, water withdrawals at Grant Grove during the peak season would not be increased,

and additional conservation measures would be implemented to reduce withdrawals if possible. The preferred alternative should not result in any additional impacts and could result in potentially minor benefits depending on the extent of the reduction in water withdrawals.

Use in the Atwell Mill Grove would be reduced and the campground removed, resulting in fewer localized user impacts, such as soil compaction and trampling and displacement of vegetation, a negligible to minor benefit. Removing the campground would also reduce water demand and withdrawals of surface and subsurface water at Atwell Mill. Consistent with actions related to other sequoia groves, converting to day use only would result in less danger of falling trees and limbs injuring people.

In conjunction with the interpretive program at Big Stump, fire fuels, understory growth, and the viewshed would be manipulated at this grove to help maintain the visibility of elements of past logging (e.g., sequoia stumps and mill sawdust piles). This manipulation would be limited in extent, and most of the grove would continue to be managed as part of the ecosystem, with natural processes allowed to shape the communities. Adverse impacts would be localized, minor, and long term.

Increased visitor use at Grant Grove and Big Stump Basin would contribute to trampling and soil compaction. These impacts have already occurred to varying degrees, with disturbance more prevalent in higher use groves like Grant Grove. Visitor use would continue to be managed to minimize impacts to sequoias, with higher use areas requiring more intensive measures (e.g., paved trails and fencing in areas of heavy foot traffic). Impacts would be localized and negligible to minor.

At Dillonwood modest levels of day use and education would be accommodated in addition to research. Experimental sequoia forest management techniques would be continued, and a plan for long-term management would be developed. Grove health would be monitored. Further planning at Dillonwood would identify appro-

priate uses and facilities and mitigation measures to protect grove health. Facilities would not be placed in the grove. Any development and use accommodated at Dillonwood would result in the permanent displacement of soils and vegetation. With mitigation measures, these long-term impacts would be localized and minor.

Cumulative Impacts. Cumulative impacts on sequoia groves are based on analyses of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on the regional level, this alternative's contribution to those effects would be incremental and localized.

As described in the regional and park context sections, giant sequoia groves in the park and region will continue to be affected by various impacts on a cumulative basis. Fire suppression over the past century has especially affected sequoia reproduction, leading to an unnatural build-up of forest fuels. Current ecosystem management goals for groves managed by the U.S. Forest Service and the National Park Service should reduce the threat of intensive fires and improve long-term ecological conditions. Other ongoing and future threats include air pollution, the unnatural effects of pathogens, and anthropogenic climate change.

The ongoing restoration of Giant Forest would improve the ecological integrity of this grove, a major, long-term benefit.

The continued expansion of concession facilities at Grant Grove is not expected to have additional hydrological impacts during the drier peak months. Present water withdrawals (average 33,500 gallons/day during the peak use season) and stored water (1.2 million gallons) should provide sufficient supply to meet demand from expanded concession facilities. Water withdrawals would not be increased, and conservation efforts to reduce consumptive uses would be implemented if water was insufficient to meet demand. Additional conservation measures

would be necessary during drought years. While the water storage tank is being filled, water flow into Abbot Creek would be reduced by a maximum of 10%, with a negligible impact, the same as the no-action alternative.

As described under the no-action alternative, the addition of Dillonwood to Sequoia National Park and the creation of Giant Sequoia National Monument have increased the protection of sequoia groves in the region. Experimental sequoia forest management techniques would be continued in the Dillonwood Grove, which would support expanding knowledge about sequoia ecosystem management.

Overall, past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, could have major, beneficial, long-term effects due to reduced fire threats and improved ecological conditions. However, past management of giant sequoia groves (e.g., logging, fire suppression) have altered groves throughout the region and made them more prone to intense wildfires and other threats, such as regional air pollution and anthropogenic climate change. The resulting impacts of these actions are major and adverse. The preferred alternative would contribute a minor, beneficial, long-term effect as a result of reduced water withdrawals, visitor use, and development within some groves. The preferred alternative would also contribute additional incremental minor, adverse impacts from increased use within some groves, which would be mitigated.

Conclusion. Giant sequoia groves would continue to be managed as integral to the ecosystem. Not allowing development zones in sequoia groves would improve resource conditions. Not increasing peak-season water withdrawals at Grant Grove, and implementing additional conservation measures to reduce withdrawals, could result in beneficial effects, depending on the extent to which withdrawals were decreased. Other actions under the preferred alternative should not result in any additional impacts on giant sequoia groves.

Manipulating or altering grove conditions at Big Stump to maintain site-specific conditions related to historic logging and to accommodate increased visitor use, along with limited new facilities in some groves, would result in negligible to minor, localized, adverse impacts, with intensive visitor management and other measures used to minimize impacts.

On a cumulative basis, the addition of the Dillonwood Grove to the park and the creation of Giant Sequoia National Monument have increased the overall protection of sequoia groves. The preferred alternative would contribute incrementally to minor, beneficial, long-term effects by prohibiting and removing development in all sequoia groves, improving Grant Grove hydrology, and reducing development and use within the Atwell Mill Grove. The preferred alternative would contribute incremental, negligible to minor, localized impacts as a result of increased day use within some groves. As described for the no-action alternative, most major cumulative impacts have resulted from past management activities, such as logging and fire suppression, which have altered sequoia groves throughout the region and made them more prone to intense wildfires and other threats. More recent ongoing programs (such as prescribed burning and restoration efforts) would continue to improve grove conditions.

There would be no impairment of park resources or values.

Impacts of Alternative A

Analysis. Alternative A would reduce use and development in some areas of the Grant Grove and Atwell Mill Grove. This would result in fewer user-related impacts such as soil compaction and trampling of vegetation, a negligible to minor benefit. Reducing parking and the trail system at the Grant Tree, removing the Atwell Mill campground from a second-growth portion of the grove, and restoring these areas would result in localized minor benefits.

Reducing facilities and levels of use would reduce water demand and withdrawals of surface

and subsurface water at Grant Grove and Atwell Mill. Reductions could be substantial due to the removal of overnight facilities, which use up to 75% more water than day facilities. Reducing impacts to grove hydrology and potential contributions to moisture stress on the General Grant Grove, sequoia groves south of the Grant Grove, and the Atwell Mill Grove would be a long-term benefit.

Low levels of use and education would be accommodated in the Dillonwood Grove, as well as research. The health of this grove would be protected by continuing experimental sequoia forest management techniques, developing a plan for long-term management, and monitoring the grove's health. Further planning at Dillonwood would identify appropriate uses and facilities and mitigation measures to protect the grove. Any development accommodated at Dillonwood would result in the permanent displacement of soils and vegetation. With mitigation measures, these long-term impacts would be localized and minor.

Cumulative Impacts. As described in the regional and park context sections, giant sequoia groves in the park and region will continue to be affected by various impacts on a cumulative basis. Ongoing threats include air pollution, unnatural effects of pathogens, and anthropogenic climate change. Current ecosystem management goals for groves managed by the U.S. Forest Service and the National Park Service should reduce the threat of intensive fires and improve ecological conditions over the long term.

The ongoing restoration of Giant Forest would improve the ecological integrity of the grove, a long-term, major benefit.

The continued expansion of concession facilities at Grant Grove is not expected to cause additional hydrological impacts during the drier peak months because existing water withdrawals (average 33,500 gallons/day) and stored water should meet demand. Water withdrawals would not be increased, and conservation efforts to reduce consumptive uses would be implemented

if water was insufficient to meet demand. Additional active conservation measures would likely be necessary during drought years. While the water storage tank is being filled, water flow into Abbot Creek would be reduced by a maximum of 10%, with a negligible impact, the same as the no-action alternative.

The addition of the Dillonwood Grove to Sequoia National Park and the creation of Giant Sequoia National Monument have increased the regional extent of giant sequoia protection. Experimental sequoia forest management techniques at the Dillonwood Grove would support expanding knowledge about sequoia ecosystem management.

Alternative A would contribute a minor, beneficial, long-term increment to overall cumulative impacts.

Conclusion. Giant sequoia groves would continue to be managed as integral to the ecosystem. Alternative A would have localized negligible to minor benefits on the General Grant and Atwell Mill Groves because use and the amount of facilities would be reduced, resulting in less withdrawal of surface and subsurface water. Reductions could be substantial due to the removal of overnight facilities, which use approximately 75% more water than day facilities. Reducing impacts to grove hydrology and potential contributions to moisture stress on Grant Grove, sequoia groves south of Grant Grove, and Atwell Mill Grove would be a long-term benefit.

On a cumulative basis, as described for the no-action alternative, the addition of the Dillonwood Grove to Sequoia National Park and the creation of Giant Sequoia National Monument have increased the overall protection of sequoia groves in the region. Alternative A would contribute incrementally to a minor, long-term benefit to sequoia groves because development and use within some groves would be reduced. Most adverse cumulative impacts to giant sequoias have resulted from past activities, which have altered groves throughout the region and made them more prone to intense wildfires and other threats. Some ongoing programs (such as

prescribed burning) would continue to improve grove conditions.

There would be no impairment of park resources or values.

Impacts of Alternative C

Analysis. Actions at Big Stump to support the interpretive program (such as manipulating fire fuels, understory growth, and viewsheds) would be limited in extent, and most of the grove would continue to be managed as integral to the surrounding ecosystem, with natural processes shaping the communities. Adverse, long-term impacts would be localized and minor.

Increased visitor use at Grant Grove, Redwood Mountain Grove, Atwell Mill, Big Stump, and Dillonwood would contribute to trampling and soil compaction. These impacts have already occurred to varying degrees, with disturbance more prevalent in higher use groves like Grant Grove. Visitor use would continue to be managed to minimize impacts to sequoias, with higher use areas requiring more intensive measures (e.g., paved trails, fencing in areas of heavy foot traffic). Continued camping at the Atwell Mill campground would result in some risk of trees and limbs falling in overnight use areas. Impacts would be localized and negligible to minor.

Expanding development within the General Grant Grove (shuttle stops, accessible parking and trails) and the Atwell Mill Grove (a campground), and new development at Dillonwood would all permanently displace soils and vegetation. With mitigation measures, these long-term impacts would be localized and minor.

Increased visitor use and development at Grant Grove and Atwell Mill would increase water consumption. As described under the "Context" section, ground and surface water conditions are critical to the reproduction and maintenance of sequoias. Existing water consumption is relatively low at Atwell Mill (approximately 18,600 gallons/year), and water consumption even with a larger campground would still be relatively

low. Existing water withdrawals at Grant Grove average 33,500 gallons per day during the peak season. Because of the uncertainty of water withdrawal impacts on giant sequoia systems, peak-season water withdrawals within the park would not be increased, and a monitoring program would be implemented. If it was determined that new water sources had to be sought outside the parks, studies would need to be undertaken to ensure that there would be no adverse effects on other sequoia groves. With mitigating measures and no additional peak-season water withdrawals at Grant Grove, alternative C should not result in any additional impacts.

Low levels of use and education would be accommodated in the 1,800-acre Dillonwood Grove, in addition to research. Experimental sequoia forest management techniques would be continued, and a plan for long-term resource management would be developed. Grove health would be monitored. Further planning at Dillonwood would identify appropriate uses, facilities, and mitigation measures to protect grove health. Any development accommodated at Dillonwood would result in the permanent displacement of soils and vegetation. With mitigation measures, these long-term impacts would be localized and minor.

Cumulative Impacts. As described under the regional and park context sections, giant sequoia groves in the park and region will continue to be affected by various impacts on a cumulative basis. Ongoing threats include air pollution, unnatural effects of pathogens, and anthropogenic climate change. Current ecosystem management goals for groves managed by the U.S. Forest Service and the National Park Service should reduce the threat of intensive fires and improve ecological conditions over the long term.

The ongoing restoration of Giant Forest would improve the ecological integrity of the grove, a long-term, major benefit.

The expansion of concession facilities at Grant Grove is not expected to have additional hydrological impacts during the drier peak months.

Existing water withdrawals and stored water should meet demand from expanded facilities; additional active conservation measures would likely be necessary during drought years. Water withdrawals would not be increased, and conservation efforts to reduce consumptive uses would be implemented if there was insufficient water to meet demand. During the filling of the water storage tank, water flow into Abbot Creek is decreased by about 10%, with a negligible impact, the same as the no-action alternative.

The addition of the Dillonwood Grove to Sequoia National Park and the creation of Giant Sequoia National Monument have increased the extent of giant sequoia protection in the region. Experimental sequoia forest management techniques at the Dillonwood Grove would support expanding knowledge about sequoia ecosystem management.

Alternative C would contribute incrementally to a minor, adverse, long-term impact on a cumulative basis.

Conclusion. Giant sequoia groves would continue to be managed as integral to the ecosystem. Localized manipulation or alteration of grove conditions at Big Stump to maintain conditions related to historic logging, along with limited new facilities within some groves to accommodate increased visitor use, would result in minor, adverse impacts. Increased visitor use and development at Grant Grove and Atwell Mill would increase water consumption. Because of the uncertainty of water withdrawal impacts on giant sequoia systems, no increased peak-season water withdrawals would occur. If new water sources had to be sought outside the parks, studies would need to be undertaken to ensure that there would be no adverse effects on other sequoia groves. With mitigating measures and no peak-season increased water consumption at Grant Grove, alternative C should not result in any additional impacts.

On a cumulative basis, as described for the no-action alternative, the addition of the Dillonwood Grove to Sequoia National Park has increased the overall protection of sequoia

groves. On a cumulative basis alternative C would have a minor, adverse, long-term impact to sequoia groves because of increased development and use within some groves. Most adverse cumulative impacts to giant sequoias have resulted from past activities such as logging and fire suppression, which have altered groves throughout the region and made them more prone to intense wildfires and other threats. Ongoing programs such as prescribed burning would continue to improve grove conditions.

There would be no impairment of park resources or values.

Impacts of Alternative D

Analysis. At Big Stump local conditions (fire fuels, understory growth, and viewsheds) would be manipulated to support the interpretive program. Impacts would be limited in extent, and most of the grove would continue to be managed as integral to the ecosystem, with natural processes shaping the community. Long-term adverse impacts would be localized and minor.

Increased visitor use at Grant Grove, Redwood Mountain, Atwell Mill, Big Stump, Muir, and Dillonwood groves would contribute to trampling and soil compaction. These impacts have already occurred to varying degrees, with disturbance more prevalent in higher use groves like Grant Grove. Visitor use would continue to be managed to minimize impacts to sequoias, with higher use areas requiring more intensive measures (e.g., paved trails, fencing in areas of heavy foot traffic). Continued camping at the Atwell Mill campground would result in some risk of trees and limbs falling in overnight use areas. Impacts would be localized and negligible to minor.

Expanding development within the Grant Grove (shuttle stops, accessible parking and trails) and Atwell Mill Grove (a campground), along with converting or adding facilities at Dillonwood, would permanently displace soils and vegetation. With mitigating measures, the long-term impacts would be localized and minor.

Increased visitor use and development at Grant Grove and Atwell Mill would increase water consumption. Present water consumption is relatively low at Atwell Mill (approximately 18,600 gallons/year), and water consumption with an expanded campground would still be relatively low. Existing water withdrawals at Grant Grove average 33,500 gallons per day during the peak season. Because of the uncertainty of water withdrawal impacts on giant sequoia systems, no increased peak-season water withdrawals would occur, and a monitoring program would be implemented. If it was determined that new water sources had to be sought outside the parks, studies would need to be undertaken to ensure that there would be no adverse effects on other sequoia groves. With mitigating measures and no peak-season water withdrawals at Grant Grove, alternative D should not result in any additional impacts.

Modest levels of day use and education would be accommodated in the Dillonwood Grove, in addition to research. Experimental sequoia forest management techniques would be continued, and a plan for long-term resource management would be developed. Grove health would be monitored. Further planning at Dillonwood would identify appropriate uses, facilities, and mitigation measures to protect grove health. Any development accommodated at Dillonwood would result in the permanent displacement of soils and vegetation. With mitigating measures, these long-term impacts would be localized and minor.

Cumulative Impacts. As described in the regional and park context sections, giant sequoia groves in the park and region have been affected, and will continue to be affected, by various impacts on a cumulative basis. Continuing and future threats include air pollution, unnatural effects of pathogens, and anthropogenic climate change. Current ecosystem management goals for groves managed by the U.S. Forest Service and the National Park Service should reduce the threat of intensive fires and improve ecological conditions over the long term.

The ongoing restoration of Giant Forest would improve the ecological integrity of the grove, a major, long-term benefit. No additional hydrological impacts are expected during the drier peak months with the continued expansion of concession facilities at Grant Grove. Present water withdrawals (average 33,500 gallons/day) plus stored water should meet demand from expanded facilities. Water withdrawals would not be increased; if there was insufficient water to meet demand, conservation efforts to reduce consumptive uses would be implemented. Additional active conservation measures would likely be necessary during drought years. When the water storage tank is filled during the peak runoff season, water flow into Abbot Creek is decreased by a maximum of 10%, with a negligible impact, the same as the no-action alternative.

The addition of the Dillonwood Grove to Sequoia National Park and the creation of Giant Sequoia National Monument have increased the extent of giant sequoias being protected in the region. Experimental sequoia forest management techniques at the Dillonwood Grove would support expanding knowledge about sequoia ecosystem management.

Alternative D would contribute to a minor, adverse, long-term impact on a cumulative basis.

Conclusion. Giant sequoia groves would continue to be managed as integral to the ecosystem. Manipulating or altering grove conditions at Big Stump to maintain site-specific conditions related to historic logging for interpretive programs, along with limited new development in some groves, would result in minor adverse impacts. Increased visitor use and development at Grant Grove and Atwell Mill would increase water consumption. Because of the uncertainty of water withdrawal impacts on giant sequoia systems, no increased peak-season water withdrawals would occur. If new water sources had to be sought outside the parks, studies would be undertaken to ensure that there would be no adverse effects on other sequoia groves. With mitigating measures, alternative D should not result in any additional impacts.

On a cumulative basis, as described for the no-action alternative, the addition of the Dillonwood Grove to Sequoia National Park and the creation of Giant Sequoia National Monument have increased the overall protection of sequoia groves in the region. Alternative D would contribute incrementally to a minor, adverse, long-term impact to sequoia groves as a result of use increases in some groves. Most adverse cumulative impacts to giant sequoias have resulted from activities such as logging and fire suppression, which have altered groves throughout the region and made them more prone to intense wildfires and other threats. Ongoing programs such as prescribed burning would continue to improve grove conditions.

There would be no impairment of park resources or values.

MEADOW / RIPARIAN / AQUATIC COMMUNITIES

Regional Context

As a result of past settlement and development, resource extraction, and human use, riparian / aquatic ecosystems have been affected throughout the Sierra Nevada. Specific aquatic and riparian habitats have been degraded by dams and diversions, mining, forest management, development, introduced organisms, contaminant deposition, and overgrazing. Foothill areas below 3,300 feet appear to have the greatest loss of riparian vegetation of any region in the Sierra Nevada (SNEP 1996). The alteration and continued deterioration of aquatic and riparian habitats have affected native fish, amphibians, and aquatic invertebrates. Many aquatic and riparian dependent species (see “Threatened, Endangered, and Rare Species” in “The Affected Environment”) and communities have suffered local extinctions and are threatened throughout their range.

The suppression of natural fires in historic times is another stressor. Fire affects water quality and

quantity, sediment transport, the availability of woody debris, water temperature, and the structure and composition of riparian vegetation. In short, fire affects the habitat of aquatic fauna, especially in the foothills and in the conifer belt.

Park Context

Within the parks, historical grazing by sheep and cattle during pre-park periods (1860s through 1940s, depending on the area) altered meadow ecosystems. Some riparian areas were trampled and illegally grazed by trespass cattle. Invasive exotic plant species occur in some montane meadows and riparian corridors. In a few site-specific areas, exotic wetland plants (*Elodea* sp.) have virtually displaced native benthic plants (*Isoetes* sp.) that normally dominate the lake bottoms, altering the structural and floristic characteristics (e.g., Rae Lakes). The primary threats to native aquatic wildlife include competition, predation, and genetic introgression (hybridization) from exotic species. Atmospheric contaminants are another major concern, especially pesticides and pollutants from regional air pollution. Polluted air contributes nutrients and causes episodic acidification of park waters.

Numerous management actions have already been taken to improve conditions within the parks (e.g., rerouting trails away from meadows, prohibiting camping in meadows, closing back-country campsites that are too close to water, revegetating impacted areas, and educating users about their impacts and the use of low-impact practices). A system of residual biomass standards for meadows open to stock grazing has been implemented, and the amount of grazing allowed during a given season is limited. This ensures that adequate residual matter remains at a site each year. Annual grazing programs, including opening dates and total allowable use, are based on monitoring. The implementation of grazing standards has reduced impacts. Allowing more natural fire regimes in the parks in recent years has also helped restore native vegetation patterns and processes.

*Impact Thresholds for Meadow / Riparian /
Aquatic Communities*

Negligible — The impact would be at the lower levels of detection or not measurable.

Minor — The impact would be detectable, but it would not affect the viability of the local population or overall community size, structure, or composition.

Moderate — The impact would be clearly detectable and could have an appreciable effect on the resource. This would include impacts that affect the abundance or distribution of local populations, but it would not affect the viability of the regional population. Localized changes to community size, structure, or composition and ecological processes could occur.

Major — The impact would be severely adverse or exceptionally beneficial. Impacts would have a substantial, highly noticeable, or widespread influence, affecting the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Community size, structure, or composition and ecological processes would be highly altered, and landscape level changes could be expected.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the parks' enabling legislation,
- key to the natural or cultural integrity of the parks or to opportunities for enjoyment of the parks, or
- identified as a goal in this general management plan or other relevant NPS planning documents.

Impacts of the No-Action Alternative

Analysis. Meadows, riparian areas, and aquatic communities around popular lakes and streams and at stream crossings that receive more concentrated human use would continue to have localized, minor to moderate, adverse, long-term impacts. Increased use would contribute to the adverse effects. High and even moderate visitation at lakes and along streams would continue to result in localized trampling of vegetation and loss of wetland flora due to social trails that form along their edges and often cut through wetland meadows. The number of user trails and their width could increase with more use, particularly in popular day use areas. Swimmers, waders, and anglers would continue to trample streambank vegetation and disturb lake and stream bottoms.

Continued management actions to reduce impacts from visitor use would include rerouting trails away from meadows, prohibiting camping in meadows, closing backcountry campsites that are too close to water, revegetating impacted areas, and educating users about their impacts and the use of low-impact practices.

Because many of the impacted areas already experience moderate to high levels of use, and because management actions to minimize impacts would continue to be employed, additional impacts from some increased use would likely be negligible to minor. Moderate levels of impact could occur if more use affected lightly used or undisturbed areas, resulted in shorelines becoming denuded and eroded, or intensified present impacts.

Even though most park meadows are open to grazing, some areas would continue to be closed to stock because they are heavily used by backpackers for camping, they are small, they are designated for research purposes, or they are relatively sensitive, including providing breeding habitat for declining amphibian species. In other areas, stock are permitted, but feed must be packed in. All park meadows open to grazing are subject to residual biomass standards that set limits on the amount of grazing allowed during a given season (see "Park Context").

Localized, minor to moderate, long-term impacts to some meadows would continue to be caused by stock use. The severity of impacts and the amount of disturbance would depend on the characteristics of pack stock use, management and handling techniques, and the nature of the areas being used. Since the 1970s and 1980s, conditions in some meadows have generally improved as a result of declining use and greater compliance by stock users with minimum impact guidelines. However, impacts in meadows that continue to receive heavy stock use include persistent hoof prints, streambank shearing, soil pedestals, erosion, and other soil impacts. Vegetation is directly affected through defoliation, trampling, and root shearing, and indirectly through changes in soil structure or nutrient status, shifts in species composition, and the potential introduction of exotic plant species. Meadow animal life is also affected through the removal of vegetative biomass (wildlife cover), crushed rodent burrows, and disturbance by grazing stock. Even when grazed meadows are healthy and productive, the removal of forage by stock diverts nutrients and energy from the natural system, depriving native herbivores and decomposers, and the predators that feed on them.

Surface water would continue to be diverted from natural streams and springs in several areas. Development areas either use water storage and/or multiple sources to reduce the extent of impacts on any one stream. Impacts would likely be moderate and long term, diminishing in intensity as more tributaries augment streamflow below the point of withdrawal.

Ongoing water conservation measures at Grant Grove during the peak visitor use season would maintain the existing water withdrawals by using stored water. No changes in the saturation levels in the meadows adjacent and below the diversions would occur.

Relocating or redesigning bridges over the South Fork of the Kings River in the Cedar Grove area and removing dams in the upper Mineral King basin would provide opportunities to revegetate and restore specific riparian areas, resulting in localized minor to moderate, beneficial effects

over the long term. Adverse impacts from facility removal (such as bank disturbance and increased erosion potential) would be minor to moderate and short term. The extent and duration of these impacts would be minimized by careful design and timing of facility removal, temporary erosion control measures, and follow-up restoration.

Cumulative Impacts. Cumulative effects on riparian / aquatic ecosystems are based on analyses of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on the regional level, this alternative's contribution to those effects would be incremental and localized.

Riparian / aquatic ecosystems are among the most impacted habitats in the Sierra Nevada, as described in the "Regional Context" section, with foothill areas below 3,300 feet appearing to have the greatest loss of riparian vegetation of any region in the Sierra Nevada.

However, a number of ongoing and reasonably foreseeable future actions in the parks and surrounding lands could have cumulative beneficial effects on aquatic and riparian ecosystems in the long term. The USFS Sierra Nevada Framework for Conservation and Collaboration and management plans for adjacent wilderness areas and Giant Sequoia National Monument would all address ecosystem management issues of lands adjacent to the parks.

Removing development and restoring the Giant Forest has substantially decreased water demand from Wolverton Creek, resulting in increased streamflows during the summer and helping restore the aquatic community to more natural conditions. While concession development at Wuksachi would increase water withdrawals from Wolverton and Silliman creeks, using multiple water sources would help ensure that minimum flows were maintained in each stream (NPS 1979).

While concession development at Grant Grove would increase, conservation measures during the peak season would ensure that existing water withdrawals were maintained by using stored water to supplement supplies. No changes in the saturation levels in the meadows adjacent and below the diversions would occur.

Even though some actions in and around the parks could have beneficial, long-term, effects because regional meadow / riparian / aquatic communities have been highly impacted by past and continuing land use and development, there would continue to be a net major, adverse, cumulative impact on these communities over the long term. The no-action alternative would contribute localized minor to moderate incremental adverse and beneficial effects.

Conclusion. Continued and slightly increased use and facility development would have minor to moderate, adverse, long-term effects on meadow, riparian, and aquatic communities, primarily in developed areas, around popular lakes and streams, at stream crossings, and below water withdrawal diversions. Removing some facilities would likely have minor to moderate adverse, short-term impacts.

On a cumulative basis the no-action alternative would have an incremental, minor to moderate, long-term contribution to overall impacts. The impacts of all other programs within the parks and throughout the region would have a net major, adverse, long-term effect on regional meadow, riparian, and aquatic communities, primarily due to the widespread alteration and loss of these resources because of land use and development outside the parks.

In accordance with the criteria for determining impairment, there would be no impairment of park resources or values.

Impacts of the Preferred Alternative

Analysis. Under the preferred alternative actions would be taken to reduce impacts to meadow, riparian, and aquatic communities and to restore damaged areas. Increased frontcountry use of

aquatic and riparian communities is expected to occur predominantly along the Marble Fork of the Kaweah River at Lodgepole, along the Middle Fork near Ash Mountain, and along the South Fork of the Kings River at Cedar Grove and Knapp's cabin. Local areas currently experience high to moderate levels of use, and impacts to specific sites have occurred. Compared to the no-action alternative, restricting river access points and potentially hardening some access points should reduce the extent of impacts and allow for riparian habitat to be restored, a moderate, long-term benefit. Redesigning campgrounds at Cedar Grove and Lodgepole (away from the rivers) and increasing visitor education would also help control impacts.

Expanded facilities such as lodging and camping near the South Fork would be sited outside riparian areas and would not directly impact those resources. Developing access points and launch sites for nonmotorized boats would result in minor, site-specific impacts, such as the trampling and uprooting of small amounts of vegetation and localized erosion and compaction of soil and bottom sediments. However, these designated access points and launch sites would help contain and reduce the extent of the visitor-related impacts noted above.

To a lesser degree, increased frontcountry use would be accommodated along the North Fork near the park boundary, along Shepherd Saddle Road, and along the upper reaches of the East Fork of the Kaweah River (areas that are zoned for high and low use). Increased use could result in additional adverse, long-term impacts to rivers and tributary streams in these areas. However, the extent and intensity of impacts would be limited and minor. Levels of use would still be low (areas zoned as low-use frontcountry), only limited reaches of the rivers and streams would be affected, and management actions to reduce impacts would be employed if necessary (e.g., designated river access points and stream crossings, and signs to direct visitors to areas that can withstand use).

The extent of site-specific, adverse effects such as trampling, compaction, grazing, and erosion

should be reduced in some backcountry meadows and riparian areas where use would be limited to protect resources. This would be a minor to moderate, long-term benefit, particularly if some heavily grazed meadows received substantially less use. Nonnative plant species could be introduced by livestock, but this would be mitigated by switching to weed-free feed and by monitoring and removing introduced species.

Relocating or redesigning bridges over the South Fork of the Kings River in the Cedar Grove area (as described for the no-action alternative) would provide opportunities to revegetate and restore specific riparian areas, resulting in localized, minor, beneficial, long-term impacts. Adverse impacts from facility removal, such as bank disturbance and increased erosion potential, would be minor and short term. The extent and duration of these impacts would be minimized by careful design and timing of facility removal, temporary erosion control measures, and follow-up restoration efforts.

Surface water would continue to be diverted from natural streams and springs in several areas of the parks. However, the amount of water diverted during the low-flow season would not increase. Because conservation would be emphasized in this alternative, withdrawals are expected to be reduced, allowing greater water flows downstream of the diversions. Reduced withdrawals from springs at Grant Grove (Round Meadow and Merritt Spring) would improve local hydrology and could potentially decrease moisture stress within meadows adjacent to and below the diversions during droughts. These actions would result in minor to moderate, beneficial effects that would increase riparian vegetation productivity and habitat for fish and other aquatic organisms in affected stream reaches over the long term.

Cumulative Impacts. As described for the no-action alternative, cumulative effects on riparian / aquatic ecosystems are based on analyses of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with potential effects of this alternative. Whereas widespread, more intensive impacts have oc-

curred throughout the region, this alternative's contribution to those effects would be incremental and localized.

As described under the no-action alternative, a number of reasonably foreseeable future actions proposed for the parks and surrounding lands could have beneficial effects. The USFS Sierra Nevada Framework for Conservation and Collaboration, management plans for adjacent wilderness areas and Giant Sequoia National Monument would all address ecosystem management issues of lands near the parks.

Removing development and restoring the Giant Forest have substantially decreased water demand from Wolverton Creek, resulting in increased streamflows during the summer and helping restore the aquatic community to more natural conditions. While a day use staging area for backcountry access at Wolverton and concession development at Wuksachi would increase water withdrawals from Wolverton Creek, using multiple water sources and conservation measures are expected to ensure minimum flows in each stream (NPS 1979). No new water diversion sites would be developed if current multiple sources did not meet demand. Conservation efforts, such as using low-flow fixtures, would be implemented, as well as educating staff and visitors to conserve water.

While concession development at Grant Grove would increase, conservation measures during the peak visitor use season would allow existing water withdrawals to be maintained by using stored water to supplement water supplies. No changes in the saturation levels in the meadows adjacent and below the diversions would occur.

Even though actions in and around the parks could have beneficial, long-term effects, the regional riparian / aquatic ecosystems in the greater Sierra Nevada have been highly impacted by past land use and development. Therefore, there would continue to be a net major, adverse, cumulative impact on regional meadow, riparian, and aquatic communities over the long term. This alternative's contribution to the cumulative impacts would be primarily beneficial

due to improving aquatic and riparian conditions within the parks. This alternative would also contribute some site-specific minor adverse impacts.

Conclusion. The preferred alternative would result in minor to moderate, beneficial, long-term impacts to meadow, riparian, and aquatic communities in localized areas, primarily at Lodgepole, Cedar Grove, and Ash Mountain, and where resource conditions were improved in the backcountry. The preferred alternative would also result in localized minor, adverse, long-term impacts such as vegetation trampling due to increased use in some areas. Facility removal would have minor to moderate, adverse, short-term impacts.

The preferred alternative's contribution to the cumulative effects to wetlands and riparian communities would be primarily beneficial. Some minor adverse impacts would occur in localized areas. In conjunction with other actions in and outside the parks, there would be a net major, adverse, long-term, cumulative impact on meadow, riparian, and aquatic communities in the region, principally because of the impacts from land use and development outside the parks.

There would be no impairment of park resources or values.

Impacts of Alternative A

Analysis. Removing facilities, decreasing use, and restoring areas would reduce impacts around some lakes and streams (such as trampled streambank vegetation, disturbance of lake and stream bottoms, loss of wetland flora), compared to the no-action alternative. Specific proposals include removing and restoring the Boy Scout camp along Wolverton Creek; reducing campground sizes along the South Fork of the Kings River at Cedar Grove and along the Marble Fork of the Kaweah River at Lodgepole; removing maintenance and lodging at Grant Grove; and limiting/directing river access along those same areas, as well as along the Middle Fork of the Kaweah. Social trails would likely decrease in number and size with less use. Improving the

condition of the remaining trail system would provide localized benefits, such as where trails cross through meadows. Banning stock use and grazing within the parks would stop impacts to riparian and meadow vegetation and soils, such as root and streambank shearing, defoliation, changes in soil structure or nutrient status, shifts in species composition, potential introduction of exotic plant species, removal of wildlife cover, and wildlife disturbance. Major, long-term benefits could be expected as a result of eliminating potentially irreversible impacts to heavily grazed meadows.

Relocating management facilities outside the parks could result in impacts to wetlands. The extent and intensity of these impacts would depend on site-specific conditions and project design. However, all possible measures would be taken to avoid wetlands or to minimize impacts. If wetlands could not be avoided, mitigating measures, including wetland restoration to compensate for any loss of wetlands, would reduce impacts to negligible to minor.

As described for the no-action alternative, relocating or redesigning bridges over the South Fork in the Cedar Grove area would provide opportunities to revegetate and restore specific riparian areas, resulting in localized minor to moderate, beneficial effects over the long term. Adverse impacts from facility removal (such as bank disturbance and increased erosion potential) would be minor to moderate and short term. The extent and duration of these impacts would be minimized by careful design and timing of facility removal, temporary erosion control measures, and follow-up restoration.

Surface water would continue to be diverted from natural streams and springs in several areas. However, the amount of water diverted would be reduced under this alternative, thus allowing greater water flows downstream of the diversions. Reduced withdrawals in springs at Grant Grove (Round Meadow and Merritt Spring) would improve local hydrology and could potentially decrease moisture stress within meadows adjacent to and below the diversions during droughts. These actions would result in

minor to moderate, beneficial, long-term impacts that would increase riparian vegetation productivity and habitat for fish and other aquatic organisms in affected stream reaches.

Cumulative Impacts. As described for the no-action alternative, widespread, more intensive cumulative impacts have occurred on the regional level, and riparian / aquatic ecosystems remain among the most impacted habitats in the Sierra Nevada, as described in the “Context” section. However, this alternative’s contribution to those effects would be incremental and localized.

Individual future construction projects, along with continued regional population growth and development in general, would have site-specific, adverse, short-term effects and would contribute to adverse, long-term effects throughout the region. Similar to the no-action alternative, this alternative’s contribution to those effects would be incremental and localized.

As described under the no-action alternative, a number of reasonably foreseeable future actions proposed for the parks and surrounding lands could have beneficial effects. For example, the USFS Sierra Nevada Framework for Conservation and Collaboration and management plans for adjacent wilderness areas and Giant Sequoia National Monument would all address ecosystem management issues of lands near the parks.

Also as described for the no-action alternative, the restoration of the Giant Forest has substantially decreased water demand from Wolverton Creek, resulting in more natural conditions. While concession development at Wuksachi would increase water withdrawals from Silliman and Wolverton creeks, the use of multiple water sources is expected to ensure that minimum flows would be maintained in each stream (NPS 1979).

While concession development at Grant Grove would increase, water conservation measures and not withdrawing any more water during the peak visitor use season would not change the

saturation levels in meadows adjacent and below the diversions.

Even though actions in and around the parks could have beneficial, long-term effects, the regional riparian / aquatic ecosystems in the greater Sierra Nevada have been highly impacted by past land use and development. Therefore, there would continue to be a net major, adverse, cumulative impact on regional meadow, riparian, and aquatic communities over the long term.

Conclusion. Alternative A would result in localized, minor to moderate, beneficial impacts to meadow, riparian, and aquatic communities over the long term, primarily in developed areas, around popular lakes, at streams and stream crossings, and below water withdrawal points. Facility removal would have minor to moderate, adverse, short-term impacts.

Even though long-term effects would generally be beneficial, in conjunction with past, present, and reasonably foreseeable future actions, there would be a net major, adverse, long-term, cumulative effect on regional wetlands and riparian communities, principally because of the impacts from land use and development outside the parks.

There would be no impairment of park resources or values.

Impacts of Alternative C

Analysis. Increased frontcountry use and development would occur primarily along the Marble Fork of the Kaweah River at Lodgepole, along the Middle Fork near Ash Mountain, and along the South Fork of the Kings River at Cedar Grove and Knapp’s cabin. Expanded facilities such as lodging and camping near the South Fork would be sited outside riparian areas and would not directly impact those resources. To accommodate more use and to reduce the extent of impacts from visitors accessing the rivers (e.g., trampled streambanks, disturbed stream bottoms, increased turbidity and sedimentation, loss of wetland flora), specific access points and

trails would be defined. Redesigning campgrounds at Cedar Grove and Lodgepole to move them away from the rivers and increasing visitor education would also help control impacts. Compared to the no-action alternative, restricting the spatial distribution of river users and enhancing site durability would help reduce the extent of impacts and allow riparian habitat to be restored, a long-term, minor benefit.

To a lesser degree, increased frontcountry use would also be accommodated along the North Fork of the Kaweah River near the park boundary, along Shepherd Saddle Road, and along the upper reaches of the East Fork. Because these areas are currently little used, increased use could result in minor, adverse, long-term impacts. These areas would be zoned as low-use frontcountry, and only limited reaches of the rivers and streams would be affected. Management actions would be employed to reduce impacts if necessary (e.g., designating river access points and stream crossings, posting signs to direct visitors to areas that can withstand use).

Reducing the extent of major trail corridors would help decrease the extent of impacts such as trampling, compaction, grazing, and erosion in some backcountry meadows and riparian areas. This would be a minor to moderate, long-term benefit, particularly if some currently heavily grazed meadows received substantially less use. The potential of irreversible impacts to some heavily grazed meadows could also be reduced, a major, long-term benefit. Dispersing use in some meadows and riparian areas in the backcountry to areas of no or light use could result negligible to minor, widely dispersed impacts. Maintaining the desired zone conditions through lower use levels, smaller party sizes, and an emphasis on low-impact practices, along with educating visitors about resource protection, would avoid or minimize long-term impacts from dispersed use. If grazing was dispersed to high-elevation meadows with low productivity, even very low use could result in moderate to major impacts. However, continuing to use residual biomass standards would help protect meadow structure and function, thus precluding major impacts.

As described for the no-action alternative, relocating or redesigning bridges over the South Fork of the Kings River in the Cedar Grove area would provide opportunities to revegetate and restore specific riparian areas, resulting in localized, minor, beneficial effects over the long term. Adverse impacts from facility removal (such as bank disturbance and increased erosion potential) would be short term and minor and would be minimized by careful design and timing of facility removal, temporary erosion control measures, and follow-up restoration efforts.

Additional impacts from increased water demand under this alternative would incrementally reduce aquatic habitat in the currently affected reaches and likely extend farther downstream. Increased water demand associated with overnight use would be limited, day use is not expected to increase greatly, and water conservation measures would be implemented, all of which would help limit additional needs for water. Compared to the no-action alternative, impacts are expected to be minor to moderate and long term.

Water conservation measures at Grant Grove, along with not withdrawing more water during the peak visitor use season, would not change the saturation levels in meadows adjacent and below the diversions.

Cumulative Impacts. As described for the no-action alternative, widespread, more intensive impacts have occurred on the regional level, and meadow, riparian, and aquatic communities remain among the most impacted habitats in the Sierra Nevada. However, this alternative's contribution to those effects would be incremental and localized.

Individual future construction projects, along with continued regional population growth and development in general, would have site-specific, adverse, short-term impacts and would contribute to the long-term adverse effects throughout the region.

As described under the no-action alternative, a number of reasonably foreseeable future actions proposed for the parks and surrounding lands could have cumulative beneficial effects. The USFS Sierra Nevada Framework for Conservation and Collaboration, wilderness management plans for adjacent areas, and a management plan for Giant Sequoia National Monument would all address ecosystem management issues of nearby lands.

The restoration of the Giant Forest, as described for the no-action alternative, has substantially decreased water demand from Wolverton Creek, resulting in more natural conditions. While transit support facilities at Lodgepole and concession development at Wuksachi would increase water withdrawals from Silliman and Wolverton creeks, the use of multiple water sources and conservation measures would help ensure minimum flows in each stream (NPS 1979).

Concession development at Grant Grove would also increase water demand. Water conservation measures and not withdrawing any more water during the peak visitor use season would not change the saturation levels in meadows adjacent and below the diversions. Cumulative in-park actions that would affect water withdrawals would not appreciably add to water demands or impacts.

Even though actions in and around the parks could have beneficial, long-term effects, meadow / riparian / aquatic ecosystems in the greater Sierra Nevada have been highly impacted by past land use and development. Therefore, there would continue to be a net major, adverse, long-term impact on the ecosystems regionally.

Conclusion. Alternative C would result in localized, minor to moderate, beneficial, long-term effects to meadow, riparian, and aquatic communities in some areas, primarily in the Lodgepole, Cedar Grove, and Ash Mountain developed areas and in the backcountry where use was dispersed. Also, the potential of irreversible impacts to some heavily grazed meadows could be reduced, which would be a major, long-term benefit. However, alternative C would also re-

sult in minor to moderate, adverse, long-term impacts due to incremental increases in water diversions and increased dispersal of visitors in the backcountry.

On a cumulative basis, alternative C would have both beneficial and adverse, localized effects on wetlands and riparian communities within the parks. In conjunction with past, present, and reasonably foreseeable actions, however, there would continue to be a net major, adverse, long-term effect on regional meadow, riparian, and aquatic communities, primarily because of impacts from land use and development outside the parks.

There would be no impairment of resources or values.

Impacts of Alternative D

Analysis. Increased frontcountry use of meadows and riparian communities is expected to occur predominantly along the Marble Fork of the Kaweah River at Lodgepole, along the Middle Fork near Ash Mountain, and along the South Fork of the Kings River between Cedar Grove and the road's end. Expanded facilities, such as lodging and camping near the South Fork, would be outside riparian or meadow areas in order not to directly impact those resources.

As described under alternative C, to accommodate more use and to reduce impacts from visitors accessing the rivers (e.g., trampled streambanks and beds, increased turbidity and sedimentation, loss of wetland flora), specific access points and trails would be defined and possibly hardened. Redesigning the Cedar Grove and Lodgepole campgrounds and moving campsites away from the rivers, along with increasing visitor education, would also help control impacts. Developing access points and launch sites for nonmotorized boats would uproot and trample small amounts of vegetation; these areas would likely remain void of plants due to erosion and compaction of soils and bottom sediments. Erosion would affect turbidity and sedimentation in adjacent areas. Site-specific impacts would be minor. However, these stream reaches currently

experience high to moderate levels of use, and impacts from unconfined and undirected access have already degraded riparian zones. Compared to the no-action alternative, restricting the spatial distribution of river users and enhancing site durability should reduce the extent of impacts and allow riparian habitat to be restored, a long-term, minor benefit.

To a lesser degree, increased frontcountry use would also be accommodated along the North Fork of the Kaweah River near the park boundary and along the upper reaches of the East Fork (areas zoned for low- and high-use frontcountry). Because these areas currently receive relatively little use, more visitors could create additional long-term adverse impacts to the rivers and tributary streams. The extent and intensity of impacts would be limited and minor. Management actions to reduce impacts would be taken if necessary (e.g., designating river access points and stream crossings, or erecting barriers or signs to direct visitors to areas that could better withstand use). Greater management of high use along the East Fork in upper Mineral King would likely be necessary to limit impacts.

A large portion of the backcountry would continue to be managed for lower use and undisturbed conditions. Concentrating use and allowing more use in existing high-use areas would result in an incremental minor increase in long-term impacts (e.g., compaction, erosion, trampling, loss of vegetation) in meadows and riparian areas in these backcountry areas. Because use would be concentrated, limited grazing would be available in popular grazing areas, and supplemental feed would have to be brought in. Using residual biomass standards would allow park managers to limit grazing in particular areas, helping reduce impacts.

A few trails would be designated for foot-traffic only, therefore some additional riparian areas and meadows would no longer be subject to stock grazing and use impacts, resulting in minor to moderate, long-term benefits, depending on what areas were reserved for foot-traffic only.

As described for the no-action alternative, relocating or redesigning bridges over the South Fork of the Kings River in the Cedar Grove area would provide opportunities to revegetate and restore specific riparian areas, resulting in localized, minor, beneficial effects over the long term. Adverse impacts from facility removal (such as bank disturbance and increased erosion potential) would be minor and short term. The extent and duration of these impacts would be minimized by careful design and timing of facility removal, temporary erosion control measures, and follow-up restoration efforts.

Additional impacts from increased water demand under this alternative would incrementally reduce aquatic habitat in the currently affected reaches and farther downstream. Increased water demand is expected to be minimal because additional water demand associated with overnight use would be limited, day use is not expected to increase greatly, and water conservation measures would be implemented. Water conservation measures at Grant Grove, along with not withdrawing more water during the peak season, would not change the saturation levels in the meadow adjacent to and below the diversions. Compared to the no-action alternative, impacts are expected to be minor and long term.

Cumulative Impacts. As described for the no-action alternative, cumulative impacts are based on analyses of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on a regional level, this alternative's contribution to those effects would be incremental and localized.

Riparian and aquatic communities remain among the most impacted habitats in the Sierra Nevada, as described in the "Regional Context" section. Individual future construction projects, along with continued regional population growth and development in general, would have site-specific, adverse, short-term effects and would contribute to adverse, long-term effects throughout the region.

As described under the no-action alternative, a number of reasonably foreseeable future actions proposed for the parks and surrounding lands could have cumulative beneficial effects. The USFS Sierra Nevada Framework for Conservation and Collaboration, management plans for adjacent wilderness areas, and a management plan for Giant Sequoia National Monument would all address ecosystem management issues of nearby lands.

As described for the no-action alternative, the restoration of the Giant Forest has substantially decreased water demand from Wolverton Creek, resulting in more natural conditions. While transit support facilities at Wolverton and concession development at Wuksachi would increase water withdrawals from Silliman and Wolverton creeks, the use of multiple water sources is expected to ensure minimum flows in each stream (NPS 1979).

Concession development at Grant Grove would also increase water demand. Water conservation measures and not withdrawing any more water during the peak visitor use season would not change the saturation levels in the meadows adjacent and below the diversions. Cumulative in-park actions that would affect water withdrawals would not appreciably add to water demands or impacts.

Even though actions in and around the parks could have beneficial, long-term effects, the regional riparian / aquatic ecosystems in the greater Sierra Nevada have been highly impacted by past land use and development. Therefore, there would continue to be a net major, adverse, cumulative impact on regional wetlands, riparian, and aquatic ecosystems over the long term.

Conclusion. Alternative D would result in minor, localized, long-term benefits to meadow, riparian, and aquatic communities in some areas, primarily in the Lodgepole, Cedar Grove, and Ash Mountain developed areas. Alternative D would result in localized, minor, adverse, long-term impacts where river access points were developed in currently unaffected locations.

Minor, adverse, long-term impacts would also result from greater use in high-use backcountry areas and from an incremental increase in water diversions.

On a cumulative basis, alternative D would result in both beneficial and adverse impacts to wetlands and riparian communities. However, when combined with the effects of actions by others, there would continue to be a net long-term, major, adverse, cumulative effect on regional wetlands and riparian communities, primarily because of impacts from land use and development outside the parks.

There would be no impairment of park resources or values.

WILDLIFE AND WILDLIFE HABITAT

Regional Context

Wildlife habitat within the greater Sierra Nevada region has been and will likely continue to be affected by various land uses, development, altered fire regimes, population growth, recreational use, and air pollution. Adverse wildlife effects include reduced habitat, increased habitat fragmentation and isolation, mortality, harassment or disturbance of wildlife, and competition from exotic species, all of which affect wildlife composition, abundance, and distribution.

Park Context

Within the parks terrestrial wildlife are also affected by landscape level stressors, primarily ecological impacts from exotic species, changes in species composition and abundance due to the altered fire regime, bioaccumulation of contaminants, and isolation and fragmentation of some species due to differences in land-use practices on adjacent lands. Other effects on wildlife occur from conflicts with visitor use, changes to the natural distribution and abundance of native species due to park developments, and anthropogenic mortality (both accidental and by poaching). The primary threats to native aquatic wildlife include competition and genetic

Impact Thresholds for Wildlife and Wildlife Habitat

Negligible — The impact would be at the lower levels of detection or not measurable.

Minor — The impact would be detectable, but it would not affect the viability of the local population or overall community size, structure, or composition.

Moderate — The impact would be clearly detectable and could have an appreciable effect on the resource. This would include impacts that affect the abundance or distribution of local populations, but it would not affect the viability of the regional population. Localized changes to community size, structure, or composition and ecological processes could occur.

Major — The impact would be severely adverse or exceptionally beneficial. Impacts would have a substantial, highly noticeable, or widespread influence, affecting the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Community size, structure, or composition and ecological processes would be highly altered, and landscape level changes could be expected.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the parks' enabling legislation,
- key to the natural or cultural integrity of the parks or to opportunities for enjoyment of the parks, or
- identified as a goal in this general management plan or other relevant NPS planning documents.

introgression from exotic species, as well as predation.

Impacts of the No-Action Alternative

Analysis. Existing developments and visitor use have affected natural wildlife movements, habitat, and food sources. Individuals, populations, and species vary in their sensitivity to disturbance. Increased use and limited new development might temporarily disturb or displace some individual animals, particularly those sensitive to human disturbance. Certain wildlife, such as small mammals, could also be attracted to the increased food source that visitors represent. Large portions of the parks are undeveloped and receive very little visitor use, and they are expected to continue to provide relatively undisturbed habitats for wildlife. This would particularly benefit species that are intolerant of human intrusions and that require large, unfragmented territories, such as the northern goshawk or the wolverine (see "Threatened, Endangered, or Special Concern Species" for the latter). Increased use is expected to occur primarily in areas already experiencing heavier use, and incremental impacts on wildlife are expected to be negligible to minor. Wildlife sensitive to disturbance probably already avoid these areas, and wildlife that do utilize these areas are likely habituated to human presence. In addition, management actions to avoid or minimize the extent and severity of impacts would continue, such as restricting use in specific areas or by season; confining or directing use by means of barriers, trails, and designated camping areas; and restoring impacted sites as funding became available.

Greater use could result in an increase in improper food storage by visitors. Food and garbage attract wildlife and condition wildlife to associate humans with food, which can lead to human/wildlife conflicts. Continued management practices (such as providing garbage and food storage containers resistant to wildlife, and educating visitors) would continue to be implemented, resulting in negligible to minor impacts.

Occasionally wildlife are killed or injured by motor vehicles on park roads. This impact could increase slightly with additional vehicle use, although the number of incidents would still be low, and impacts would be negligible to minor.

Winter use primarily in and around the major developed areas along Generals Highway would continue. While winter use could increase, it would still be low, with limited disturbance to wildlife. In general snow cover would protect underlying soils and vegetation, and impacts to wildlife habitat would be negligible to minor.

Cumulative Impacts. Cumulative impacts on wildlife are based on analyses of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with the potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on the regional level, this alternative's contribution to those effects would be incremental and localized.

As discussed under "Regional Context," adverse wildlife effects within the greater Sierra Nevada region include reduced and fragmented habitat, disturbance of wildlife, and competition from exotic species, all of which affect wildlife composition, abundance, and distribution. Some ongoing and future restoration programs within the parks (e.g., the Giant Forest developed area) and proposed development projects (e.g., expanded visitor facilities at Grant Grove and Wuksachi, and the Giant Forest transit system) would have both beneficial and adverse impacts to wildlife habitat. Impacts would generally be minor because development would be reduced or expanded in areas that would continue to accommodate high-use levels.

Several actions by others could have cumulative beneficial effects. For example, the USFS Sierra Nevada Framework for Conservation and Collaboration, and management plans for adjacent wilderness areas and for Giant Sequoia National Monument, would all address ecosystem management issues on lands adjacent to the parks.

While some cumulative actions would have beneficial, long-term cumulative effects in the parks and region, overall throughout the larger Sierra Nevada region, past, present, and reasonably foreseeable future actions, in combination with actions under this alternative, would have a major, adverse, long-term, cumulative impact on

wildlife. The no-action alternative would contribute a minor, beneficial, long-term component to cumulative effects as a result of removing and redesigning a limited number of facilities, but it would contribute a minor, adverse, long-term increment to cumulative effects through continued use and development.

Conclusion. Wildlife populations and habitat would continue to be influenced to varying degrees by existing facilities and visitor use that affect natural movements of wildlife, habitat, and food sources. Increased use would have negligible to minor, adverse, long-term impacts. Impacts would be related to more visitor use displacing or disturbing wildlife, conflicts with animals associating humans with food, and the injury or loss of wildlife from motor vehicle collisions.

On a cumulative basis, the no-action alternative would contribute a negligible to minor, beneficial, long-term effect because a limited number of facilities would be removed or redesigned, but it would contribute a minor, adverse, long-term increment to cumulative effects through continued use and development. In conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts on wildlife, principally as a result of actions outside the parks.

In accordance with the criteria for determining impairment, there would be no impairment of park resources or values.

Impacts of the Preferred Alternative

Analysis. As described for the no-action alternative, increased use, most likely in developed areas and to a lesser extent along other front-country trails and easily accessible backcountry areas, could result in increased localized user impacts, such as trampling and loss of vegetation, which could affect wildlife habitat. However, actions under this alternative to mitigate adverse effects — for example, providing designated river access points and improving trail conditions (including measures to minimize impacts such as site hardening, fencing, design-

nated trails and campsites, higher standard trails for stock use, visitor education, and restoration of disturbed areas) — would reduce impacts in specific areas and increase opportunities for habitat restoration, particularly riparian habitat. Compared to the no-action alternative, these actions would have a minor, long-term benefit.

In the backcountry the preferred alternative would limit use as needed in some areas in order to protect resources, and commercial stock use would be more regulated. These actions would reduce habitat impacts to a minor degree; some meadow and riparian habitats now being heavily grazed could be improved to a moderate degree for wildlife such as rodents or birds. The addition of a high Sierra camp on the Hockett Plateau could create conditions for more interactions between humans and bears. Continued management practices (such as providing wildlife-resistant garbage and food storage containers and educating visitors) would result in negligible to minor impacts.

Impacts from new development could be both short term (e.g., construction-related noise, dust, and visual presence) and long term (e.g., loss of habitat, night lighting, fire suppression in the vicinity of structures, human presence), with effects on the presence and distribution of species within the area. Because these developments would affect limited areas, because they would be primarily within developed areas or at previously disturbed sites, and because impacts would be mitigated to the extent possible, adverse impacts would likely be minor.

Wildlife being killed or injured by motor vehicles on park roads could increase slightly because of additional vehicle use and because some Hume Lake traffic would be redirected to Quail Flat road. Potential shuttle service in high-use areas could help reduce traffic volumes. Overall, the number of incidents would still be low, and impacts would be negligible to minor.

Expanded winter use would occur primarily in and around the major developed areas along Generals Highway. Winter use would still be low, and disturbance to wildlife would be

limited. In general snow cover would protect underlying soils and vegetation from visitor-related impacts, so effects to wildlife habitat would be negligible to minor.

Cumulative Impacts. As described for the no-action alternative, cumulative impacts on wildlife are based on analyses of past, present, and reasonably foreseeable actions in the Sierra Nevada region, in combination with potential effects of this alternative. Whereas widespread, more intensive impacts have occurred on the regional level, this alternative's contribution to those effects would be incremental and localized.

As discussed under "Regional Context," adverse wildlife effects within the greater Sierra Nevada region include reduced and fragmented habitat, disturbance of wildlife, and competition from exotic species, all of which affect wildlife composition, abundance, and distribution. Some ongoing and future restoration programs within the parks (e.g., restoring the Giant Forest developed area) and proposed development projects (e.g., expanded visitor facilities at Grant Grove and Wuksachi, and the Giant Forest transit system) would have both beneficial and adverse impacts to wildlife habitat. Impacts would generally be minor because development would be reduced or expanded in areas that would continue to accommodate high-use levels.

Programs and actions outside the parks that could have cumulative beneficial effects include plans by the U.S. Forest Service related to the Sierra Nevada Framework for Conservation and Collaboration, along with management plans for adjacent wilderness areas and Giant Sequoia National Monument, which would all address ecosystem management issues on adjacent lands.

On a cumulative basis, the preferred alternative would contribute minor to moderate, beneficial, long-term impacts and minor adverse impacts. While some actions would have beneficial, long-term, cumulative effects in the parks and region, overall past, present, and reasonably foreseeable actions throughout the Sierra Nevada region, in conjunction with actions under this alternative,

would have long-term, major, adverse impacts on wildlife.

Conclusion. Improving the frontcountry trail system would have negligible to minor, beneficial, long-term impacts to wildlife habitat. Limiting backcountry use where necessary for resource protection would result in localized minor to moderate benefits. Constructing new facilities, increasing frontcountry and winter use, and dispersing backcountry use would result in increased potential for conflicts between humans and wildlife. Impacts would range from wildlife learning to associate humans with food sources (leading to more interactions) to injury or loss of wildlife from motor vehicle collisions. These impacts would be negligible to minor, localized, and long term.

The preferred alternative would contribute a negligible to moderate beneficial component to cumulative effects, as well as a minor adverse increment. In conjunction with past, present, and reasonably foreseeable actions, there would continue to be a major, adverse, long-term, cumulative impact on wildlife and wildlife habitat throughout the region, principally as a result of impacts outside the parks.

There would be no impairment of park resources or values.

Impacts of Alternative A

Analysis. Alternative A would result in less development and use throughout the parks, as well as more opportunities to revegetate and restore wildlife habitat. Localized minor benefits to wildlife could result from less altered habitat and human disturbance, possibly fewer road kills, and decreased opportunities for conflicts or interactions with humans. Removing facilities throughout the parks would result in localized, minor, short-term disturbances to wildlife, with beneficial impacts over the long term.

Reducing human use and eliminating stock use in heavily used areas would reduce direct impacts to habitat, such as trampling and soil compaction. Indirect impacts from the introduction

or spread of nonnative species, such as brown-headed cowbirds (a nest parasite that attacks a number of rare native warbler species), would also be reduced. Residential areas and pack stations have created conditions suitable for cowbirds, and reducing development and removing pack stations would no longer favor this species. However, campgrounds and other outdoor eating areas would still provide cowbirds with a food source.

Limited new facility construction within existing developed areas would have negligible adverse effects because the amount of habitat affected would be small and is already affected by ongoing uses. Relocating facilities outside the parks could result in the removal of habitat and displacement of wildlife, depending on the selected relocation sites. With careful siting and design of facilities and mitigating measures to minimize long-term impacts, impacts are expected to be site-specific and minor, although possibly moderate in intensity. Further studies and environmental analysis would be completed as part of the site-selection process.

Cumulative Impacts. As described for the no-action alternative, widespread, more intensive cumulative impacts have occurred on the regional level, with adverse effects on wildlife composition, abundance, and distribution. However, this alternative's contribution to those effects would be incremental and localized.

Some ongoing and future restoration programs within the parks and proposed development projects would have both beneficial and adverse impacts to wildlife habitat. Impacts would generally be minor because development would be reduced or expanded in areas that would continue to accommodate high-use levels.

Programs and actions outside the parks that could have cumulative beneficial effects include plans by the U.S. Forest Service related to the Sierra Nevada Framework for Conservation and Collaboration, wilderness management plans, and a Giant Sequoia National Monument management plan, which would all address ecosystem management issues on adjacent lands.

On a cumulative basis, alternative A would contribute a minor to moderate, beneficial, long-term effect through reduced use and development, and a minor, adverse, long-term effect from the construction of limited new development within and outside the parks. While some actions would have beneficial, long-term effects in the parks and region, overall past, present, and reasonably foreseeable actions throughout the larger Sierra Nevada region, in conjunction with actions under this alternative, would continue to have major, adverse, cumulative impacts on wildlife and wildlife habitat over the long term.

Conclusion. Alternative A would result in minor to moderate, beneficial, long-term impacts as a result of reduced use and fewer facilities, and minor, adverse, long-term impacts from limited new concession developments.

On a cumulative basis, this alternative would contribute minor to moderate beneficial impacts and minor adverse impacts. In conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts on wildlife, principally as a result of impacts outside the parks.

There would be no impairment of resources or values.

Impacts of Alternative C

Analysis. Impacts related to new development would be the same as those described for the preferred alternative. They would be both short term (e.g., construction-related noise, dust, and visual presence) and long term (e.g., loss of habitat, night lighting, fire suppression in the vicinity of structures, human presence), with effects on the presence and distribution of species within the area. Because new developments would affect limited areas, because they would be located primarily within existing developed areas or at previously disturbed sites, and because impacts would be mitigated to the extent possible, impacts would likely be minor.

More visitor use in developed areas and to a lesser extent along frontcountry trails and easily

accessible backcountry areas could increase localized impacts to wildlife habitat because of trampling and loss of vegetation. However, providing designated river access points and improving trail conditions (e.g., hardening sites, providing fencing to protect resources, designating trails and campsites, maintaining stock trails at higher standards, educating visitors, and restoring disturbed areas) would minimize impacts. Habitat restoration, particularly in riparian areas, would be a minor benefit. Increased human presence would also affect the presence and distribution of species, a negligible to minor impact because these areas and trails already receive moderate to high use.

Reducing the extent of high-use backcountry areas, dispersing use in the backcountry, and improving trail conditions would improve habitat to a minor degree. Reducing and dispersing stock use could improve meadow and riparian habitats now being heavily grazed, a moderate beneficial impact for species such as rodents or birds. However, to the extent that use was directed to areas where no use occurs now, even a slight increase in human presence could lower the habitat suitability for species such as goshawks or wolverine, displacing them from a portion of their territory. Low-use levels, smaller party sizes, an emphasis on low-impact practices, educating visitors, restricting visitor activities during sensitive times, or other possible management techniques would all help minimize impacts. Most park areas would no longer be subject to disturbance and would presumably continue to provide relatively undisturbed habitat for wildlife species. Overall, impacts in the backcountry would be minor and long term.

Continued management practices, such as providing wildlife-resistant garbage and food storage containers and educating visitors, would help reduce the frequency of human/wildlife interactions, resulting in negligible to minor impacts.

The number of wildlife that are killed or injured by motor vehicles on park roads could increase slightly with additional motor vehicle use and as a result of redirecting some Hume Lake traffic to

the Quail Flat road. However, shuttle service in other park areas could help reduce the extent of traffic growth. Overall, the number of incidents would still be low, and impacts would be negligible to minor.

Even though opportunities for winter use would be expanded, primarily in and around the major developed areas along Generals Highway, use is still expected to be low, thus limiting disturbance to wildlife. Snow cover would protect underlying soils and vegetation from activity-related impacts, with negligible to minor impacts on wildlife habitat.

Cumulative Impacts. As described for the no-action alternative, widespread, more intensive cumulative impacts have occurred on the regional level, including reduced and fragmented habitat, disturbance of wildlife, and competition from exotic species, all of which affect wildlife composition, abundance, and distribution. However, this alternative's contribution to those effects would be incremental and localized.

Some ongoing and future restoration programs within the parks and proposed development projects would have both beneficial and adverse impacts to wildlife habitat. Impacts would generally be minor because development would be reduced or expanded in areas that would continue to accommodate high-use levels.

Programs and actions outside the parks that could have cumulative beneficial effects include USFS plans related to the Sierra Nevada Framework for Conservation and Collaboration, along with management plans for wilderness areas and Giant Sequoia National Monument, which would all address ecosystem management issues on adjacent lands.

On a cumulative basis, alternative C would contribute a minor to moderate, beneficial, long-term effect, and a minor, adverse, long-term effect from the construction of limited new facilities. While some actions would have beneficial, long-term effects in the parks and region, overall past, present, and reasonably foreseeable actions throughout the larger Sierra Nevada region, in

conjunction with actions under this alternative, would continue to have major, adverse, long-term, cumulative impacts on wildlife and wildlife habitat.

Conclusion. The construction and use of new facilities, more frontcountry and winter use, and the dispersal of backcountry use would result in an increased potential for conflicts between humans and wildlife. Impacts would range from wildlife learning to associate humans with food (with potentially more interactions) to injury or loss of a small number of wildlife from motor vehicle collisions. These impacts would be negligible to minor, localized, and long term. Reducing the extent of high-use backcountry areas would result in minor to moderate, localized, long-term benefits.

On a cumulative basis, alternative C would contribute negligible to moderate beneficial effects and minor adverse effects. In conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts on wildlife and wildlife habitat throughout the region, principally as a result of impacts outside the parks.

There would be no impairment of park resources or values.

Impacts of Alternative D

Analysis. Impacts related to new development could be both short term (e.g., construction-related noise, dust, and visual presence) and long term (e.g., loss of habitat, night lighting, fire suppression in the vicinity of structures, human presence), with effects on the presence and distribution of wildlife species. Because these developments would affect limited areas, because they would be located primarily within existing developed areas or at previously disturbed sites, and because impacts would be mitigated to the extent possible, impacts would likely be minor.

Constructing a Grant Grove bypass would result in the loss of wildlife habitat and could increase wildlife mortality from roadkills. The degree of impact would be related to the location of the

roadway alignment and site-specific conditions along the road corridor. The extent of habitat loss would be minimized through careful design (e.g., siting the alignment to follow existing road corridors wherever possible) and by applying mitigating measures as part of construction (e.g., slope stabilization / erosion control measures, revegetation). Increased vehicular and human activity along the road corridor would likely affect individuals and possibly local wildlife populations. The wildlife community probably has already been affected to some degree by human activity, and vehicles and increasing human use would not be expected to substantially alter wildlife populations. Long-term impacts would likely be minor to moderate in intensity along the road corridor; however, further environmental analysis would be completed prior to construction.

Increased use in developed areas and along existing higher use trails, as well as expanding the frontcountry trail system and adding pullouts along Generals Highway, could result in minor, localized impacts to wildlife habitat, such as trampling and loss of vegetation. More human presence would also affect wildlife present in these areas. Effects would be negligible to minor in areas where use is already moderate to high and where the use of new trails would displace wildlife from the vicinity of the trail. The extent of adverse impacts would be minimized by carefully siting trails to avoid sensitive areas (e.g., raptor nests) and by applying mitigating measures as needed (e.g., closing areas or restricting use). Alternative D would designate river access points in order to reduce localized impacts, allowing other impacted areas to be restored, particularly riparian habitat, a minor benefit.

In the backcountry alternative D would increase use and concentrate it in major trail corridors, as well as allowing larger parties in high-use areas. It is likely then that disturbance associated with existing high-use trail corridors and campsites would increase to a negligible to minor degree. Constructing new high-use trail corridors would disturb wildlife. However, expected low levels of use, various party sizes, designated campsites, visitor education programs, restrictions on visitor activities during sensitive times, or other

possible management techniques would help minimize and confine impacts to wildlife to localized areas. Under this alternative most of the parks would remain as relatively undisturbed habitat for wildlife species. The addition of a high Sierra camp on the Hockett Plateau could result in more opportunities for bear/human interactions. Overall impacts in the backcountry would be minor and long term.

Continued management practices, such as providing wildlife-resistant garbage and food storage containers and educating visitors, would continue to be implemented, resulting in negligible to minor impacts on wildlife.

The number of wildlife killed or injured by motor vehicles on park roads could increase slightly with additional motor vehicles and as a result of redirecting some Hume Lake traffic to a bypass road. In other park areas, shuttle service could also help reduce the extent of traffic growth. Overall, the number of incidents would still be low, and impacts would be negligible to minor.

Expanded winter use in and around the major developed areas along Generals Highway, plus increased winter use in the Mineral King Valley, could affect some wildlife species. Winter use would still be low, and management actions such as restricting off-trail travel, closing areas, and limiting party sizes would be taken as necessary to limit impacts. As a result, long-term impacts would be minor. Snow cover would protect underlying soils and vegetation, and impacts to wildlife habitat would be negligible to minor.

Cumulative Impacts. As described for the no-action alternative, widespread, more intensive cumulative impacts on wildlife have occurred regionally as a result of reduced and fragmented habitat, disturbances, and competition from exotic species, all of which affect wildlife composition, abundance, and distribution. However, this alternative's contribution to those effects would be incremental and localized.

Some ongoing and future restoration programs within the parks (e.g., restoring the Giant Forest developed area) and proposed development

projects (e.g., expanded visitor facilities at Grant Grove and Wuksachi, and the Giant Forest transit system) would have both beneficial and adverse impacts to wildlife habitat. Impacts would generally be minor because development would be reduced or expanded in areas that would continue to accommodate high-use levels.

Programs and actions outside the parks that could have cumulative beneficial effects include plans by the U.S. Forest Service related to the Sierra Nevada Framework for Conservation and Collaboration and management plans for adjacent wildernesses and Giant Sequoia National Monument, which would all address ecosystem management issues on nearby lands.

On a cumulative basis, alternative D would contribute minor, beneficial and adverse effects over the long term. In conjunction with past, present, and reasonably foreseeable actions throughout the region, there would continue to be major, adverse, long-term, cumulative impacts on wildlife and wildlife habitat.

Conclusion. New facilities, increased front-country use, high-use backcountry corridors, and winter use, along with increased potential for interactions between people and wildlife seeking food, and injury or loss of wildlife from motor vehicle collisions, would all result in localized, negligible to minor, adverse, long-term impacts. Constructing a Grant Grove bypass (if allowed) would have minor to moderate, adverse impacts. Designating river access points would reduce localized impacts and increase opportunities for habitat restoration, particularly riparian habitat, a minor benefit.

On a cumulative basis, alternative D would contribute minor beneficial impacts, as well as minor to moderate adverse effects. In conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts on regional wildlife, principally as a result of impacts outside the parks.

There would be no impairment of park resources or values.

THREATENED, ENDANGERED, OR SENSITIVE SPECIES

Methodology for Analyzing Impacts

The alternatives are programmatic in nature. For example, the extent of impacts from changing patterns of use in the backcountry would depend on where use levels changed, the species in those areas, and the current status of those species in regard to existing impacts. Thus, only general impacts are discussed for the alternatives. Before any proposals for backcountry use or other specific actions were implemented, further environmental analysis and site-specific data collection would be completed to fully evaluate potential effects on special status species.

If the National Park Service determined that an action might adversely affect a federally listed species, then in accordance with the Endangered Species Act it must consult with the U.S. Fish and Wildlife Service to ensure that the species' continued existence would not be jeopardized or critical habitat destroyed or adversely modified. If any actions in the preferred alternative were likely to adversely affect one or more federally listed species, a biological assessment would be prepared to document the potential effects. The Fish and Wildlife Service would then prepare a biological opinion based on the assessment and other scientific sources to determine whether the proposed actions would be likely to jeopardize the continued existence of the listed species or to result in the destruction or adverse modification of critical habitat. Such an opinion would be the same as a determination of impairment. To ensure that a species was not jeopardized by proposed actions, the Park Service would confer with the Fish and Wildlife Service to identify measures for reducing adverse effects and would integrate those into the preferred alternative.

Regional Context

Regionally, rare wildlife and vegetation populations have been and will likely continue to be affected by logging, loss of natural fire regimes, mining, grazing, agriculture, development, water

Impact Thresholds for Threatened, Endangered, or Sensitive Species

In accordance with language used to determine effects on threatened and endangered species under the federal Endangered Species Act (USFWS 1998), potential effects on special status species are categorized as follows:

No effect — The proposed actions would not affect special status species or critical habitat.

Not likely to adversely affect — The effects on special status species would be extremely unlikely to occur and could not be meaningfully measured, detected, or evaluated, or they would be completely beneficial.

Likely to adversely affect — Any adverse effect to listed species that might occur as a direct or indirect result of proposed actions, and the effect would not be discountable or would be completely beneficial.

Is likely to jeopardize proposed species / adversely modify proposed critical habitat (impairment) — The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identifies situations in which an action could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside park boundaries.

Remaining considerations concerning special status species, including conclusions and evaluation of cumulative impacts, are presented in accordance with the general definitions described above.

damming and diversions, recreational use, and introduction of nonnative species. Over 50% of the 30 native Sierra Nevada amphibian species have experienced population declines. The most at-risk species are closely tied to aquatic and riparian habitat and include the true frogs (*Rana* spp.) and toads (*Bufo* spp.). Possible causes

include habitat destruction, nonnative fish, pesticides, and diseases. Declines in golden trout are associated with hybridization, competition, and predation by introduced fish in native trout habitat. Carnivores including wolverines, fishers, and Sierra Nevada red foxes have had significant declines in their range in the Sierra Nevada due in large part to habitat fragmentation and loss.

Impacts of the No-Action Alternative

Analysis. Potential effects on threatened, endangered, or sensitive species under the no-action alternative would be associated with limited increased human use in the parks. The no-action alternative would result in no effect or would not be likely to adversely affect any special status species. However, some inconsequential changes to habitat from increased visitor use might occur. Potential impacts on species that are listed by the federal government or the state as threatened, endangered, or of special concern are included in Table 27. As mentioned in the “Methodology for Analyzing Impacts” section, only general impacts are discussed for the alternatives. Before any proposals for backcountry use or other specific actions were implemented, further environmental analysis would be completed to fully evaluate effects on special status species.

Cumulative Impacts. The no-action alternative would have no effect or would not be likely to adversely affect any special status species. Consequently, the alternative would not contribute to cumulative effects.

As discussed in the “Regional Context” section, rare wildlife and vegetation populations have been and will likely continue to be affected by past and present activities throughout the region (logging, loss of natural fire regimes, mining, grazing, agriculture, development, water damming and diversions, recreational use, and introduction of nonnative species). Altogether, these impacts would continue to have a major, adverse, long-term impact.

TABLE 27: EFFECTS ON POPULATIONS OF THREATENED, ENDANGERED, OR SENSITIVE SPECIES — NO-ACTION ALTERNATIVE

Common Name	Status	Impact
Vertebrate Animals		
Mammals		
Bat, big-eared	FSC, CSC	Not likely to be adversely affected. This is primarily a forest-dwelling species. While development would continue to displace habitat or cause disturbance, no appreciable changes in development would occur under this alternative. Cave dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and other measures.
Bat, greater western mastiff	FSC, CSC	Same as above.
Bat, spotted	FSC, CSC	Same as above.
Bear, grizzly	FT	Extirpated from the Sierra Nevada.
Beaver, mountain	FSC, CSC	No effect. Fairly restricted habitat that currently receives no or very little use or is unlikely to receive increased use.
Fisher, Pacific	FSC, CSC	Not likely to be adversely affected. This species needs large areas of relatively undisturbed habitat. Although development would continue to displace habitat, no appreciable changes in development would occur.
Fox, Sierra Nevada red	CT, FSC	Not likely to be adversely affected. No data to confirm potential impacts and may not exist in the parks. If they do occur, they are highly intolerant of human presence and probably occur in the most remote and little-used areas, based on existing patterns of use or amount of use in backcountry, which would not change.
Hare, white-tailed	CSC	Not likely to be adversely affected. Although development could continue to displace habitat, no appreciable changes in development would occur.
Marten	FSS	Same as above.
Myotis, fringed	FSC	Not likely to be adversely affected. This is primarily a forest-dwelling species. While development would continue to displace habitat or cause disturbance, no appreciable changes in development would occur under this alternative. Cave dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Myotis, long-eared	FSC	Same as above.
Myotis, long-legged	FSC	Same as above.
Myotis, small-footed	FSC	Same as above.
Myotis, Yuma	FSC, CSC	Same as above.
Pallid	CSC	Same as above.
Sheep, bighorn	FE, CE	No effect. Most existing use in portions of sheep range occurs along trails and is predictable and therefore less disturbing to sheep. Patterns of backcountry use or amount of use would not change. Currently one area is closed to protect sheep. Restrictions on areas or times of visitor use of sheep range would continue to be imposed as necessary.
Wolverine, California	CT, FSC	Not likely to be adversely affected. No data to confirm potential impacts; however, wolverines are highly intolerant of human presence and probably occur in the most remote and little-used areas of parks, based on existing patterns of use or amount of use in backcountry, which would not change.
Birds		
Condor, California	FE, CE	Extirpated from the parks.
Eagle, bald	FT, CE	No effect. The parks are outside this species' preferred habitat. No known nesting or communal roosting in the parks.
Eagle, golden	CP, CSC	Not likely to be adversely affected. Although development would continue to displace habitat and varying levels of recreation-related disturbance from human activity would continue, no appreciable changes in development or patterns of use would occur.
Falcon, peregrine	CSC	No effect. No impacts to nesting habitat. Management actions such as restrictions on areas and timing of visitor use, primarily climbing activities, are used as necessary to protect nest sites.
Falcon, prairie	CSC	No effect. Rare in the parks, and no known nesting sites. Potential cliff nesting habitat would not be affected. Management actions would be imposed similar to those for peregrines if necessary.

ENVIRONMENTAL CONSEQUENCES

Common Name	Status	Impact
Flycatcher, willow	CE, FSS	Not likely to be adversely affected. Rare in the parks. Currently little habitat disturbance to two known sites. Increased use could have a negligible effect on the extent of the impact area, but use restrictions would be imposed if necessary. Stock grazing currently has minimal impacts to suitable willow habitat; stock use is curtailed based on impacts to more sensitive meadow grass/sedge species, which would occur before impacts to willows. Studies to date show no significant evidence of cowbird parasitism on riparian nesting birds.
Goshawk, northern	FSC, CSC	Not likely to be adversely affected. Although development would continue to displace habitat and varying levels of recreation-related disturbance from human activity would continue, no appreciable changes in development or patterns of use would occur under this alternative.
Gull, California	CSC	No effect. Uncommon migrants through alpine/subalpine areas.
Harrier, northern	CSC	No effect. Uncommon in the parks. Generally uses open, burnt, chaparral habitat where visitor use is currently low and unlikely to increase due to difficulty of travel through vegetation.
Hawk, Cooper's	CSC	Not likely to be adversely affected. Although development would continue to displace habitat and varying levels of recreation-related disturbance from human activity would continue, no appreciable changes in development or patterns of use would occur.
Hawk, sharp-shinned	CSC	Same as above.
Hawk, Swainson's	CT	No effect. Rare resident or accidental visitor in the parks, which are outside its usual range and preferred habitat.
Kite, white-tailed	CP	Same as above.
Lark, horned	CSC	Same as above.
Martin, purple	CSC	Same as above.
Merlin	CS	No effect. Sporadic use of open terrain in the parks.
Osprey	CSC	No effect. Rare resident or accidental visitor in the parks, which are outside its usual range and preferred habitat.
Owl, great gray	CE, FSS	Not likely to be adversely affected. Parks are apparently south of its normal range in the Sierra Nevada. Rare/limited occurrence in the parks. Increased use may have a negligible adverse effect.
Owl, long-eared	CSC	No effect. Very rare in montane zones.
Owl, short-eared	CSC	No effect. Very rare visitor.
Owl, spotted	FSC, CSC	Not likely to be adversely affected. Although development would continue to displace habitat and varying levels of recreation-related disturbance from human activity would continue, no appreciable changes in development or patterns of use would occur under this alternative.
Shrike, loggerhead	FSC, CSC	No effect. Rare resident or accidental visitor in the parks, which are outside its usual range and preferred habitat.
Swift, Vaux's	CSC	Not likely to be adversely affected. Although development would continue to displace habitat and varying levels of recreation-related disturbance from human activity would continue, no appreciable changes in development or patterns of use would occur.
Reptiles		
Lizard, California legless	FSC, CSC	Not likely to be adversely affected. Little current use or expected increased use through specific habitat along the Middle Fork of the Kaweah River.
Lizard, coast horned	FSC, CP, CSC	No effect. No modern records of sightings for the parks. Either extirpated or never established in the parks.
Amphibians		
Frog, foothill yellow-legged	FSC, CP, CSC	Extirpated from the parks.
Frog, mountain yellow-legged	FSC, CP, CSC	Not likely to be adversely affected. Little current disturbance to breeding areas from visitor/stock use. Currently one area is closed to overnight stock use to protect a frog-breeding area. Restrictions on areas or times of stock use would continue to be imposed as necessary.
Toad, Yosemite	FSC, CP, CSC	Not likely to be adversely affected. Restrictions on areas or times of stock use would be imposed as necessary.

Common Name	Status	Impact
Turtle, Western pond	FSC, CP, CSC	No effect. Very little existing human or stock use / disturbance of habitat (foothill streams/rivers); no likely increase in use.
Salamander, Mount Lyell	FSC, CP, CSC	No effect. Very little existing human or stock use / disturbance to habitat; no likely increase in use.
Fishes		
Roach, California	CSC	No effect. Minimum water flows below Kaweah hydroelectric diversions would continue to adequately protect this species.
Trout, California golden	FSC, CSC	No effect. Does not occur within the parks as a native species. Continued fishing area closures / special regulations would apply. Regulations revised as necessary based on monitoring.
Trout, Kern River rainbow	FSC, CSC	No effect. Continued fishing area closures / special regulations would apply. Regulations revised as necessary based on monitoring.
Trout, Little Kern golden	FT	Same as above.
Invertebrate Animals		
Insects		
Beetle, Ciervo aegialian	FSC	Not likely to be adversely affected. No appreciable change in development/use patterns under this alternative.
Beetle, Hopping's blister	FSC	No effect. Distribution/habitat not found in the parks.
Beetle, moestan blister	FSC	Same as above.
Beetle, molestan blister	FSC	Same as above.
Beetle, Morrison's blister	FSC	Same as above.
Beetle, San Joaquin dune	FSC	Same as above.
Beetle, San Joaquin tiger	FSC	Same as above.
Beetle, valley elderberry longhorn	FT	Not likely to be adversely affected. Believed absent due to the presence of other subspecies.
Beetle, wooly hydroporous diving	FSC	Not likely to be adversely affected. No appreciable change in development/use patterns under this alternative.
Bug, Dry Creek cliff strider	FSC	Same as above.
Butterfly, Bohart's blue	FSC	Same as above.
Butterfly, San Emigdio blue	FSC	Same as above.
Caddisfly, Denning's cryptic	FSC	Same as above.
Caddisfly, Kings Canyon cryptochian	FSC	Same as above.
Grasshopper, Sierra pygmy	FSC	Same as above.
Crustaceans		
Linderiella, California	FSC	Not likely to be adversely affected. No appreciable change in development/use patterns under this alternative.
Shrimp, vernal pool fairy	FT	Same as above.
Plants		
Tompkins' sedge	CR	Not likely to be adversely affected. Areas of any future development would be surveyed and plant populations avoided to the extent possible.

FE = federally endangered
 FT = federally threatened
 FSC = federal species of concern

CE = California endangered
 CT = California threatened
 CSC = California species of concern

CP = California protected
 CR = California rare
 FSS = Forest Service sensitive

Conclusion. The no-action alternative would have no effect or would not be likely to adversely affect any special status species. If impacts were expected, mitigating measures would be taken as necessary in consultation with the U.S. Fish and Wildlife Service.

The no-action alternative would not contribute to cumulative effects on special status species. While some actions would have beneficial, long-

term effects in the parks and region, overall past, present, and reasonably foreseeable actions would continue to have major, adverse, long-term impacts.

Because no rare, threatened, or endangered species would be likely to be adversely affected, no impairment is expected.

Impacts of the Preferred Alternative

Analysis. Most potential impacts would be related to modest increases in the footprint of development and to limiting backcountry use. The extent and intensity of potential benefits to some species would depend on where backcountry use was restricted, which would be determined in the subsequent wilderness stewardship / stock use plan. Further evaluation of effects on special status species would be included in that plan. Potential impacts under the preferred alternative that would differ from those under the no-action alternative are shown in Table 28.

As described for the no-action alternative, there would be no effects on the following species:

Mammals — grizzly bear, mountain beaver

Birds — California condor (extirpated from the parks), bald eagle, peregrine falcon, prairie falcon, California gull, Swainson’s hawk, white-tailed kite, horned lark, purple martin, merlin, northern harrier, osprey, long-eared owl, short-eared owl, loggerhead shrike

Reptiles — coast horned lizard

Amphibians — foothill yellow-legged frog (extirpated from the parks), Mount Lyell salamander

Fishes — California golden trout, California roach, Little Kern golden trout, Kern River rainbow trout

Insects — beetles (Hopping’s blister, moestan blister, molestan blister, Morrison’s blister, San Joaquin dune, and San Joaquin tiger)

TABLE 28: EFFECTS ON POPULATIONS OF THREATENED, ENDANGERED, OR SENSITIVE SPECIES — PREFERRED ALTERNATIVE

Common Name	Status	Impact
Vertebrate Animals		
Mammals		
Bat, big-eared	FSC, CSC	Not likely to be adversely affected. This species is primarily forest dwelling; there would be an incrementally small decrease in the extent of habitat due to increased development footprint / associated use / lighting. Individuals could be displaced if any buildings they occupied were removed. A survey would be completed before any action was implemented. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Bat, greater western mastiff	FSC, CSC	Same as above.
Bat, spotted	FSC, CSC	Same as above.
Fisher, Pacific	FSC, CSC	Not likely to be adversely affected. Large areas of relatively undisturbed habitat would remain. Incrementally small decreases in the extent of habitat.
Fox, Sierra Nevada red	CT, FSC	Not likely to be adversely affected. Species may not exist in the parks. If individuals do occur, they are highly intolerant of human presence and probably occur in the most remote and little-used areas. Patterns of use in little-used or unused portions of parks would not change or could decrease in some areas, which would be a beneficial effect.
Hare, white-tailed	CSC	Not likely to be adversely affected. Incrementally small decreases in the extent of habitat.
Marten	FSS	Same as above.
Myotis, fringed	FSC	Not likely to be adversely affected. This species is primarily forest dwelling; there would be an incrementally small decrease in the extent of habitat due to increased development footprint / associated use / lighting. Individuals could be displaced if any buildings they occupied were removed. Surveys would be completed before any action was implemented. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Myotis, long-eared	FSC	Same as above.
Myotis, long-legged	FSC	Same as above.
Myotis, small-footed	FSC	Same as above.
Myotis, Yuma	FSC, CSC	Same as above.
Pallid	CSC	Same as above.

Common Name	Status	Impact
Sheep, bighorn	FE, CE	Not likely to be adversely affected. Increased recreational use could occur in little or unused portions of sheep range, which could disturb sheep principally from the infrequent/unpredictable nature of cross-country use. Restrictions on cross-country use would be imposed in sheep range to avoid impacts.
Wolverine, California	CT, FSC	Not likely to be adversely affected. No data to confirm potential impacts; however, wolverines are highly intolerant of human presence and probably occur in the most remote and little-used areas of the parks. Patterns of use in little-used or unused portions of parks would not change or could decrease in some areas, which would be a beneficial effect.
Birds		
Eagle, golden	CP, CSC	Not likely to be adversely affected. Incrementally small decrease in habitat due to increased development footprint.
Flycatcher, willow	CE, FSS	Not likely to be adversely affected. Only two known sites, with little habitat disturbance. Increased use could have a negligible effect on the extent of the impact area, but use restrictions would be imposed if necessary. Stock grazing currently has minimal impacts to suitable willow habitat; stock use is curtailed based on impacts to more sensitive meadow grass/sedge species, which would be impacted before willows. Studies show no significant evidence of cowbird parasitism on riparian nesting birds, but dispersed stock use would increase the potential for impacts.
Goshawk, northern	FSC, CSC	Not likely to be adversely affected. Incrementally small decrease in habitat due to increased development footprint.
Hawk, Cooper's	CSC	Same as above.
Hawk, sharp-shinned	CSC	Same as above.
Owl, great gray	CE, FSS	Not likely to be adversely affected. Rare/limited occurrence in the parks, which are south of their normal range in the Sierra Nevada. Occurs in high visitor use/grazing locations, and potential decreased use could be a negligible to minor benefit.
Owl, spotted	FSC, CSC	Not likely to be adversely affected. Incrementally small decrease in habitat due to increased development footprint.
Swift, Vaux's	CSC	Same as above.
Reptiles		
Lizard, California legless	FSC, CSC	Not likely to be adversely affected. Some increased use could occur in specific habitat along the Middle Fork of the Kaweah River, although controlling use/designating access points would limit potential impacts.
Amphibians		
Frog, mountain yellow-legged	FSC, CP, CSC	Not likely to be adversely affected. Little current disturbance to breeding areas from visitor/stock use; reducing this use in some areas could have a negligible to minor beneficial effect.
Toad, Yosemite	FSC, CP, CSC	Not likely to be adversely affected. Reducing use in some areas could have a negligible beneficial effect.
Turtle, Western pond	FSC, CP, CSC	Not likely to be adversely affected. Low use levels along the North Fork of the Kaweah could affect turtles.
Invertebrate Animals		
Insects		
Beetle, Ciervo aegialian	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Beetle, valley elderberry longhorn	FT	Not likely to be adversely affected. Believed absent due to the presence of other subspecies. Presence would be verified as correct subspecies before any development that could affect potential habitat.
Beetle, wooly hydroporous diving	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Bug, Dry Creek cliff strider	FSC	Same as above.
Butterfly, Bohart's blue	FSC	Same as above.
Butterfly, San Emigdio blue	FSC	Same as above.
Caddisfly, Denning's cryptic	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect.
Caddisfly, Kings Canyon cryptochian	FSC	Same as above.
Grasshopper, Sierra pygmy	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.

Common Name	Status	Impact
Crustaceans		
Linderiella, California	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Shrimp, vernal pool fairy	FT	Same as above.
Plants		
Tompkins' sedge	CR	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint. Affected areas would be surveyed and plant populations avoided to the extent possible.

FE = federally endangered
 FT = federally threatened
 FSC = federal species of concern

CE = California endangered
 CT = California threatened
 CSC = California species of concern

CP = California protected
 CR = California rare
 FSS = Forest Service sensitive

Cumulative Impacts. The preferred alternative would have no effect or would not be likely to adversely affect special status species. Consequently, the alternative would generally not contribute to cumulative effects.

As discussed in the “Regional Context” section, rare wildlife and vegetation populations have been and will likely continue to be affected by past and present activities throughout the region (logging, loss of natural fire regimes, mining, grazing, agriculture, development, water dams and diversions, recreational use, and introduction of nonnative species). While some cumulative actions would have beneficial, long-term effects in the parks and region, overall past, present, and reasonably foreseeable actions would have major, adverse, long-term impacts.

Conclusion. The preferred alternative would have no effect or would not be likely to adversely affect any special status species. Mitigation in consultation with the U.S. Fish and Wildlife Service would be implemented as necessary.

The preferred alternative would generally not contribute to cumulative effects. While some cumulative actions would have beneficial, long-term effects in the parks and region, in conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts.

Because no rare, threatened, or endangered species would likely be adversely affected under this alternative, no impairment is expected.

Impacts of Alternative A

Analysis. Alternative A would have no effect on most species or would not be likely to affect species. Some species of concern within the parks could benefit from actions under alternative A. Table 29 lists impacts that would differ from those under the no-action alternative. Of the federally listed species, the bighorn sheep could be beneficially affected. The extent and intensity of potential benefits to some species would depend on the extent and location of decreased back-country use, which would be determined in a wilderness stewardship / stock use plan. Further evaluation of effects on special status species would be included in that plan.

As described for the no-action alternative, there would be no effects on the following species:

Mammals — grizzly bear, mountain beaver

Birds — California condor (extirpated from the parks), bald eagle, peregrine falcon, prairie falcon, California gull, Swainson’s hawk, white-tailed kite, horned lark, purple martin, merlin, northern harrier, osprey, long-eared owl, short-eared owl, loggerhead shrike

Reptiles — coast horned lizard

Amphibians — foothill yellow-legged frog (extirpated from the parks), Mount Lyell salamander, western pond turtle

Fishes — California golden trout, California roach, Little Kern golden trout, Kern River rainbow trout

Insects — beetles (Hopping’s blister, moestan blister, molestan blister, Morrison’s blister, San Joaquin dune, and San Joaquin tiger).

TABLE 29: EFFECTS ON POPULATIONS OF THREATENED, ENDANGERED, OR SENSITIVE SPECIES — ALTERNATIVE A

Common Name	Status	Impact
Vertebrate Animals		
Mammals		
Bat, big-eared	FSC, CSC	Not likely to be adversely affected. This is primarily a forest-dwelling species. A decreased development footprint would result in less habitat displacement, a negligible benefit. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Bat, greater western mastiff	FSC, CSC	Same as above.
Bat, spotted	FSC, CSC	Same as above.
Fisher, Pacific	FSC, CSC	Not likely to be adversely affected. This species needs large areas of relatively undisturbed habitat. Reducing visitor use and removing trails in foothill hardwood / mixed conifer zones could increase habitat suitability in some areas.
Fox, Sierra Nevada red	CT, FSC	Not likely to be adversely affected. Rare resident that is highly intolerant of human presence and probably occurs in the most remote and little-used areas of the parks. Patterns of use in little-used or unused portions of parks would not change or could decrease in some areas. Trail corridors, particularly in higher use areas, could be acting as barriers that affect home range size and dispersal. Trails, including some high-use trails, would be reduced. This alternative could have beneficial effects.
Hare, white-tailed	CSC	Not likely to be adversely affected. Decreased development footprint and less displacement of habitat would slightly increase extent of habitat, a negligible benefit.
Marten	FSS	Not likely to be adversely affected. Decreased development footprint and less displacement of habitat would slightly increase extent of habitat, a negligible benefit.
Myotis, fringed	FSC	Not likely to be adversely affected. This is primarily a forest-dwelling species. A decreased development footprint would result in less habitat displacement, a negligible benefit. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Myotis, long-eared	FSC	Same as above.
Myotis, long-legged	FSC	Same as above.
Myotis, small-footed	FSC	Same as above.
Myotis, Yuma	FSC, CSC	Same as above.
Pallid	CSC	Same as above.
Sheep, bighorn	FE, CE	Not likely to be adversely affected. Decreased recreational use, with less disturbance of sheep. Restrictions on cross-country use would be imposed in sheep range to avoid impacts.
Wolverine, California	CT, FSC	Not likely to be adversely affected. Rare resident that is highly intolerant of human presence and probably occurs in the most remote and little-used areas of the parks. Patterns of use in little-used or unused portions of the parks would not change or could decrease in some areas. Trail corridors, particularly in higher use areas, could be acting as barriers that affect home range size and dispersal. Trails, including some high-use trails, would be reduced. This alternative could have beneficial effects.
Birds		
Eagle, golden	CP, CSC	Not likely to be adversely affected. Impacts due to decreased development footprint and habitat displacement would have a negligible beneficial effect.
Flycatcher, willow	CE, FSS	Not likely to be adversely affected. Rare in the parks. Little habitat disturbance to two known sites; consequently, reduced visitor use would have a negligible beneficial effect. Stock grazing currently has minimal impacts to suitable willow habitat, and stock use is curtailed based on impacts to more sensitive meadow grass/sedge species, which would be impacted before willows. Studies to date show no evidence of cowbird parasitism on riparian nesting birds. Eliminating stock could have a negligible beneficial effect on some suitable riparian habitat and reduced potential for brown-headed cowbird presence.
Goshawk, northern	FSC, CSC	Not likely to be adversely affected. Impacts due to decreased development footprint and habitat displacement would have a negligible beneficial effect.
Hawk, Cooper's	CSC	Same as above.
Hawk, sharp-shinned	CSC	Same as above.

ENVIRONMENTAL CONSEQUENCES

Common Name	Status	Impact
Owl, great gray	CE, FSS	Not likely to be adversely affected. Rare/limited occurrence in the parks, which are apparently south of their normal range in the Sierra Nevada. Occurs in existing high visitor use/grazing locations. Potential decreased use in existing high-use areas may be a negligible to minor benefit.
Owl, spotted	FSC, CSC	Not likely to be adversely affected. Impacts due to decreased development footprint and habitat displacement would have a negligible beneficial effect.
Swift, Vaux's	CSC	Same as above.
Reptiles		
Lizard, California legless	FSC, CSC	Not likely to be adversely affected. Little current use through specific habitat along the Middle Fork of the Kaweah River. Reduced recreational use could have a beneficial effect.
Amphibians		
Frog, mountain yellow-legged	FSC, CP, CSC	Not likely to be adversely affected. Little current disturbance to breeding areas from visitor/stock use. Reduced recreational use and the elimination of stock/grazing in some breeding areas could have a beneficial effect.
Toad, Yosemite	FSC, CP, CSC	Same as above.
Invertebrate Animals		
Insects		
Beetle, Ciervo aegialian	FSC	Not likely to be adversely affected. Decreased use could have a localized, negligible, adverse effect if the species is present.
Beetle, valley elderberry longhorn	FT	Not likely to be adversely affected. Believed absent due to presence of other subspecies. Presence would be verified as correct subspecies before any development that could affect potential habitat.
Beetle, wooly hydroporous diving	FSC	Not likely to be adversely affected. Decreased use could have a localized, negligible, adverse effect if the species is present.
Bug, Dry Creek cliff strider	FSC	Same as above.
Butterfly, Bohart's blue	FSC	Same as above.
Butterfly, San Emigdio blue	FSC	Same as above.
Caddisfly, Denning's cryptic	FSC	Not likely to be adversely affected. Small increase in extent of natural areas would be a negligible benefit.
Caddisfly, Kings Canyon cryptochian	FSC	Same as above.
Grasshopper, Sierra pygmy	FSC	Not likely to be adversely affected. Decreased use could have a localized, negligible, adverse effect if the species is present.
Crustaceans		
Linderiella, California	FSC	Not likely to be adversely affected. Decreased use could have a localized, negligible, adverse effect if the species is present.
Shrimp, vernal pool fairy	FT	Same as above.
Plants		
Tompkins' sedge	CR	Not likely to be adversely affected. Decreased development footprint and less displacement of habitat could result in a small increase in extent of habitat, a negligible benefit.

FE = federally endangered
 FT = federally threatened
 FSC = federal species of concern

CE = California endangered
 CT = California threatened
 CSC = California species of concern

CP = California protected
 CR = California rare
 FSS = Forest Service sensitive

Cumulative Impacts. On a cumulative basis, alternative A would have a beneficial impact on some species. As discussed in the “Regional Context” section, rare wildlife and vegetation populations will likely continue to be affected by past and present activities throughout the region (logging, loss of natural fire regimes, mining, grazing, agriculture, development, water damming and diversions, recreational use, and intro-

duction of nonnative species). These actions would have major, adverse, long-term impacts.

Conclusion. Alternative A would have no effect on any federal species except the Valley elderberry longhorn beetle, which would not be likely to be adversely affected. Mitigation in consultation with the U.S. Fish and Wildlife Service would occur as necessary. There could be bene-

ficial impacts on some special status species because of reduced development and use.

On a cumulative basis, alternative A would have a beneficial effect to some species. In conjunction with past, present, and reasonably foreseeable actions throughout the region, adverse impacts would continue to be long term and major.

Because no rare, threatened, or endangered species would be likely to be adversely affected, no impairment is expected.

Impacts of Alternative C

Analysis. Most potential impacts would be related to increasing the development footprint and dispersing/increasing backcountry use to little or unused portions of the parks. Impacts that would differ from those under the no-action alternative are presented in Table 30.

The extent and intensity of potential benefits to some species would depend on the extent and location of decreased backcountry use, which would be determined in a wilderness stewardship / stock use plan subsequent to the general

management plan. Further evaluation of effects on special status species would be included in that plan.

As described for the no-action alternative, there would be no effects on the following species:

Mammals — grizzly bear, mountain beaver

Birds — California condor (extirpated from the parks), bald eagle, peregrine falcon, prairie falcon, California gull, Swainson’s hawk, white-tailed kite, horned lark, purple martin, merlin, northern harrier, osprey, long-eared owl, short-eared owl, loggerhead shrike

Reptiles — coast horned lizard

Amphibians — foothill yellow-legged frog (extirpated from the parks), Mount Lyell salamander

Fishes — California golden trout, California roach, Little Kern golden trout, Kern River rainbow trout

Insects — beetles (Hopping’s blister, moestan blister, molestan blister, Morrison’s blister, San Joaquin dune, and San Joaquin tiger)

TABLE 30: EFFECTS ON POPULATIONS OF THREATENED, ENDANGERED, OR SENSITIVE SPECIES — ALTERNATIVE C

Common Name	Status	Impact
Vertebrate Animals		
Mammals		
Bat, big-eared	FSC, CSC	Not likely to be adversely affected. This species is primarily forest dwelling; there would be an incrementally small decrease in the extent of habitat due to increased development footprint / associated use / lighting. Individuals could be displaced if any buildings they occupied were removed. Surveys would be completed before any action was implemented. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Bat, greater western mastiff	FSC, CSC	Same as above.
Bat, spotted	FSC, CSC	Same as above.
Fisher, Pacific	FSC, CSC	Not likely to be adversely affected. This species needs large areas of relatively undisturbed habitat. There would be an incrementally small decrease in the extent of habitat due to increased development and use.
Fox, Sierra Nevada red	CT, FSC	Not likely to be adversely affected. This rare resident is highly intolerant of human presence and probably occurs in the most remote and little-used areas of parks, based on existing patterns of use or amount of use in the backcountry. Increased cross-country use, although low, could still disturb this species and affect portions of its home range. Trail corridors, particularly higher use trail corridors, could affect home range size and dispersal. Trails, including some high-use trails, would be reduced, which could have a beneficial effect, depending on the location and extent of trail removal.

ENVIRONMENTAL CONSEQUENCES

Common Name	Status	Impact
Hare, white-tailed	CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Marten	FSS	Same as above.
Myotis, fringed	FSC	Not likely to be adversely affected. This species is primarily forest dwelling; there would be an incrementally small decrease in the extent of habitat due to increased development footprint / associated use / lighting. Surveys would be completed before any action was implemented. Individuals could be displaced if any buildings they occupied were removed. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Myotis, long-eared	FSC	Same as above.
Myotis, long-legged	FSC	Same as above.
Myotis, small-footed	FSC	Same as above.
Myotis, Yuma	FSC, CSC	Same as above.
Pallid	CSC	Same as above.
Sheep, bighorn	FE, CE	Not likely to be adversely affected. Increased recreational use could occur in little/unused portions of sheep range, which could disturb sheep principally from the infrequent/unpredictable nature of cross-country use. Restrictions on cross-country use would be imposed in sheep range to avoid impacts.
Wolverine, California	CT, FSC	Not likely to be adversely affected. This rare resident is highly intolerant of human presence and probably occurs in the most remote and little-used areas of parks, based on existing patterns of use or amount of use in the backcountry. Increased cross-country use, although low, could incrementally disturb this species and affect portions of its home range. Trail corridors, particularly higher use trail corridors, could affect home range size and dispersal. Trails, including some high-use trails, would be reduced, which could have a beneficial effect, depending on the location and extent of trail removal.
Birds		
Eagle, golden	CP, CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Flycatcher, willow	CE, FSS	Not likely to be adversely affected. Rare in the parks. Currently little habitat disturbance to two known sites. Increased use near nest sites could have negligible effect on the extent of impacts, but use restrictions would be imposed if necessary. Stock grazing currently has minimal impacts to suitable willow habitat; stock use is curtailed based on impacts to more sensitive meadow grass/sedge species, which would occur before impacts to willows. Studies to date show no evidence of cowbird parasitism on riparian nesting birds, although dispersed stock use would increase the potential for such impacts.
Goshawk, northern	FSC, CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Hawk, Cooper's	CSC	Same as above.
Hawk, sharp-shinned	CSC	Same as above.
Owl, great gray	CE, FSS	Not likely to be adversely affected. Rare/limited occurrence in the parks because they are apparently south of normal range in the Sierra Nevada. Occurs in high visitor use/grazing locations. Potential decreased use in existing high-use areas could be a negligible benefit.
Owl, spotted	FSC, CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Swift, Vaux's	CSC	Same as above.
Reptiles		
Lizard, California legless	FSC, CSC	Not likely to be adversely affected. Some increased use could occur in specific habitat along the Middle Fork of the Kaweah River, although controlling use and designating access points would limit potential impacts.
Amphibians		
Frog, mountain yellow-legged	FSC, CP, CSC	Not likely to be adversely affected. There is little current disturbance to breeding areas from visitor/stock use, and reducing use areas could have a negligible beneficial effect. There would be an incrementally small decrease in the extent of habitat due to increasing stock use of more or different lakes by dispersing use.

Common Name	Status	Impact
		However, restrictions on areas or times of stock use would continue to be imposed as necessary to avoid or minimize impacts.
Toad, Yosemite	FSC, CP, CSC	Same as above.
Turtle, Western pond	FSC, CP, CSC	Not likely to be adversely affected. Some increased use along the North Fork of the Kaweah River could affect turtles due to human disturbance. Low levels of use would limit effects.
Invertebrate Animals		
Insects		
Beetle, Ciervo aegialian	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Beetle, valley elderberry longhorn	FT	Not likely to be adversely affected. Believed absent due to presence of other subspecies. Presence would be verified as correct subspecies before any development that could affect potential habitat.
Beetle, wooly hydroporous diving	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Bug, Dry Creek cliff strider	FSC	Same as above.
Butterfly, Bohart's blue	FSC	Same as above.
Butterfly, San Emigdio blue	FSC	Same as above.
Caddisfly, Denning's cryptic	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect.
Caddisfly, Kings Canyon cryptochian	FSC	Same as above.
Grasshopper, Sierra pygmy	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Crustaceans		
Linderiella, California	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Shrimp, vernal pool fairy	FT	Same as above.
Plants		
Tompkins' sedge	CR	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint. Affected areas would be surveyed and plant populations avoided to the extent possible.

FE = federally endangered
 FT = federally threatened
 FSC = federal species of concern

CE = California endangered
 CT = California threatened
 CSC = California species of concern

CP = California protected
 CR = California rare
 FSS = Forest Service sensitive

Cumulative Impacts. Alternative C would have no effect or would not be likely to adversely affect any special status species. Consequently, the alternative would generally not contribute to cumulative effects.

As discussed in the “Regional Context” section, rare wildlife and vegetation populations have been and will likely continue to be affected by past and present activities throughout the region (logging, loss of natural fire regimes, mining, grazing, agriculture, development, water dams and diversions, recreational use, and nonnative species). Altogether, these impacts would have a long-term, major, adverse impact.

Conclusion. This alternative would have no effect or would not be likely to adversely affect any special status species. Mitigation would be implemented as necessary in consultation with the U.S. Fish and Wildlife Service.

Alternative C would generally not contribute to cumulative effects on special status species. While some cumulative actions would have beneficial impacts in the parks and region, in conjunction with past, present, and reasonably foreseeable actions, there would continue to be major, adverse, long-term impacts.

Because no rare, threatened, or endangered species would be likely to be adversely affected, no impairment is expected.

Impacts of Alternative D

Analysis. Potential impacts on threatened or endangered species would be related to increasing the development footprint and frontcountry trail system and slightly increasing backcountry concentrated use areas. Impacts that would differ from those under the no-action alternative are presented in Table 31. The extent and intensity of potential benefits to some species would depend on where backcountry use decreased, which would be determined in a subsequent wilderness stewardship / stock use plan. Effects on special status species would be further evaluated in that plan.

As described for the no-action alternative, there would be no effects on the following species:

Mammals — grizzly bear, mountain beaver

Birds — California condor (extirpated from the parks), bald eagle, peregrine falcon, prairie falcon, California gull, Swainson’s hawk, white-tailed kite, horned lark, purple martin, merlin, northern harrier, osprey, long-eared owl, short-eared owl, loggerhead shrike

Reptiles — coast horned lizard

Amphibians — foothill yellow-legged frog (extirpated from the parks), Mount Lyell salamander

Fishes — California golden trout, California roach, Little Kern golden trout, Kern River rainbow trout

Insects — beetles (Hopping’s blister, moestan blister, molestan blister, Morrison’s blister, San Joaquin dune, and San Joaquin tiger)

TABLE 31: EFFECTS ON POPULATIONS OF THREATENED, ENDANGERED, OR SENSITIVE SPECIES — ALTERNATIVE D

Common Name	Status	Impact
Vertebrate Animals		
Mammals		
Bat, big-eared	FSC, CSC	Not likely to be adversely affected. This species is primarily forest dwelling; there would be an incrementally small decrease in the extent of habitat due to increased development footprint / associated use / lighting. Individuals could be displaced if any buildings they occupied were removed. Surveys would be conducted before any action was implemented. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Bat, greater western mastiff	FSC, CSC	Same as above.
Bat, spotted	FSC, CSC	Same as above.
Fisher, Pacific	FSC, CSC	Not likely to be adversely affected. This species needs large areas of relatively undisturbed habitat. There would be an incrementally small decrease in the extent of habitat due to increased development and use.
Fox, Sierra Nevada red	CT, FSC	Not likely to be adversely affected. This rare resident is highly intolerant of human presence and probably occurs in the most remote and little-used areas of parks, based on existing patterns of use or amount of backcountry use. Increased use would occur in existing high-use areas; extended high-use areas would most likely occur along existing secondary trails, areas that foxes probably already avoid.
Hare, white-tailed	CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Marten	FSS	Same as above.
Myotis, fringed	FSC	Not likely to be adversely affected. This species is primarily forest dwelling; there would be an incrementally small decrease in the extent of habitat due to increased development footprint / associated use / lighting. Individuals could be displaced if any buildings they occupied were removed. Surveys would be conducted before any action was implemented. Cave-dwelling bats would continue to be protected by the existing <i>Cave Management Plan</i> (NPS 1992a) and protective measures.
Myotis, long-eared	FSC	Same as above.
Myotis, long-legged	FSC	Same as above.
Myotis, small-footed	FSC	Same as above.
Myotis, Yuma	FSC, CSC	Same as above.
Pallid	CSC	Same as above.

Common Name	Status	Impact
Sheep, bighorn	FE, CE	Not likely to be adversely affected. Increased recreational use of trails in portions of sheep range would be unlikely to result in disturbance to sheep, which are accustomed to recreational use along the trails.
Wolverine, California	CT, FSC	Not likely to be adversely affected. This rare resident is highly intolerant of humans and probably occurs in the most remote and little-used areas of parks, based on existing patterns of use or amount of use in the backcountry. Increased use would occur in existing high-use areas; extended high-use areas would most likely occur along existing secondary trails, areas that wolverines probably already avoid.
Birds		
Eagle, golden	CP, CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Flycatcher, willow	CE, FSS	Not likely to be adversely affected. Rare in the parks. Little habitat disturbance to two known sites. Increased use would likely have a negligible effect because social trails are difficult to create in willow habitat. Current stock grazing has minimal impacts to suitable willow habitat; stock use is curtailed based on impacts to more sensitive meadow grass/sedge species, which would be impacted before willows. Studies show no evidence of cowbird parasitism on riparian nesting birds to date.
Goshawk, northern	FSC, CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Hawk, Cooper's	CSC	Same as above.
Hawk, sharp-shinned	CSC	Same as above.
Owl, great gray	CE, FSS	Not likely to be adversely affected. Rare/limited occurrence because parks are apparently south of the owl's normal range in the Sierra Nevada. Occurs in high visitor use/grazing locations. There would be an incrementally small decrease in habitat extent due to potential increased visitor use in existing high-use areas.
Owl, spotted	FSC, CSC	Not likely to be adversely affected. There would be an incrementally small decrease in the extent of habitat due to increased development footprint.
Swift, Vaux's	CSC	Same as above.
Reptiles		
Lizard, California legless	FSC, CSC	Not likely to be adversely affected. Some increased use could occur in specific habitat along the Middle Fork of the Kaweah River, although controlling use and designating access points would limit potential impacts.
Amphibians		
Frog, mountain yellow-legged	FSC, CP, CSC	Not likely to be adversely affected. There is little current disturbance to breeding areas from visitor/stock use. Currently one area is closed to overnight stock use to protect the frog-breeding area. There would be an incrementally small decrease in the extent of habitat due to increased use in existing high-use areas. However, restrictions on areas or times of stock use would continue to be imposed as necessary, which would avoid or minimize potential new impacts.
Toad, Yosemite	FSC, CP, CSC	Same as above.
Turtle, Western pond	FSC, CP, CSC	Not likely to be adversely affected. Some increased human use along the North Fork of the Kaweah River could affect turtles. Low levels of use would limit effects.
Invertebrate Animals		
Insects		
Beetle, Ciervo aegialian	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Beetle, valley elderberry longhorn	FT	Not likely to be adversely affected. Believed absent due to presence of other subspecies. Presence would be verified as correct subspecies before any development that could affect potential habitat.
Beetle, wooly hydroporous diving	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Bug, Dry Creek cliff strider	FSC	Same as above.
Butterfly, Bohart's blue	FSC	Same as above.
Butterfly, San Emigdio blue	FSC	Same as above.
Caddisfly, Denning's cryptic	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect.

Common Name	Status	Impact
Caddisfly, Kings Canyon cryptochian	FSC	Same as above.
Grasshopper, Sierra pygmy	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Crustaceans		
Linderiella, California	FSC	Not likely to be adversely affected. Increased use could have a localized, negligible, adverse effect if the species is present.
Shrimp, vernal pool fairy	FT	Same as above.
Plants		
Tompkins' sedge	CR	Not likely to be adversely affected. Increased development footprint could affect this species. Plant populations would be surveyed and avoided to the extent possible.

FE = federally endangered
 FT = federally threatened
 FSC = federal species of concern

CE = California endangered
 CT = California threatened
 CSC = California species of concern

CP = California protected
 CR = California rare
 FSS = Forest Service sensitive

Cumulative Impacts. Alternative D would have no effect or would not be likely to adversely affect any special status species. Consequently, there would generally be no contribution to cumulative effects.

As discussed in the “Regional Context” section, rare wildlife and vegetation populations have been and will likely continue to be affected by past and present activities throughout the region (logging, loss of natural fire regimes, mining, grazing, agriculture, development, water damming and diversions, recreational use, and introduction of nonnative species). While some cumulative actions would have beneficial, long-term, effects in the parks and region, overall past, present, and reasonably foreseeable actions, in conjunction with this alternative, would have major, adverse, long-term impacts.

Conclusion. This alternative would have no effect on would not be likely to affect any special status species. Mitigation would be implemented as necessary in consultation with the U.S. Fish and Wildlife Service.

Alternative D would generally not contribute to cumulative effects on special status species. While some cumulative actions would have beneficial, long-term effects in the parks and region, overall past, present, and reasonably foreseeable actions, in conjunction with this alternative, would have major, adverse, long-term impacts.

Because no rare, threatened, or endangered species would be likely to be adversely affected, no impairment is expected.

AIR QUALITY

Methodology

Impacts Related to Stationary Sources, Smoke Emissions, Human Health and Enjoyment

Impacts of alternatives within the parks would be similar under all alternatives. No actions being considered would increase levels of park stationary source emissions above conformity *de minimis* values of 50–100 tons per year. Smoke emissions from the parks’ managed wildland fires over the next 10 years have been included in the State Implementation Plan for the San Joaquin Valley and would not vary by alternative. The parks would continue to provide periodic air quality warnings and education. This information would not vary by alternative.

Transportation-Related Impacts

Park Visitor Use Studies. A survey of visitors to Sequoia and Kings Canyon National Parks conducted in 1994–95 indicated that 62% of visitors were from California (NPS 1995e). However, this survey did not include information on state vehicle registration. It is expected that approximately 80% or more of the vehicles entering the parks are registered in California, including rental vehicles.

The 1998 “Visitor Use Study” determined that 94% of vehicles were passenger cars, 3% were other passenger vehicles under 22 feet in length (including motorcycles, pickups, and vans), and 3% were buses, trucks, and RVs over 22 feet in length (BRW and Lee Engineering 1999).

Since transportation-related air quality is partly a function of traffic volume, the roadway segments chosen for the carrying capacity analysis were also used for air quality analysis, plus segments on Generals Highway were added for Lost Grove and Moro Rock. Table 32 shows the speed limits for these segments and their length.

Because the majority of vehicles going to Sequoia and Kings Canyon are registered in California, fleetwide average emission factors for light-duty autos that comply with California emission standards were used in the analysis. The California Air Resources Board provided the emission factors used in this study.

Mobile Emissions. To compare future emissions under each alternative with the base year, emission factors for 1997 and 2010 were used. Due to continual improvements in motor vehicle emission control technology and the replacement of older vehicles with newer models, gaseous

emissions from automobiles are projected to decrease fleetwide by approximately 70% for volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NO_x). During the same period, fleetwide emission factors for sulfur dioxide (SO₂) are expected to decrease by approximately 40%. Particulate emissions (PM₁₀) from automobiles include exhaust emissions, and emissions due to brake and tire wear. Fleetwide average PM₁₀ emission factors are expected to remain essentially constant throughout the analysis period.

Motor vehicle emission factors provided by the California Air Resources Board are in grams per mile and are dependent on motor vehicle speed. For the impact analysis, emissions were determined for each roadway segment based on segment length (miles), minimum posted speed (mph), and daily traffic volumes. Daily traffic volumes for each segment were converted to annual vehicle miles traveled (VMT). The following formula was used to calculate emissions for each road segment:

$$\text{annual VMT} \times \text{emission factor (g/mi)} \div 453.6 \text{ g/lb} \div 2,000 \text{ lb/ton} = \text{emissions (ton/year)}$$

To simplify the impact analysis, it was assumed that all vehicles entering the park would be light

TABLE 32: SUMMARY OF PEAK-SEASON DAILY VEHICLE VOLUME ESTIMATES FOR THE AIR QUALITY ANALYSIS

Area	Representative Road Segment	Posted Speed (mph)	Road Segment Length (miles)	Existing (1997)	No-Action Alternative	Preferred Alternative	Alternative A	Alternative C	Alternative D
Growth Factor					1.23	1.30	0.90	1.30	1.48
Cedar Grove	Kings Canyon Highway west of Cedar Grove	35	8.8	1,040	1,280	1,350	940	1,350	1,540
Grant Grove / Big Stump	Kings Canyon Highway west of Generals Highway	25	4.7	3,720	4,580	4,840	3,350	4,840	5,510
Upper Generals Highway	Generals Highway north of Lost Grove	45	11.3	1,610	1,980	2,090	1,450	2,090	2,380
Wuksachi/Lodgepole/Wolverton	Generals Highway south of Lodgepole	25	2.2	2,340	2,880	3,040	2,110	3,040	3,460
Giant Forest	Generals Highway south of Moro Rock	35	4.3	2,220	2,730	2,890	2,000	2,890	3,290
Ash Mountain/Foothills	Generals Highway north of Ash Mountain	25	6.5	2,470	3,040	3,210	2,220	3,210	3,660
Mineral King	Mineral King Road	25	15.5	230	280	300	210	300	340

SOURCE: Segment lengths and speed limits — “Sequoia / Kings Canyon Road System Evaluation/Parkwide Road Engineering Study,” January 1988; future estimates — URS Corporation.

NOTE: Future estimates are for the year 2010.

TABLE 33: EMISSION FACTORS AND CALCULATIONS

Year	Applicable Emission Factors for Posted Speed (g/mile)				
	VOC	CO	NO _x	SO ₂	PM ₁₀
Cedar Grove (Posted speed is 35 mph; road segment is 8.8 miles.)					
1997	0.466	10.508	0.859	0.005	0.032
2010	0.101	3.302	0.228	0.003	0.031
Grant Grove / Big Stump Area (Posted speed is 25 mph; road segment is 4.7 miles.)					
1997	0.659	12.514	0.919	0.007	0.036
2010	0.145	3.907	0.248	0.004	0.036
Upper Generals Highway (Posted speed is 45 mph; road segment is 11.3 miles.)					
1997	0.399	9.708	0.864	0.005	0.03
2010	0.086	2.965	0.224	0.003	0.029
Wuksachi / Lodgepole / Wolverton Area (Posted speed is 25 mph; road segment is 2.5 miles.)					
1997	0.659	12.514	0.919	0.007	0.036
2010	0.145	3.907	0.248	0.004	0.036
Giant Forest Area (Posted speed is 35 mph; road segment is 4.3 miles.)					
1997	0.466	10.508	0.859	0.005	0.032
2010	0.101	3.302	0.228	0.003	0.031
Mineral King Area (Posted speed is 25 mph; road segment is 15.5 miles.)					
1997	0.659	12.514	0.919	0.007	0.036
2010	0.145	3.907	0.248	0.004	0.036

duty automobiles and that all vehicles on a given road segment would travel the entire length.

Speed-dependent emission factors were selected based on the minimum posted speed for each roadway segment (NPS 1988b). Table 33 shows the posted speed for each segment and the applicable emission factors.

A comprehensive assessment of emission changes associated with transit was beyond the scope of this study. More detailed information on the number and types of buses, projected ridership, size and locations of parking facilities, seasonal use variations, and other factors would be needed for a detailed assessment of emission changes associated with each alternative. Under all alternatives bus emissions could increase, partially offsetting any reductions in automobile emissions due to higher emission standards.

Impact definitions and intensities are shown in the text box on the next page. As previously stated, the San Joaquin Valley is a severe non-attainment area for ozone and a serious nonattainment area for particulate matter. Both VOC and NO_x are ozone precursors in the presence of sunlight and are evaluated separately in lieu of ozone, which is formed as a secondary pollutant.

Impacts of the No-Action Alternative

Analysis

As stated in the “Methodology” section, actions under this alternative would not increase stationary emissions above conformity *de minimis* values of 50–100 tons per year. Smoke emissions from the parks’ managed wildland fires over the next 10 years have been included in the San Joaquin Valley’s State Implementation Plan. The parks would continue to provide periodic air quality warnings and education. This information would not vary by alternative.

Even though traffic is projected to increase in the parks under the no-action alternative, emissions of CO, VOC, and NO_x are expected to decrease from base year levels due to higher emission standards and cleaner engines (see Table 34). For all the road segments analyzed, CO emissions are projected to decrease by about two-thirds, from 282 to 108 tons per year. The impact would be reduced from major adverse (emissions exceeding 250 tons per year in a CO attainment area) to moderate adverse (emissions greater than 100 tons/year).

VOC emissions, a precursor to ozone formation in the presence of sunlight, would decrease from

Thresholds for Air Quality Human Health Impacts

Attainment Pollutants: The following impact thresholds have been defined for attainment pollutants:

	<u>Activity Analyzed</u>		<u>Current Air Quality</u>
Negligible:	Emission levels would be less than 50 tons/year for each pollutant.	and	The first highest three-year maximum for each pollutant is less than NAAQS.
Minor:	Emission levels would be less than 100 tons/year for each pollutant.	and	The first highest three-year maximum for each pollutant is less than NAAQS.
Moderate:	Emission levels would be greater than or equal to 100 tons/year for any pollutant.	or	The first highest three-year maximum for each pollutant is greater than NAAQS.
Major:	Emission levels would be greater than or equal to 250 tons/year for any pollutant.	and	The first highest three-year maximum for each pollutant is greater than NAAQS.

Nonattainment Pollutants (severe for O₃ and serious for PM): The following impact thresholds have been defined for the non-attainment pollutants and their precursors:

Negligible:	There would be a net decrease in emissions from current levels.
Minor:	Emissions would be 0–5 tons/year.
Moderate:	Emissions would be greater than 5 tons/year and less than conformity <i>de minimis</i> levels* (25 tons/year for ozone and 70 tons/year for PM).
Major:	Emissions would be equal to or greater than conformity <i>de minimis</i> levels (25 tons/year for ozone and 70 tons/year for PM).

* Conformity *de minimis* levels are levels of emissions below which a federal action in a nonattainment area is presumed to conform to a state’s implementation plan and would not require further review. Actions in attainment areas are presumed to conform and do not require analysis with respect to *de minimis* levels. Emission values representing the Clean Air Act conformity *de minimis* levels for all pollutants are shown in the glossary.

Criteria for Determining Impairment

Impairment (for both attainment and non-attainment/maintenance areas): Impacts would have a major adverse effect on park resources and values, and they would

- contribute to deterioration of the park’s air quality to the extent that the park’s purpose could not be fulfilled as established in its enabling legislation; or
- affect resources key to the park’s natural or cultural integrity or opportunities for enjoyment; or
- affect the resource whose conservation is identified as a goal in the general management plan or other park planning documents.

about 13.4 tons per year to 3.6 tons per year (a 74% reduction). The impact level for a severe ozone nonattainment area would decrease from moderate adverse (less than 25 tons/year) to minor (less than 5 tons/year). NO_x emissions, which are also an ozone precursor, would decrease from about 22.5 tons per year to 7.3 tons per year (a 68% reduction), with a moderate adverse impact (greater than 5 tons/year but less than 25 tons/year).

Emissions of PM₁₀ would increase slightly under the no-action alternative (from 0.83 ton/year to 1.01 tons/year). Emission factors are expected to remain relatively constant through 2010, and the rise mirrors projected traffic increases under the no-action alternative. Impacts from PM₁₀ emissions would be minor throughout the assessment period because they would be less than 5 tons per year in a serious nonattainment area for particulate matter.

Emissions of SO₂ are expected to decrease slightly and would be negligible throughout the assessment period (less than 50 tons/year in an attainment area for SO₂).

Cumulative Impacts

Other actions in the immediate area and the greater San Joaquin Valley could have cumulative impacts when viewed in the context of the alternatives being considered for the general management plan. These include the implementation of public transportation recommendations in the 1996 *Giant Forest Interim Management Plan* (NPS 1996a). The net effect of these actions would be to reduce vehicle-related air emissions in the San Joaquin Valley and along the corridors leading to the parks.

Widening California 180 over the next six or more years and improving California 198 are not likely to increase traffic to the parks according to Tulare County Transportation Commission officials, since the improvements are directed at relieving congestion and not increasing traffic volume.

The parks are surrounded by Sequoia National Forest, Sierra National Forest, and Inyo National Forest, all of which experience wildfires and planned burns. NPS and USFS fire management staff coordinate their planned ignitions and work closely with the San Joaquin Valley Unified Air

TABLE 34: PEAK-SEASON PROJECTED AUTOMOBILE EMISSIONS — NO-ACTION ALTERNATIVE

Scenario	Daily Traffic Volume	Daily VMT	Annual VMT	Annual Emissions (tons/year)				
				VOC	CO	NO _x	SO ₂	PM ₁₀
Cedar Grove Area								
1997	1,040	9,152	3,340,480	1.72	38.69	3.16	0.02	0.12
2010	1,280	11,264	4,111,360	0.46	14.96	1.03	0.01	0.14
Grant Grove / Big Stump Area								
1997	3,720	17,484	6,381,660	4.64	88.03	6.46	0.05	0.25
2010	4,580	21,526	7,856,990	1.26	33.84	2.15	0.03	0.31
Upper Generals Highway								
1997	1,610	18,193	6,640,445	2.92	71.06	6.32	0.04	0.22
2010	1,980	22,374	8,166,510	0.77	26.69	2.02	0.03	0.26
Wuksachi / Lodgepole / Wolverton Area								
1997	2,340	5,148	1,879,020	1.36	25.92	1.90	0.01	0.07
2010	2,880	6,336	2,312,640	0.37	9.96	0.63	0.01	0.09
Giant Forest Area								
1997	2,220	9,546	3,484,290	1.79	40.36	3.30	0.02	0.12
2010	2,730	11,739	4,284,735	0.48	15.60	1.08	0.01	0.15
Mineral King Area								
1997	230	3,565	1,301,225	0.95	17.95	1.32	0.01	0.05
2010	280	4,340	1,584,100	0.25	6.82	0.43	0.01	0.06
Total								
1997	11,160	63,088	23,027,120	13.38	282.01	22.46	0.15	0.83
2010	13,730	77,579	28,316,335	3.59	107.87	7.34	0.10	1.01

Pollution Control District so that prescribed fires are conducted under favorable air quality conditions; therefore, potential impacts on smoke-sensitive areas at any one time are minimized.

Other factors affecting air quality in Sequoia and Kings Canyon National Parks include pollutants from the San Joaquin Valley and the central California coast, which are transported on prevailing winds. Automobiles in the San Joaquin Valley are a major source of pollutants. Other sources of pollution include power generation, petroleum production, and agricultural practices.

Expected reductions in automobile emissions as a result of California air quality standards and improved engine technologies would result in beneficial, long-term impacts on air quality in the parks and region. In the short term impacts would continue to be adverse.

Expansion projects in the region would affect air emissions in the San Joaquin Valley. Tulare County is undertaking a master plan that is scheduled to be completed in 2005, and a new plan for the gateway community of Three Rivers will be started once the county plan has been approved. The population of Three Rivers is projected to increase by about 2.8% per year, from 2,200 people in 2000 to 2,900 in 2010 and 3,200 in 2015 (pers. comm. with Graber 2003). According to the Tulare County Association of Governments, the population of Tulare County is projected to increase by about 1% per year, from 386,000 in 2003 to 418,000 in 2010 and 491,675 in 2025 (pers. comm. with Graber 2003). The county has 120,795 housing units currently, which is projected to increase to 154,727 units by 2010, an increase of 33,932 units (pers. comm. with Graber 2003). According to the Council of Fresno County Governments, Fresno County's population in 2002 was 846,855, which is projected to increase to 992,351 by 2010 (pers. comm. with Gagliolo 2003), or approximately 2% per year. The number of households is projected to grow from 283,860 to 336,146 units. Collectively, an increasing population, new housing, and future tourist development would result in additional

vehicles and associated air emissions in the region.

Despite increased visitation, air quality in the parks under the no-action alternative would improve with reduced emissions due to higher emission standards and cleaner engines, decreasing the long-term, adverse impact from major to moderate.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major, adverse, and long term.

Conclusion

Under the no-action alternative proposed actions within the parks would not increase levels of stationary source emissions above conformity *de minimis* values (50–100 tons/year). Smoke emissions from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. Despite increased park traffic projections under the no-action alternative, automobile-related emissions are expected to decrease by 2010, primarily as a result of decreases in fleetwide average emission factors. Adverse emission impacts within the parks would range from negligible to moderate.

Other actions in the immediate area and greater San Joaquin Valley may have cumulative impacts when viewed in the context of past, present, and reasonably foreseeable actions. Wildfires and planned burns on adjacent federal lands are coordinated with the San Joaquin Valley Unified Air Pollution Control District to minimize potential impacts on smoke sensitive areas at any one time. Other factors affecting air quality include pollutants from the San Joaquin Valley and the central California coast, including those from automobiles, power generation, petroleum production, and agricultural practices. Expected reductions in automobile emissions as a result of California air quality standards and

improved engine technologies would result in reduced automobile emissions over the long term. Development projects in the region would affect air emissions in the San Joaquin Valley to an unknown degree.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major and adverse over the long term.

No park air quality resources or values would be impaired under this alternative.

Impacts of the Preferred Alternative

Analysis

Impacts would be similar to the no-action alternative. Proposed actions within the parks would not increase levels of stationary source emissions above conformity *de minimis* values (50–100 tons/year). Smoke emissions from the parks’ managed wildland fires over the next 10 years have been included in the San Joaquin Valley’s

State Implementation Plan. The parks would continue to provide periodic air quality warnings and education.

Visitor traffic projections under the preferred alternative are expected to increase by 30% compared to the no-action alternative. Nevertheless, emissions of CO, VOC, and NO_x are expected to decrease by 2010 from base year levels due to lower fleetwide emissions (see Table 35). By 2010 CO emissions are projected to be about 114 tons per year, a decrease of about 60% from the base year. Similar to the no-action alternative, the impact would be reduced from major to moderate (greater than 100 tons/ year in a CO attainment area).

VOC emissions would decrease by about 72% from the base year, to about 3.8 tons per year by 2010. The impact would be minor adverse because emissions would be less than 5 tons per year. NO_x emissions would decrease by about two thirds, to about 7.8 tons per year; the impact level would be moderate adverse because emissions would be greater than 5 tons per year but less than 25 tons per year in a severe nonattainment area for ozone.

TABLE 35: PROJECTED AUTOMOBILE EMISSIONS — PREFERRED ALTERNATIVE AND ALTERNATIVE C

Scenario	Daily Traffic Volume	Daily VMT	Annual VMT	Annual Emissions (tons/year)				
				VOC	CO	NO _x	SO ₂	PM ₁₀
Cedar Grove Area								
1997	1,040	9,152	3,340,480	1.72	38.69	3.16	0.02	0.12
2010	1,350	11,880	4,336,200	0.48	15.78	1.09	0.01	0.15
Grant Grove / Big Stump Area								
1997	3,720	17,484	6,381,660	4.64	88.03	6.46	0.05	0.25
2010	4,840	22,748	8,303,020	1.33	35.76	2.27	0.04	0.33
Upper Generals Highway								
1997	1,610	18,193	6,640,445	2.92	71.06	6.32	0.04	0.22
2010	2,090	23,617	8,620,205	0.82	28.17	2.13	0.03	0.28
Wuksachi / Lodgepole / Wolverton Area								
1997	2,340	5,148	1,879,020	1.36	25.92	1.90	0.01	0.07
2010	3,040	6,688	2,441,120	0.39	10.51	0.67	0.01	0.10
Giant Forest Area								
1997	2,220	9,546	3,484,290	1.79	40.36	3.30	0.02	0.12
2010	2,890	12,427	4,535,855	0.50	16.51	1.14	0.01	0.15
Mineral King Area								
1997	230	3,565	1,301,225	0.95	17.95	1.32	0.01	0.05
2010	300	4,650	1,697,250	0.27	7.31	0.46	0.01	0.07
Total								
1997	11,160	63,088	23,027,120	13.38	282.01	22.46	0.15	0.83
2010	14,510	82,010	29,933,650	3.79	114.04	7.76	0.11	1.08

Emissions of PM₁₀ would increase slightly (from 0.83 to 1.08 tons/year) but would remain minor adverse for a serious nonattainment area (less than 5 tons/year); emission factors are expected to remain relatively constant through 2010.

Emissions of SO₂ are expected to decrease slightly and would be negligible throughout the assessment period (less than 50 tons/year in an SO₂ attainment area).

Cumulative Impacts

As described for the no-action alternative, other actions in the immediate area and the greater San Joaquin Valley could have cumulative impacts in conjunction with past, present, and reasonably foreseeable actions. Implementing public transportation recommendations in the *Giant Forest Interim Management Plan* (NPS 1996a) would help reduce vehicle-related air emissions in the valley and along the corridors leading to the parks.

Planned highway improvements on California 180 and 198 are not likely to increase park traffic because the improvements would relieve congestion, not increase traffic volume.

Wildfire management and planned burns in the parks and adjacent national forests are coordinated with the San Joaquin Valley Unified Air Pollution Control District. Prescribed fires are conducted under favorable air quality conditions to minimize potential impacts on smoke sensitive areas.

Other factors affecting air quality in Sequoia and Kings Canyon National Parks include pollutants from the San Joaquin Valley and the central California coast, which are transported on prevailing winds. These pollutants are generated by traffic in the San Joaquin Valley, power generation, petroleum production, and agricultural practices. Expected reductions in automobile emissions as a result of California air quality standards and improved engine technologies would result in beneficial, long-term impacts on air quality in the parks and region. In the short term impacts would continue to be adverse.

As described for the no-action alternative, regional population growth in Tulare and Fresno Counties would affect air emissions in the San Joaquin Valley. According to the Tulare County Association of Governments, the population of Tulare County is projected to increase from 386,000 in 2003 to 418,00 in 2010 (pers. comm. with Graber 2003). The county has 120,795 housing units currently, which is projected to increase to 154,727 units by 2010 (pers. comm. with Graber 2003). According to the Council of Fresno County Governments, Fresno County's population in 2002 was 846,855, which is projected to increase to 992,351 by 2010 (pers. comm. with Gagliolo 2003). The number of households is projected to grow from 283,860 to 336,146 units.

Despite increased visitation, air quality in the parks under the preferred alternative would improve with reduced emissions due to higher emission standards and cleaner engines, decreasing the long-term, adverse impact from major to moderate.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major and adverse over the long term.

Conclusion

Under the preferred alternative proposed actions within the parks would not increase levels of stationary source emissions above conformity *de minimis* values, the same as the no-action alternative. Smoke emissions from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. Despite increased park visitor traffic projections, automobile-related emissions are expected to decrease by 2010, primarily as a result of lower fleetwide average emissions. By 2010 adverse vehicle emission impacts within the parks would range from negligible to moderate, with no change in impact level from the no-action alternative.

Other actions in the immediate area and greater San Joaquin Valley may have cumulative impacts when viewed in the context of the preferred alternative and combined with past, present, and reasonably foreseeable actions. Wildfires and planned burns on adjacent federal lands are coordinated with the San Joaquin Valley Unified Air Pollution Control District to minimize potential impacts on smoke-sensitive areas. Other factors affecting air quality include pollutants from the San Joaquin Valley and the central California coast, including those from automobiles, power generation, petroleum production, and agricultural practices. Expected reductions in automobile emissions as a result of California air quality standards and improved engine technologies would result in reduced automobile emissions over the long term. Development projects in the region would affect air emissions in the San Joaquin Valley to an unknown degree.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major and adverse over the long term.

No park air quality resources or values would be impaired as a result of actions under this alternative.

Impacts of Alternative A

Analysis

Impacts from stationary sources would be similar to the no-action alternative. Proposed development within the parks would not increase emissions above conformity *de minimis* levels of 50–100 tons per year. Smoke from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. The parks would continue to provide periodic air quality warnings and education.

Impacts related to visitor traffic under alternative A would be similar to but less than those described for the no-action alternative because visitor use is projected to decrease by about 10% (see Table 36). Overall reductions in automobile emissions would occur as a result of fleetwide emission improvements. By 2010 CO emissions are projected to be about 79 tons per year, a decrease of 72% from the base year. The impact level would be reduced from major to minor adverse because emissions would be less than 100 tons per year in a CO attainment area.

VOC emissions would decrease by about 80%, to 2.6 tons per year, and the impact would decrease from moderate to minor for a severe ozone nonattainment area. NO_x emissions would decrease by about 75% (to 5.4 tons/year), resulting in a moderate adverse impact because emissions would be greater than 5 tons per year.

Emissions of PM₁₀ would increase slightly but would remain minor adverse (less than 5 tons/year for a serious nonattainment area); emission factors are expected to remain relatively constant through 2010.

Emissions of SO₂ are expected to decrease slightly and would be negligible throughout the assessment period.

Cumulative Impacts

As described for the no-action alternative, other actions that could have cumulative impacts in conjunction with past, present, and reasonably foreseeable actions include the following:

- Implementing public transportation recommendations in the *Giant Forest Interim Management Plan* would help reduce vehicle-related air emissions in the San Joaquin Valley and along the corridors leading to the parks.
- Improving California 180 and 198 is aimed at relieving congestion, not increasing traffic volume.

TABLE 36: PROJECTED AUTOMOBILE EMISSIONS — ALTERNATIVE A

Scenario	Daily Traffic Volume	Daily VMT	Annual VMT	Annual Emissions (tons/year)				
				VOC	CO	NO _x	SO ₂	PM ₁₀
Cedar Grove Area								
1997	1,040	9,152	3,340,480	1.72	38.69	3.16	0.02	0.12
2010	940	8,272	3,019,280	0.34	10.99	0.76	0.01	0.10
Grant Grove / Big Stump Area								
1997	3,720	17,484	6,381,660	4.64	88.03	6.46	0.05	0.25
2010	3,350	15,745	5,746,925	0.92	24.75	1.57	0.03	0.23
Upper Generals Highway								
1997	1,610	18,193	6,640,445	2.92	71.06	6.32	0.04	0.22
2010	1,450	16,385	5,980,525	0.57	19.55	1.48	0.02	0.19
Wuksachi / Lodgepole / Wolverton Area								
1997	2,340	5,148	1,879,020	1.36	25.92	1.90	0.01	0.07
2010	2,110	4,642	1,694,330	0.27	7.30	0.46	0.01	0.07
Giant Forest Area								
1997	2,220	9,546	3,484,290	1.79	40.36	3.30	0.02	0.12
2010	2,000	8,600	3,139,000	0.35	11.43	0.79	0.01	0.11
Mineral King Area								
1997	230	3,565	1,301,225	0.95	17.95	1.32	0.01	0.05
2010	210	3,255	1,188,075	0.19	5.12	0.32	0.01	0.05
Total								
1997	11,160	63,088	23,027,120	13.38	282.01	22.46	0.15	0.83
2010	10,060	56,899	20,768,135	2.64	79.14	5.38	0.09	0.75

- Coordinating wildfire management and planned burns in the parks and adjacent national forests with the San Joaquin Valley Unified Air Pollution Control District would minimize potential impacts on smoke sensitive areas.
- Regional population growth in Fresno and Tulare counties would affect air emissions. Fresno County’s population is projected to increase from 846,855 in 2002 to 992,351 by 2010, and the number of households from 283,860 to 336,146. Tulare County is projected to increase from 386,000 people in 2003 to 418,00 in 2010 and housing units from 120,795 to 154,727.

Pollutants from the San Joaquin Valley and the central California coast are transported into the parks on prevailing winds. These pollutants are generated by traffic in the San Joaquin Valley, power generation, petroleum production, and agricultural practices. Expected reductions in automobile emissions as a result of California air quality standards and improved engine technologies would result in beneficial, long-term impacts on air quality in the parks and region. In

the short term impacts would continue to be adverse.

With level or reduced visitation, air quality in the parks under alternative A would improve because of reduced emissions associated with higher emission standards and cleaner engines, reducing the long-term impact from major adverse to moderate adverse.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would be major and adverse over the long term.

Conclusion

Under alternative A proposed development within the parks would not increase levels of stationary source emissions above conformity *de minimis* values, the same as the no-action alternative. Smoke emissions from the parks’ managed wildland fires over the next 10 years have been included in the San Joaquin Valley’s State Imple-

mentation Plan. Park visitor traffic projections are expected to decrease by 10% compared to the no-action alternative. By 2010 vehicle emission impacts within the parks would range from negligible to minor adverse; compared to the no-action alternative this would be beneficial because the impact would be reduced.

As described for the no-action alternative, other actions in the immediate area and the greater San Joaquin Valley may have cumulative impacts. Wildfires and planned burns on adjacent federal lands are coordinated with the San Joaquin Valley Unified Air Pollution Control District to minimize potential impacts on smoke sensitive areas. Pollutants from the San Joaquin Valley and the central California coast that affect air quality in the parks include those from automobiles, power generation, petroleum production, and agricultural practices. Long-term reductions in automobile emissions are expected as a result of California air quality standards and improved engine technologies. Development projects in the region would affect air emissions in the San Joaquin Valley to an unknown degree.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would be major and adverse over the long term.

No air quality resources or values would be impaired as a result of actions under this alternative.

Impacts of Alternative C

Analysis

Impacts would be similar to the no-action alternative. Proposed development within the parks would not increase levels of stationary source emissions above conformity *de minimis* values of 50–100 tons per year. Smoke emissions from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. The parks

would continue to provide periodic air quality warnings and education.

Visitor traffic projections in the parks under alternative C are expected to be the same as the preferred alternative, with a 30% projected increase. Even with increased park visitor traffic, overall emissions of CO, VOC, and NO_x are expected to decrease by 2010 due to lower fleet-wide emissions (see Table 35). CO emissions are projected to decrease by about 60% to 114 tons per year, resulting in a moderate adverse impact.

VOC emissions, as a precursor to ozone formation, would decrease by about 72% to 3.8 tons per year, resulting in a minor adverse impact in a severe ozone nonattainment area. NO_x emissions would decrease by about 66% to 7.8 tons per year, resulting in a moderate adverse impact.

Emissions of PM₁₀ would increase slightly but would remain minor adverse for a serious non-attainment area.

Emissions of SO₂ are expected to decrease slightly and would be negligible throughout the assessment period.

Cumulative Impacts

As described for the no-action alternative, other actions in the immediate area and greater San Joaquin Valley that could have cumulative impacts when viewed in conjunction with past, present, and reasonably foreseeable actions include the following:

- Implementing public transportation recommendations in the *Giant Forest Interim Management Plan* would help reduce vehicle-related air emissions in the San Joaquin Valley and along the corridors leading to the parks.
- Improving California 180 and 198 is aimed at relieving congestion, not increasing traffic volume.
- Coordinating wildfire management and planned burns in the parks and adjacent national forests with the San Joaquin Valley Unified Air Pollution Control District

would minimize potential impacts on smoke sensitive areas.

- Regional population growth in Fresno and Tulare counties would affect air emissions. Fresno County's population is projected to increase from 846,855 in 2002 to 992,351 by 2010, and the number of households from 283,860 to 336,146. Tulare County is projected to increase from 386,000 people in 2003 to 418,00 in 2010 and housing units from 120,795 to 154,727.

Prevailing winds transport pollutants from the San Joaquin Valley and the central California coast into the parks. These pollutants are generated by traffic in the San Joaquin Valley, power generation, petroleum production, and agricultural practices. Expected reductions in automobile emissions as a result of California air quality standards and improved engine technologies would result in beneficial, long-term impacts on air quality in the parks and region. In the short term impacts would continue to be adverse.

Despite increased visitation, air quality in the parks under alternative C would improve with decreased emissions because of higher emission standards and cleaner engines, reducing the long-term, adverse impact from major to moderate.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major and adverse over the long term.

Conclusion

Under alternative C proposed development within the parks would not increase levels of stationary source emissions above conformity *de minimis* values, the same as the no-action alternative. Smoke emissions from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. Despite increased park visitor traffic projections, automobile-related emissions are expected to decrease by 2010,

primarily as a result of lower fleetwide average emissions. By 2010 vehicle emission impacts within the parks would range from negligible to moderate adverse, with no change in impact levels from the no-action alternative.

Other actions in the immediate area and greater San Joaquin Valley may have cumulative impacts when viewed in the context of alternative C and combined with past, present, and reasonably foreseeable actions. Wildfire management and planned burns on adjacent federal lands are coordinated with the San Joaquin Valley Unified Air Pollution Control District to minimize potential impacts on smoke-sensitive areas. Other factors affecting park air quality include pollutants from the San Joaquin Valley and the central California coast, including those from automobiles, power generation, petroleum production, and agricultural practices. Long-term reductions in automobile emissions are expected as a result of California air quality standards and improved engine technologies. Development projects in the region would affect air emissions in the San Joaquin Valley to an unknown degree.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major and adverse over the long term.

No air quality resources or values would be impaired as a result of actions under this alternative.

Impacts of Alternative D

Analysis

Impacts would be similar to the no-action alternative. Proposed development within the parks would not increase levels of stationary source emissions above conformity *de minimis* values of 50–100 tons per year. Smoke emissions from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. The parks would continue to provide periodic air quality warnings and education.

Park visitor traffic projections under alternative D would be the highest of any alternative, with an expected 48% increase compared to the no-action alternative. Even though traffic would increase, emissions of CO, VOC, and NO_x are expected to decrease by 2010 due to lower fleet-wide average emissions (see Table 37). CO emissions are projected to decrease by about 54% to 130 tons per year, resulting in a moderate adverse impact (greater than 100 tons/year in a CO attainment area).

As a precursor to ozone formation, VOC emissions would decrease by about 68% to 4.3 tons per year, a minor adverse impact in a severe ozone nonattainment area. NO_x emissions would fall by about 60%, to 8.8 tons per year, with a moderate adverse impact.

Emissions of PM₁₀ would increase slightly (from 0.83 to 1.23 tons/year) but would remain minor adverse for a serious nonattainment area.

Emissions of SO₂ are expected to decrease slightly and would be negligible throughout the assessment period.

Cumulative Impacts

As described for the no-action alternative, other actions that could have cumulative impacts in conjunction with past, present, and reasonably foreseeable actions include the following:

- Implementing public transportation recommendations in the *Giant Forest Interim Management Plan* would help reduce vehicle-related air emissions in the San Joaquin Valley and along the corridors leading to the parks.
- Improving California 198 and 180 is aimed at relieving congestion, not increasing traffic volume.
- Coordinating wildfire management and planned burns in the parks and adjacent national forests with the San Joaquin Valley Unified Air Pollution Control District would minimize potential impacts on smoke sensitive areas.
- Regional population growth in Fresno and Tulare counties would affect air emissions. Fresno County’s population is projected to increase from 846,855 in 2002 to 992,351 by 2010, and the number of households

TABLE 37: PROJECTED AUTOMOBILE EMISSIONS — ALTERNATIVE D

Scenario	Daily Traffic Volume	Daily VMT	Annual VMT	Annual Emissions (tons/year)				
				VOC	CO	NO _x	SO ₂	PM ₁₀
Cedar Grove Area								
1997	1,040	9,152	3,340,480	1.72	38.69	3.16	0.02	0.12
2010	1,540	13,552	4,946,480	0.55	18.00	1.24	0.02	0.17
Grant Grove / Big Stump Area								
1997	3,720	17,484	6,381,660	4.64	88.03	6.46	0.05	0.25
2010	5,510	25,897	9,452,405	1.51	40.71	2.58	0.04	0.38
Upper Generals Highway								
1997	1,610	18,193	6,640,445	2.92	71.06	6.32	0.04	0.22
2010	2,380	26,894	9,816,310	0.93	32.08	2.42	0.03	0.31
Wuksachi / Lodgepole / Wolverton Area								
1997	2,340	5,148	1,879,020	1.36	25.92	1.90	0.01	0.07
2010	3,460	7,612	2,778,380	0.44	11.97	0.76	0.01	0.11
Giant Forest Area								
1997	2,220	9,546	3,484,290	1.79	40.36	3.30	0.02	0.12
2010	3,290	14,147	5,163,655	0.57	18.79	1.30	0.02	0.18
Mineral King Area								
1997	230	3,565	1,301,225	0.95	17.95	1.32	0.01	0.05
2010	340	5,270	1,923,550	0.31	8.28	0.53	0.01	0.08
Total								
1997	11,160	63,088	23,027,120	13.38	282.01	22.46	0.15	0.83
2010	16,520	93,372	34,080,780	4.31	129.83	8.83	0.13	1.23

from 283,860 to 336,146. Tulare County is projected to increase from 386,000 people in 2003 to 418,00 in 2010 and housing units from 120,795 to 154,727.

Pollutants from the San Joaquin Valley and the central California coast are transported into the parks on prevailing winds. These pollutants are generated by traffic in the San Joaquin Valley, power generation, petroleum production, and agricultural practices. Expected reductions in automobile emissions as a result of California air quality standards and improved engine technologies would result in beneficial, long-term impacts on air quality in the parks and region. Short-term impacts would continue to be adverse.

Despite increased visitation, air quality in the parks under alternative D would improve with reduced emissions due to higher emission standards and cleaner engines, decreasing the long-term, adverse impact from major to moderate.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. Long-term cumulative impacts would continue to be major and adverse.

Conclusion

Under alternative D proposed development within the parks would not increase levels of stationary source emissions above conformity *de minimis* values, the same as the no-action alternative. Smoke emissions from the parks' managed wildland fires over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan. Despite increased park visitor traffic projections, automobile-related emissions are expected to decrease by 2010 because of lower fleetwide average emissions. By 2010 vehicle emission impacts would range from negligible to moderate adverse, with no change in impact level from the no-action alternative.

Other actions in the immediate area and greater San Joaquin Valley may have cumulative impacts in conjunction with past, present, and reasonably foreseeable actions. Planned burns on

adjacent federal lands are coordinated with the San Joaquin Valley Unified Air Pollution Control District to minimize potential impacts on smoke-sensitive areas. Other factors affecting park air quality include pollutants from the San Joaquin Valley and the central California coast, including those from automobiles, power generation, petroleum production, and agricultural practices. Long-term reductions in automobile emissions are expected as a result of California air quality standards and improved engine technologies. Development projects in the region would affect air emissions in the San Joaquin Valley to an unknown degree.

The parks would continue to experience some of the worst air quality in the United States, not as a result of management actions in the parks, but as the result of poor air quality in the San Joaquin Valley. The cumulative impact on air quality would continue to be major and adverse over the long term.

No park air quality resources or values would be impaired under this alternative.

Conformity Determination

The alternatives being considered would conform to the Clean Air Act for the following reasons:

1. Emissions from existing and proposed stationary sources in the park would be below the conformity *de minimis* values.
2. Emissions from managed wildland fires in the parks over the next 10 years have been included in the San Joaquin Valley's State Implementation Plan.
3. Future traffic projections for the parks have been included in the regional transportation model that will be used to develop the regional transportation plan for the San Joaquin Valley.
4. The National Park Service is committed to employing best management practices to reduce emissions from all air pollution sources within the parks, as stated in the *Air Resources Management Action Plan* (NPS 1999a).

Wild and Scenic Rivers

GUIDING REGULATIONS AND POLICIES

The Wild and Scenic Rivers Act of 1968, as amended, states that the comprehensive river management plan for the Middle and South Forks of the Kings River and the North Fork of the Kern River “shall assure that no development or use of park lands shall be undertaken that is inconsistent with the designation of the river” (16 USC 1274(a)(63) and (64). The act also stipulates that rivers included in the system are to be preserved and protected in their free-flowing condition.

Section 10(a) of the Wild and Scenic Rivers Act states that river managing agencies may provide for other uses of the river corridor so long as such uses are not inconsistent with the protection and enhancement of outstandingly remarkable values and with public use and enjoyment of the river area.

Section 7 of the Wild and Scenic Rivers Act prohibits the Federal Energy Regulatory Commission (FERC) from licensing the “construction of any dam, water conduit, reservoir, powerhouse, transmission line, or other project works under the Federal Power Act . . . on or directly affecting any river” designated as a component of the wild and scenic rivers system. Any developments below or above a wild, scenic, or recreational river area shall not “invade the area or unreasonably diminish the scenic, recreational, fish or wildlife values present in the area.” Hydroelectric facilities within Sequoia National Park are not covered by the Federal Energy Regulatory Commission.

Public Law 99-338, as amended by Public Law 108-447, authorizes the secretary of the interior to extend the permit for hydroelectric facilities within the park until September 8, 2026 (16 USC 45a-1). Public Law 95-625, which amended Public Law 93-522, incorporated hydroelectric facilities within the Mineral King addition.

METHODOLOGY FOR ANALYZING IMPACTS

The impact analysis evaluates how well each alternative would protect and enhance outstandingly remarkable values for designated and eligible wild and scenic rivers. Outstandingly remarkable values include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values or features. Thresholds for the impacts are defined in the text box.

Impacts are evaluated on a segment-wide basis in terms of whether they would be beneficial or adverse to the outstandingly remarkable values that have been defined for a river segment. Beneficial impacts would result from actions that protect and enhance these values, while adverse impacts would result from actions that reduce those values.

The duration of the impact considers whether the impact would be temporary and/or associated with transitional types of activities or if the impact would occur over a long period and affect the protection and enhancement of outstandingly remarkable river values.

Impacts are generically analyzed for the backcountry and frontcountry segments that are designated or are eligible and suitable for designation as wild and scenic rivers.

AREAS OF IMPACT ANALYSIS

Areas of impact analysis for wild and scenic rivers are the river corridors inside the parks. Designated and eligible river segments and their associated outstandingly remarkable values are shown in Table 38. For frontcountry river segments, the areas of impact analysis include the following:

- the Kings Canyon for the lower segments of the South Fork of the Kings River

Impact Thresholds for Wild and Scenic Rivers

Negligible — Impacts would not be detectable to most visitors and would have no discernible effect on a river’s outstandingly remarkable values.

Minor — Impacts would be slightly detectable to some visitors but are not expected to have an overall effect on a river’s outstandingly remarkable values.

Moderate — Impacts would be clearly detectable by many visitors and could have an appreciable effect on a river’s outstandingly remarkable values.

Major — Impacts would have a substantial and noticeable effect on most visitors or the river’s outstandingly remarkable values.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the general management plan or other relevant planning documents.

- the Lodgepole and Potwisha areas for the lower segments of the Marble Fork of the Kaweah
- the foothills area from the Buckeye Flat campground to Ash Mountain for the Middle Fork of the Kaweah
- the Mineral King Valley area for the East Fork of the Kaweah
- the South Fork campground area for the South Fork of the Kaweah.

**RIVER PROTECTION MEASURES
COMMON TO ALL ALTERNATIVES**

Under all alternatives measures would be taken to protect and enhance the values and free-flowing condition of designated and study rivers as described in the alternatives. These measures include the evaluation of water resources projects according to criteria in section 7 of the Wild and Scenic Rivers Act, floodplain / wetland assessments, restoring ecological processes, and managing impacts on riverbanks. There are over 134 miles of designated and eligible rivers in the parks. No development is proposed along the less accessible wild segments — more than 80% (110+ miles) of the designated and eligible rivers. Actions proposed for recreational segments would affect less than 18% (24 miles) of designated or eligible rivers. Section 7 of the Wild and Scenic Rivers Act applies to designated rivers. By policy the National Park Service would apply the same standard of review for eligible rivers.

River use levels are expected to remain at or near current levels for each classified or eligible river.

Zoning prescriptions and zone locations support river classification and protection by describing typical river protection measures, desired resource conditions, and appropriate activities and facilities. Management zoning overlays the river segment classifications. Zoning describes the general carrying capacity or degree of social interaction that visitors could expect in each zone. Most rivers in the backcountry or designated wilderness would be classified as wild, the exception being the recreational classification for the East Fork of the Kaweah in the Mineral King Valley area because it is bridged and accessible by road. Rivers in frontcountry zones are classified as recreational since roads parallel the segments, or the corridors contain more development. River corridors would include 0.25 mile on each side of the river segment.

Many of the designated and eligible river areas are remote and untrailed. Due to the inaccessibility of these areas to all but the most skilled

TABLE 38: WILD AND SCENIC RIVER SEGMENTS AND OUTSTANDINGLY REMARKABLE VALUES

River Segments	Classification	Outstandingly Remarkable Values						
		Scenery	Recreation	Geology	Wildlife	Prehistory / History	Vegetation	Fish
Designated Rivers								
Middle Fork of the Kings	Wild	•	•	•	•	•	•	
South Fork of the Kings	Wild	•	•	•				
South Fork of the Kings	Recreational	•	•	•				
North Fork of the Kern	Wild	•	•	•				•
Eligible Rivers								
South Fork of the San Joaquin	Wild	•	•	•				
Marble Fork of the Kaweah • Upper Segment	Wild	•	•	•				
• Lower Segment	Recreational	•	•	•				
Middle Fork of the Kaweah • Upper Segment	Wild	•						
• Lower Segment	Recreational	•	•			•		
East Fork of the Kaweah • Upper Segment	Wild	•	•	•				
• Center Segment	Recreational	•	•					
• Lower Segment	Wild	•						
South Fork of the Kaweah	Wild	•		•				

cross-country travelers, a detailed user capacity program is not necessary. Use and impacts in more accessible locations would be managed as described below:

- *Backcountry rivers classified as wild or eligible for this classification* — The vast majority of the parks’ designated river segments are in wilderness areas (82.5 miles, out of 90.1 miles total). The rugged terrain in these areas, coupled with the short backcountry season (generally May through September), functions as a natural limit on the number of backcountry users. Usage has been static for more than 20 years. Although these natural barriers help ensure that the parks’ backcountry areas remain largely unchanged by human use, the parks will address and monitor user capacity of these river areas through the use of several different mechanisms. First, backcountry areas of the parks are subject to the parks’ wilderness quota system, which sets limits for numbers of overnight users in different backcountry areas. All overnight backcountry users (both hikers and stock parties) must receive a wilderness permit. Once permitted trailhead limits are reached,

no further permits are issued for that time period. The permitted number of overnight users per trailhead was based on studies of backcountry user travel patterns, and their associated impacts on resources and solitude (Parsons 1986; Stohlgren 1982, 1986; Parsons et al. 1981; Parsons and Stohlgren 1987; Stohlgren and Parsons 1986).

Stock parties are subject to additional restrictions that regulate party size and that determine when parties may access certain areas. Stock parties are limited to 20 head of stock. The average stock party size is 4.5 people and 7 animals, well below the upper limit, and only a few stock parties each year come close to the cap. Stock access to backcountry meadows is regulated under the parks’ *Stock Use and Meadow Management Plan* (NPS 1986d). This plan includes a monitoring component to assess the condition of meadow and riparian resources. Opening dates are established for when stock parties may use meadows; dates are based on snowpack data to ensure that the meadows and trails are dry enough to sustain stock hoof impacts and vegetation stresses. The superintendent also has the ability to tem-

porarily close areas, such as meadows, to all use (36 CFR Part 1). In the past the superintendent has exercised his authority to close meadows and other areas to allow resources to recover from the impacts of human use. If monitoring data indicate that desired meadow conditions are not being met, the superintendent may close a meadow until desired conditions are achieved, based on monitoring data.

These tools will enable park managers to regulate the number of people and stock animals using backcountry areas of the parks and to monitor conditions in the river corridors to prevent the degradation of outstandingly remarkable values.

- *Frontcountry rivers classified as recreational or eligible for this classification* — The only designated wild and scenic river segment in the parks' frontcountry is the lower segment of the South Fork of the Kings River, which is 7.6 miles long. The river corridor boundary extends 0.25 mile on each side of the river. This recreational river segment flows through the floor of the Kings Canyon in Kings Canyon National Park. The area is open seasonally, typically from May through October; road access is limited by Caltrans to those times when safe access can be provided. Under each action alternative this segment would be zoned as low-use frontcountry, with some areas zoned as development.

User capacities for this segment of the Kings River would be addressed by seasonal closures; zoning; limiting areas of development; managing overnight use by limiting the number of developed campsites, parking spaces, and lodging rooms; establishing development setbacks; removing facilities within floodplains; managing river-based recreation; defining river access points; prohibiting motorized watercraft; and regular inspection of the condition of resources, including the river's outstandingly remarkable values. As a mitigating measure, riverbanks would be restored as needed. Watercraft use on the river would

be prohibited under all alternatives except alternative D, which would allow for limited, nonmotorized watercraft use. Stock use would continue, except under alternative A, which would remove the pack station. The pack station in Cedar Grove provides service for backcountry stock trips. The number of stock entering the backcountry here is subject to the stock party size restrictions and the backcountry overnight permitting system. Hiking and other forms of recreation such as fishing, picnicking, and bicycle use would continue within the river corridor. Day use on the floor of the Kings Canyon is limited by the remoteness of the area, which is two hours of challenging driving from the nearest metropolitan area. Day use is largely comprised of scenic driving, walking trails through Zumwalt Meadow, and viewing Roaring River Falls.

The number of overnight users and the type of overnight use would be regulated through zoning and facility sizing and design. Facilities for overnight use (such as lodging buildings, campgrounds and employee housing) can only be located in developed zones, and overnight facilities cannot be located in floodplains. Overnight lodging at Cedar Grove consists of 21 beds. Lodging facilities under each of the action alternatives (except alternative A) could be modestly expanded provided that site-specific compliance indicates that the expansion would not degrade the river's outstandingly remarkable values. There are four campgrounds within or adjacent to the river corridor, which contain a total of 352 campsites. Under each of the action alternatives (except alternative C) campgrounds would be redesigned and fewer spaces would be provided. Cedar Grove also accommodates 21 employee housing units. Each of the alternatives would maintain the existing number of housing units with the exception of alternative C, which would slightly expand housing opportunities, provided that the expansion did not degrade outstandingly remarkable values.

IMPACTS COMMON TO ALL ALTERNATIVES

Small-scale, historic hydroelectric facilities on the Marble and Middle Forks of the Kaweah River, and four dams in Mineral King that feed the East Fork of the Kaweah River, if permitted by the secretary of the interior, will continue to operate in accordance with the conditions imposed by Congress in Public Law 108-447, with minor, adverse impacts on flows. It has been determined that the magnitude of impacts resulting from these relatively small-scale facilities does not preclude the inclusion of these segments in the wild and scenic rivers system, since they remain “generally natural and riverine in appearance” (47 FR (173): 39458). These facilities are somewhat conspicuous. Their continued operation is expected to have moderate, adverse, long-term impacts on scenic values. Recreational activities have occurred along the access routes, resulting in moderate, beneficial impacts.

Park managers will work with the hydroelectric operator through a regulated permitting process to ensure that the facilities are maintained and operated in a manner that does not impair park resources. In accordance with Public Law 108-447, a reauthorization permit requires that an independent safety assessment be conducted and that any identified deficiencies be corrected. The secretary of the interior may also impose any other reasonable terms and conditions necessary for the management and care of Sequoia National Park and the purposes for which it was established. Because new hydroelectric infrastructure would not be permitted in the national parks, the secretary of the interior may consider termination of the special use permit if catastrophic damage requiring reconstruction occurred to existing facilities.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Analysis

Backcountry Rivers. There would be negligible to minor, beneficial impacts on scenic and recre-

ational values of designated and eligible river segments as a result of the management prescriptions, the goal of which would be to improve resource conditions. Most of these sections are already in designated wilderness or roadless areas, and recreation is controlled by permit and park regulations. Recreational and scenic values along riverbanks would be affected in localized areas as a result of erosion caused by backcountry stock and hiker use, resulting in minor, adverse, short- and long-term impacts. There would be no impacts on other outstandingly remarkable values along backcountry wild river segments. Geology would not be altered along any river segment; the rare Kern Valley rainbow trout would not be affected along the North Fork of the Kern; and wildlife, vegetation, and prehistory / history along the Middle Fork of the Kings River would not be affected. In conjunction with management prescriptions, impacts would be mitigated by requiring permits for use and regulating seasonal access to some areas (that is, areas would be opened depending on soil moisture conditions, and some areas would be closed to stock use).

Frontcountry Rivers. Concentrated human use combined with unlimited river access under the no-action alternative would continue to have minor, adverse, short- and long-term impacts on scenic and recreational values in more heavily used areas. Crowded conditions, riverbank erosion, and littering could occur seasonally as a result of water play, camping, fishing, and non-motorized watercraft use. (Nonmotorized watercraft use is not allowed on the lower segment of the South Fork of the Kings River, which is a designated wild and scenic river, but it is allowed on frontcountry segments of proposed rivers.) Activities, such as camping in campgrounds and fishing, would continue to be regulated on river segments designated or proposed as wild or scenic, helping protect recreational values. While some use conflicts could occur along small stretches of rivers between different types of users, these conflicts would not change the range of recreational opportunities; thus, impacts would be minor and adverse. Slight use increases along some river sections could result in minor, adverse, short-

term impacts on scenic values, but the impact would affect only small areas that are generally more heavily used, and scenic values would continue to predominate. Replacing and relocating some facilities within floodplains would result in safer visitor experiences; the impact on recreational values in localized areas would be minor to moderate, beneficial, and long term. There would be no impacts on geology values in front-country segments since most of the formations are granite and meta-volcanic.

Cumulative Impacts

In the past hiker and stock use levels were higher and were not as proactively managed or regulated as they are today. This contributed to riverbank erosion and damage in backcountry areas, resulting in moderate, adverse, long-term impacts on both recreational and scenic values. Continued permit requirements for backcountry use, resource monitoring, seasonal closures, and reduced backcountry use have all resulted in improved conditions. Along portions of the South Fork of the Kings River crowding sometimes occurs because this is a popular backcountry entry point, resulting in localized, moderate, adverse impacts on both scenic and recreational values. Other outstandingly remarkable values as described in the alternatives matrix in volume 1 are not likely to have been or be impacted by past, present, or reasonably foreseeable future actions; for example, geology would not be altered because most of the formations are granite and meta-volcanic. The remoteness and inaccessibility of the North Fork of the Kern River would protect the outstandingly remarkable value related to fish. Similarly, the remoteness and inaccessibility of the Middle Fork of the Kings River would protect the value of pre-history / history (Native American sites in the Tehipite Valley). In conjunction with the actions of this alternative, there would be negligible additional impacts on outstandingly remarkable values for the backcountry river segments because no new development would occur, and use levels would remain relatively constant.

In the frontcountry past construction and reconstruction of roads (Generals Highway and Kings

Canyon Highway) and park facilities contributed to impacts on scenic values. While roads and park facilities may intrude on the scenery, values have generally not been affected by the small-scale facilities, resulting in negligible, adverse, long-term impacts. At the same time these projects have facilitated public recreational access to river corridors for fishing, camping, and water play, resulting in minor, beneficial, long-term impacts. These beneficial impacts relate to the outstandingly remarkable value of recreation for the South Fork of the Kings River, the Marble Fork of the Kaweah River (areas near the Lodgepole and Potwisha campgrounds), and the Middle Fork of the Kaweah River (the Buckeye Flat campground, Potwisha, Hospital Rock, and the Ash Mountain area). River access in some frontcountry areas is limited by steep or rocky terrain, so that use is often concentrated in a few spots, resulting in crowding, numerous visitor-created trails, and localized erosion. These impacts, however, have not resulted in the degradation of outstandingly remarkable values along designated or eligible segments.

Planned improvements of campgrounds and developed areas would result in more campsites or facilities being relocated outside the floodplain. The bridge at Cedar Grove would be relocated or rebuilt so it would not be subject to damage during floods and would have a reduced impact on free-flowing conditions in the river. These future actions would result in negligible to moderate, beneficial, long-term impacts on recreational values since safer, more sustainable facilities would be provided, and recreational activities such as fishing, hiking, and water play would continue.

Impacts under the no-action alternative on recreational and scenic values of frontcountry river segments would continue to result largely from visitation and uncontrolled river access in several popular areas. Impacts on scenic and recreational values would be minor, adverse, and long term because of riverbank erosion, visitor-created trails, and littering. Conflicts between fishing and water play, or crowding at popular water play areas, could result in minor, adverse, short-term impacts to recreational values.

The no-action alternative, in conjunction with the other cumulative actions, would result in negligible to minor, beneficial, long-term impacts to recreational values as the result of planned facility improvements. At the same time these actions would continue to perpetuate minor, adverse, short- and long-term impacts on recreational and scenic values from uncontrolled river access in some frontcountry areas.

Conclusion

While unregulated river access in some frontcountry areas would continue, the overall impact on designated and eligible river segments and their outstandingly remarkable values would be minor, beneficial, and long term due to improved facilities, as well as facilities being relocated out of floodplains.

In conjunction with past, present, and reasonably foreseeable actions affecting the outstandingly remarkable values of rivers, cumulative impacts to wild and scenic rivers and eligible segments within the parks and the values they represent would generally be negligible to minor, beneficial, as well as adverse, and long term.

There would be no impairment of wild and scenic river resources or values.

IMPACTS OF THE PREFERRED ALTERNATIVE

Analysis

Backcountry Rivers. Most of the river segments are in designated wilderness or roadless areas, and recreation is controlled by permit and park regulations. There would be negligible to minor impacts as a result of restoring impacted areas in the major trails zone. Under the preferred alternative improving resource conditions and providing for sustainable use would result in negligible to minor, beneficial, long-term impacts on the scenic and recreational values of designated or eligible wild and scenic rivers. There would be no impacts on the other outstandingly remarkable values along backcountry wild river segments. Geology would not be

altered along any river segment; the rare Kern Valley rainbow trout would not be affected along the North Fork of the Kern; and wildlife, vegetation, and prehistory / history along the Middle Fork of the Kings River would not be affected. Recreational and scenic values along riverbanks would be affected by riverbank erosion caused by backcountry stock and hiker use, resulting in minor, adverse, short- and long-term impacts in localized areas. These impacts would not degrade outstandingly remarkable values along designated or eligible segments. Requiring permits for backcountry use, regulating seasonal access to some areas (that is, opening areas depending on soil moisture conditions), and closing some areas to stock use would mitigate adverse effects.

Frontcountry Rivers. Under the preferred alternative visitor use would be managed to protect river values. Providing well-defined river access routes and restoring riverbanks by removing unwanted trails that were created by visitors would enhance both scenic and recreational values, resulting in minor to moderate, beneficial, long-term impacts along popular frontcountry river corridors. There would be no impacts on geology values along frontcountry segments since most of the formations are granite and meta-volcanic. Riverbank erosion and littering would be reduced, but crowding in some areas could occur in summer as a result of water play, camping, fishing, and nonmotorized watercraft use. (Nonmotorized watercraft use is not allowed on the lower segment of the South Fork of the Kings River, which is a designated wild and scenic river, but it is allowed on frontcountry segments of proposed rivers.) Activities, such as camping in campgrounds and fishing, would continue to be regulated on river segments designated or proposed as wild or scenic. Although some use conflicts could occur along small stretches of rivers, these conflicts would not alter the range of recreational opportunities, and impacts on recreational values would be minor. Crowding along some river sections could result in minor and generally short-term, adverse impacts on scenic values; such impacts would be limited to small areas, and scenic values would continue to predominate. Relocating some facil-

ities out of floodplains would improve scenic resources and make visitor experiences safer; impacts on scenic and recreational values in localized areas would be minor, beneficial, and long term.

Cumulative Impacts

As described for the no-action alternative, hiking and stock use in the past caused riverbank erosion in some backcountry areas. Recreational and scenic qualities were also affected before the river segments were designated. Permit requirements for backcountry use, reduced use levels, resource monitoring to support adjusting regulations, and seasonal closures have improved conditions. Crowding along portions of the wild segment of the South Fork of the Kings River, which is a popular backcountry entry point, results in localized, moderate, adverse impacts on both scenic and recreational values. Other outstandingly remarkable values such as geology are not likely to have been or be impacted by past, present, or reasonably foreseeable actions. The remote location, low levels of use, and regulated fishing would protect the value related to fish on the North Fork of the Kern River. Similarly, remoteness and the absence of any new development along the wild segments of the Middle Fork of the Kings River would protect the value related to prehistory / history (Native American sites in the Tehipite Valley). In conjunction with the actions under this alternative, there would be negligible cumulative impacts on outstandingly remarkable values for backcountry river segments.

In the frontcountry past construction and reconstruction of roads (Generals Highway and Kings Canyon Highway) and park facilities have contributed to moderate, adverse, short- to long-term impacts on scenic river values, while at the same time facilitating recreational access on rivers classified as recreational. Even though roads and park facilities may be apparent, their small scale generally means they do not intrude on the scenery, resulting in a negligible, long-term impact on scenic values. Overall impacts on fishing, camping, and water play have been minor, beneficial, and long term. Rivers with

popular water play areas include the South Fork of the Kings River, the Marble Fork of the Kaweah River (areas near the Lodgepole and Potwisha campgrounds), and the Middle Fork of the Kaweah (Buckeye Flat campground, Potwisha, Hospital Rock, and Ash Mountain). Because access to the rivers is limited by steep or rocky terrain, use is concentrated in several areas, resulting in crowding, numerous visitor-created trails, and localized erosion. These impacts, however, have not resulted in the degradation of outstandingly remarkable values along designated or eligible segments. Reasonably foreseeable plans include ongoing campground and developed area upgrades (relocating more campsites or facilities outside the floodplain) and relocating or rebuilding the bridge at Cedar Grove so it would not be subject to damage during floods and would have a reduced impact on free-flowing conditions in the river. These future actions would result in minor to major, beneficial, long-term impacts on recreational and scenic values because facilities would be safer and more sustainable, and because more development would be removed from the immediate river corridor.

Impacts from visitors on recreational and scenic values along frontcountry rivers would be reduced despite increased visitation because of well-defined river access and the mitigation of visitor impacts in accordance with management prescriptions, such as hardening and defining river access points to reduce riverbank erosion. User conflicts from recreational uses such as fishing and water play, or crowding at popular water play areas, could result in minor, adverse, short-term impacts on recreational values.

The preferred alternative, in conjunction with past, present, and reasonably foreseeable actions, would generally result in negligible to minor, beneficial, long-term impacts to recreational values as a result of improved facilities and controlled river access.

Conclusion

With controlled river access and improved facilities, designated and eligible wild and scenic

river segments would be more protected, ensuring the preservation of outstandingly remarkable values. This would result in minor to moderate, beneficial, long-term impacts. Visitor use in localized areas would continue to result in minor, adverse, long-term impacts on outstandingly remarkable values.

In conjunction with past, present, and reasonably foreseeable actions, cumulative impacts to wild and scenic rivers within the parks and their outstandingly remarkable values would generally be minor to moderate and beneficial over the long term.

There would be no impairment of wild and scenic river resources or values.

IMPACTS OF ALTERNATIVE A

Analysis

Backcountry Rivers. Most of the wild river segments are in designated wilderness or roadless areas, and recreation is controlled by permit and park regulations. There would be negligible to minor beneficial impacts on scenic and recreational values along backcountry river segments because resource conditions would be improved, in accordance with management prescriptions. Most of these segments are in designated wilderness or roadless areas, and recreation is controlled by permit and park regulations. Minor, adverse, short- and long-term impacts on scenic values could continue to occur in localized areas along riverbanks because of erosion caused by backcountry stock and hiker use. Continuing to require permits for use, regulating seasonal access to some areas (i.e., opening them depending on soil moisture conditions), and closing some areas to stock use would help mitigate adverse effects. These impacts would not degrade outstandingly remarkable values along designated or eligible segments. There would be no impacts on other outstandingly remarkable values along backcountry wild river segments. Geology would not be altered along any river segment; the rare Kern Valley rainbow trout would not be affected along the North Fork of the Kern; and wildlife, vegetation, and pre-

history / history along the Middle Fork of the Kings River would not be affected.

Frontcountry Rivers. Under alternative A park visitation would be limited and managed to protect river values, resulting in improved recreational opportunities and scenery along river segments. Well-defined river access routes and riverbank restoration would enhance both scenic and recreational values, resulting in minor to moderate, beneficial, long-term impacts along popular frontcountry river corridors. Scenic values would be enhanced by reducing riverbank erosion and littering. Current or decreased use levels along river segments could result in negligible to minor, beneficial, short-term impacts on scenic values, which would continue to predominate. Recreational values would be enhanced by less crowded conditions, with improved conditions for water play, camping, fishing, and non-motorized watercraft use. Activities, such as camping in campgrounds and fishing, would continue to be regulated on river segments designated or proposed as wild or scenic, further mitigating any adverse effects. Although some use conflicts could still occur along small stretches of rivers, there would be fewer visitors, and the range of recreational opportunities would not be changed, so impacts would be minor. With fewer facilities and the relocation of some facilities outside floodplains, visitor experiences would be safer, resulting in minor, beneficial, long-term impacts on river-based recreation in localized areas. There would be no impacts on geology values along designated or eligible frontcountry segments since most of the formations are granite and meta-volcanic.

Cumulative Impacts

As described for the no-action alternative, hiking and stock use caused riverbank erosion in some backcountry areas. Recreational and scenic qualities were also affected before the river segments were designated. Permit requirements for backcountry use, resource monitoring to support adjusting regulations, seasonal closures, and reduced backcountry use have resulted in improved conditions. Crowding along portions of the wild segment of the South Fork of the Kings

River, which is a popular backcountry entry point, results in localized, moderate, adverse impacts on both scenic and recreational values. Other outstandingly remarkable values such as geology, fish, and history / prehistory are not likely to have been or be impacted by past, present, or reasonably foreseeable actions due to remoteness and the absence of any new development. In conjunction with the actions under this alternative, there would be negligible cumulative impacts on outstandingly remarkable values for backcountry river segments.

In the frontcountry past construction and reconstruction of roads (Generals Highway and Kings Canyon Highway) and park facilities have contributed to moderate, adverse, short- to long-term impacts on scenic river values, while at the same time facilitating recreational access. Because of the small scale of roads and park facilities, they do not intrude on the scenery, resulting in a negligible, long-term impact on scenic values. Overall impacts on fishing, camping, and water play have been minor, beneficial, and long term. Access to the rivers is limited by steep or rocky terrain, so use is often concentrated in several areas, resulting in crowding, numerous visitor-created trails, and localized erosion. These impacts, however, have not resulted in the degradation of outstandingly remarkable values along designated or eligible segments. Reasonably foreseeable plans include relocating more campsites and facilities outside the floodplain, and replacing or rebuilding the Cedar Grove bridge so that it would not be subject to damage during floods and would have a reduced impact on free-flowing conditions in the river. These future actions would result in minor to major, beneficial, long-term impacts on recreational values because of safer and more sustainable facilities.

Impacts from visitors on recreational and scenic values related to frontcountry rivers would be reduced because of well-defined river access and the mitigation of visitor impacts in accordance with management prescriptions, such as the restoration of riverbanks. Less crowding at popular water play areas and fewer recreational use conflicts, such as fishing and water play,

would result in negligible to minor, beneficial, short-term impacts to recreational values.

Alternative A in conjunction with other past, present, and reasonably foreseeable actions, would generally result in negligible to minor, beneficial, long-term impacts on recreational values as the result of improved facilities and controlled river access.

Conclusion

With reduced use, controlled river access, and improved facilities, designated and eligible wild and scenic river segments would be more protected, and associated outstandingly remarkable values would be preserved. This would result in minor to moderate, beneficial, long-term impacts.

In conjunction with past, present, and reasonably foreseeable actions affecting outstandingly remarkable values of rivers, cumulative impacts would generally be minor to moderate, long term, and beneficial. Minor, adverse, long-term impacts on outstandingly remarkable values in localized areas would continue to result from visitor use.

There would be no impairment of wild and scenic river resources or values.

IMPACTS OF ALTERNATIVE C

Analysis

Backcountry Rivers. Dispersing use under alternative C and applying management prescriptions would result in negligible to minor, beneficial, long-term impacts on scenic and recreational values along designated and eligible wild and scenic river segments. Most segments are in designated wilderness or roadless areas, and recreation is controlled by permit and park regulations. Riverbank erosion caused by backcountry stock and hiker use has caused minor, adverse, short- and long-term impacts to recreational and scenic values in localized areas. Continuing to require permits for use, regulating seasonal access to some areas (i.e., opening them depend-

ing on soil moisture conditions), and closing some areas to stock use would help mitigate adverse effects. These impacts would not degrade outstandingly remarkable values along designated or eligible segments. There would be no impacts on other outstandingly remarkable values along backcountry wild river segments. Geology would not be altered along any river segment; the rare Kern Valley rainbow trout would not be affected along the North Fork of the Kern; and wildlife, vegetation, and prehistory / history along the Middle Fork of the Kings River would not be affected.

Frontcountry Rivers. Under alternative C visitor use would be managed to protect river values. Well-defined river access routes and riverbank restoration of unwanted trails would enhance both scenic and recreational values, resulting in minor to moderate, beneficial, long-term impacts on visitors along popular frontcountry river corridors. Riverbank erosion and littering would be reduced, enhancing scenic values, but recreational values could be affected in crowded areas as a result of water play, camping, fishing, and nonmotorized watercraft use. Activities, such as camping in campgrounds and fishing, would continue to be regulated on river segments designated or proposed as wild or scenic. Although some use conflicts could occur along small stretches of rivers, these conflicts would not alter the range of recreational opportunities, and impacts would be minor. Crowding along some sections could result in minor, short-term, adverse impacts on scenic values, which would continue to predominate. There would be no impacts on geology values along designated or eligible frontcountry segments since most of the formations are granite and meta-volcanic.

Cumulative Impacts

As described for the no-action alternative, hiking and stock use in the past caused riverbank erosion in some backcountry areas. Also recreational and scenic qualities were affected before the river segments were designated. Backcountry permit requirements, reduced use levels, and resource monitoring to support adjusting regulations and seasonal closures have improved

conditions. Crowding along portions of the wild segment of the South Fork of the Kings River, which is a popular backcountry entry point, results in localized, moderate, adverse impacts on both scenic and recreational values. Other outstandingly remarkable values such as geology, fish, and prehistory / history are not likely to have been or be impacted by past, present, or reasonably foreseeable actions. In conjunction with the actions under this alternative, there would be negligible additional discernible impacts on outstandingly remarkable values for backcountry river segments.

In the frontcountry past construction and reconstruction of roads (Generals Highway and Kings Canyon Highway) and park facilities have contributed to moderate, adverse, short- to long-term impacts on scenic river values, but at the same time they have facilitated recreational access. The relatively small scale of roads and park facilities means they generally do not intrude on the scenery, resulting in a negligible, long-term impact on scenic values. Overall impacts on fishing, camping, and water play have been minor, beneficial, and long term. Access to the rivers is limited by steep or rocky terrain, so use is often concentrated in several areas, resulting in crowding, numerous visitor-created trails, and localized erosion. These impacts, however, have not resulted in the degradation of outstandingly remarkable values along designated or eligible river segments. Reasonably foreseeable plans include relocating more campsites or facilities outside the floodplain, and replacing or rebuilding the bridge at Cedar Grove so it is less subject to damage during floods and would have a reduced impact on free-flowing conditions in the river. These future actions would result in minor to major, beneficial, long-term impacts on recreational values because of safer and more sustainable facilities.

Impacts from visitors on recreational and scenic values along frontcountry rivers would be reduced despite increased visitation because of limited and well-defined river access and the mitigation of visitor impacts in accordance with management prescriptions. User conflicts from recreational uses such as fishing and water play,

or crowding at popular water play areas, could result in minor, adverse, short-term impacts on recreational values.

Alternative C, in conjunction with past, present, and reasonably foreseeable actions, would generally result in negligible to minor, beneficial, long-term impacts to recreational values as the result of facility improvement and controlled river access. Minor, localized, long-term adverse impacts on outstandingly remarkable values would continue to result from visitor use.

Conclusion

With controlled river access and improved facilities, designated and eligible wild and scenic river segments would be protected, and their outstandingly remarkable values preserved, resulting in minor to moderate, beneficial, long-term impacts.

In conjunction with past, present, and reasonably foreseeable actions, cumulative impacts would generally be negligible to minor, beneficial, and long term. Minor, adverse, long-term impacts on outstandingly remarkable values in localized areas would continue to result from visitor use.

There would be no impairment of wild and scenic river resources or values.

IMPACTS OF ALTERNATIVE D

Analysis

Backcountry Rivers. Alternative D would have negligible to minor, beneficial impacts on the scenic and recreational values of designated and eligible wild and scenic river segments as a result of management prescriptions. As described for the no-action alternative, most of these sections are in designated wilderness or roadless areas, and recreation is controlled by permit and park regulations. Recreational and scenic values along riverbanks would be affected by riverbank erosion caused by backcountry stock and hiker use, resulting in minor, adverse, short- and long-term impacts in localized areas. These impacts would be mitigated to some extent by requiring

permits for use, regulating seasonal access to some areas (i.e., opening them depending on soil moisture conditions), and closing some areas to stock use. These measures would complement the management prescriptions. Impacts would not degrade outstandingly remarkable values along designated or eligible segments. There would be no impacts on other outstandingly remarkable values along backcountry wild river segments. Geology would not be altered along any river segment; the rare Kern Valley rainbow trout in the North Fork of the Kern would not be affected; and wildlife, vegetation, and prehistory / history along the Middle Fork of the Kings River would not be affected.

Frontcountry Rivers. Under alternative D increasing use would be managed to protect the outstandingly remarkable values of rivers. As described for the preferred alternative, well-defined river access routes and riverbank restoration would enhance both scenic and recreational values, resulting in minor, beneficial, long-term impacts. Riverbank erosion and littering would be reduced, but areas of crowding could occur seasonally as a result of water play, camping, fishing, and nonmotorized watercraft use. Activities, such as camping in campgrounds and fishing, would continue to be regulated on river segments designated or proposed as wild or scenic, thus mitigating impacts on recreational values. While some use conflicts could occur along small stretches of rivers, these conflicts would not alter the range of recreational opportunities, and impacts on recreational values would be minor. More people along some river sections could result in minor, localized, adverse, short-term impacts on scenic values, but scenic values would continue to predominate. Relocating some facilities outside floodplains would result in safer visitor experiences, with minor to moderate, beneficial, long-term impacts on recreational values in specific areas. There would be no impacts on geology values along designated or eligible frontcountry segments.

Cumulative Impacts

As described for the no-action alternative, hiking and stock use in the past caused riverbank erosion in some backcountry areas. Also, recreational and scenic qualities were affected before these river segments were designated. Conditions have improved because of permit requirements, reduced use, resource monitoring to support adjusting regulations, and seasonal closures. Occasional crowding along portions of the wild segment of the South Fork of the Kings River, which is a popular backcountry entry point, results in localized, moderate, adverse impacts on both scenic and recreational values. Other outstandingly remarkable values such as geology, fish, and prehistory / history are not likely to have been or be impacted by past, present, or reasonably foreseeable actions due to remoteness and the absence of any development. In conjunction with the actions under this alternative, there would be negligible additional discernible impacts on outstandingly remarkable values for backcountry river segments.

In the frontcountry past construction and reconstruction of roads (Generals Highway and Kings Canyon Highway) and park facilities have contributed to moderate, adverse, short- to long-term impacts on scenic river values, while at the same time facilitating recreational access. The small scale of roads and park facilities generally means they do not intrude on the scenery, resulting in a negligible, long-term impact on scenic values. Access to the rivers is limited by steep or rocky terrain, so use is concentrated in several areas, resulting in crowding, numerous visitor-created trails, and localized erosion. Reasonably foreseeable plans include relocating more campsites or facilities outside the floodplain, and replacing or rebuilding the bridge at Cedar Grove so it would not be subject to damage during floods and would have a reduced impact

on free-flowing conditions in the river. These future actions would result in minor to major, long-term, beneficial impacts on recreational values because facilities would be safer and more sustainable.

Impacts on recreational and scenic values along frontcountry rivers would be reduced despite increased visitation because of well-defined river access and the mitigation of visitor impacts in accordance with management prescriptions. User conflicts from recreational uses such as fishing and water play, or crowding at popular water play areas, could result in minor, short-term, adverse impacts on recreational values.

Alternative D, in conjunction with past, present, and reasonably foreseeable actions, would generally result in negligible to minor, beneficial, long-term impacts to recreational values as the result of improved facilities and controlled river access. Minor, localized, long-term adverse impacts on outstandingly remarkable values would continue to result from visitor use.

Conclusion

With controlled river access and improved facilities, designated and eligible wild and scenic river segments would be more protected, ensuring the preservation of outstandingly remarkable values. This would result in minor to moderate, beneficial, long-term impacts.

In conjunction with past, present, and reasonably foreseeable actions, cumulative impacts would be minor to moderate, beneficial, and long term. Minor, adverse, long-term impacts on outstandingly remarkable values in localized areas would continue to result from visitor use.

There would be no impairment of wild and scenic river resources or values.

Backcountry / Wilderness

Backcountry is a term used by the National Park Service to refer to primitive, undeveloped, and roadless portions of parks. Backcountry includes areas designated or managed to preserve wilderness characteristics. A backcountry or wilderness stewardship plan describes in greater detail how these areas are managed.

At Sequoia and Kings Canyon, most backcountry areas (96.23%) are managed as designated wilderness or to preserve wilderness values. Designated wilderness currently covers 83.56% of the parks, approximately 723,000 acres. Less than 4% of the parks would be considered as frontcountry under any alternative.

GUIDING REGULATIONS AND POLICIES

The Wilderness Act defines wilderness as

an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired conditions; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Wilderness areas are to be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical uses. They are to be "administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide

the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness."

Potential wilderness may be designated for areas that do not qualify for immediate designation due to temporary, nonconforming, or incompatible conditions. Once the nonconforming use has been removed or eliminated, these areas may be designated as wilderness.

The NPS *Management Policies 2001* stipulate how proposed, recommended, and designated wilderness areas are to be managed. Essentially, the National Park Service will take no action that would diminish the wilderness suitability of an area possessing wilderness characteristics until Congress has decided about whether to designate wilderness (sec. 6.3.1). Until that time, management decisions pertaining to lands qualifying as wilderness will be made in expectation of eventual wilderness designation. All categories of wilderness may be zoned for visitor experiences and resource conditions consistent with their wilderness values (sec. 6.3.4.1).

METHODOLOGY FOR ANALYZING IMPACTS

Since most backcountry is designated wilderness, the impact analysis is generally based on the compatibility and consistency of management with wilderness values and with the vision under each alternative. **This section does not imply that the areas would be designated as wilderness; rather wilderness studies and congressional action would be required before such designation could take place.** This section compares alternatives to show the areas, acreages, and percentages of the parks under each alternative that could be (1) compatible with designation as wilderness, consistent with the vision for each alternative, and (2) areas of potential wilderness that could be designated as wilderness.

TABLE 39: SUMMARY OF AREAS COMPATIBLE AS DESIGNATED WILDERNESS UNDER EACH ALTERNATIVE

	No-Action Alternative	Preferred Alternative	Alternative A	Alternative C	Alternative D
Existing Designated Wilderness (in acres)	723,036	723,036	723,036	723,036	723,036
Additional Areas Compatible with Management as Wilderness (in acres)					
• Hockett Plateau (56,315 acres)	56,315*	56,283 (exclude high Sierra camp — 32 acres)	56,315	56,315	0
• Redwood Canyon / North Fork of the Kaweah (35,321 acres)	35,321*	35,321	35,321	35,321	35,250 (exclude Colony Mill Road — 71 ac)
• Chimney Rock / Jennie Lakes addition (1,756 acres)	1,756*	1,756	1,756	1,756	0
• Mineral King Areas (15,600 acres added in 1978; 15,107 acres managed as backcountry)	15,000*	15,107	15,107	15,000	15,000
• Pear Lake (5 acres)	5 (becomes wilderness as facilities removed)	5 (same as no-action alternative)	5 (same as no-action alternative)	5 (same as no-action alternative)	5 (same as no-action alternative)
• Bearpaw Meadow (32 acres)	32 (becomes wilderness as facilities removed)	0 (retain Bearpaw Meadow Camp)	32 (same as no-action alternative)	0 (retain Bearpaw Meadow Camp)	0 (retain Bearpaw Meadow Camp)
• Utility Corridors (34 acres)	34 (becomes wilderness as facilities removed)	34 (same as no-action alternative)	34 (same as no-action alternative)	34 (same as no-action alternative)	34 (same as no-action alternative)
• Oriole Lake (12 acres of private land)	12 (if acquired, designate as wilderness once facilities removed)	12 (same as no-action alternative)	12 (same as no-action alternative)	– (no acquisition)	– (provide public road access)
Subtotal — Additional Areas Compatible with Management as Wilderness	108,475*	108,518	108,582	108,431	50,289
Total	831,511	831,554	831,618	831,467	773,325
Percentages					
Existing Designated Wilderness	83.56%	83.56%	83.56%	83.56%	83.56%
Additional Areas Compatible with Management as Wilderness	12.54%	12.54%	12.55%	12.53%	5.81%
Total	96.10%	96.10%	96.11%	96.09%	89.37%

NOTE: Total park acreage = 865,260.

* Under the no-action alternative this area would be managed to preserve its wilderness characteristics.

Impacts are evaluated in terms of whether they would be beneficial or adverse to wilderness values and wilderness recreational opportunities. Beneficial impacts would result from actions that would increase wilderness values, recreational opportunities, and compatibility with wilderness designation. Adverse impacts would reduce those same values, opportunities, or the

amount of area compatible with wilderness designation.

REGIONAL CONTEXT

Designated wilderness areas immediately adjacent to the parks include Golden Trout to the south; John Muir to the east, north, and west;

Impact Thresholds for Backcountry / Wilderness Impacts

Negligible — Impacts would not be detectable to most visitors and would have no discernible effect on wilderness values or recreational opportunities.

Minor — Impacts would be slightly detectable to some visitors but would not be expected to have an overall effect on wilderness values or recreational opportunities.

Moderate — Impacts would be clearly detectable by many visitors and could have an appreciable effect on wilderness values or recreational opportunities.

Major — Impacts would have a substantial and noticeable effect for most visitors on wilderness values or recreational opportunities and could permanently alter various aspects of the visitor experience.

Criteria for Determining Impairment

An impact would more likely constitute an impairment to the extent it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the general management plan or other relevant NPS planning documents.

Monarch to the west; and Jennie Lakes between Grant Grove and Sequoia National Park. With the Sequoia-Kings Canyon Wilderness at its core, these contiguous wildernesses form the largest area of designated wilderness in California and the second largest in the lower 48 states. The value of this wilderness lies in its preservation of natural conditions, without permanent improvements or human habitation.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Analysis

Under the no-action alternative 83.56% of the parks would continue to be managed as wilderness and 12.54% (108,475 acres) would continue to be managed to preserve wilderness characteristics. The majority of the parks would be free of the imprint of man, and the wilderness values of solitude and providing for primitive, unconfined recreation would be protected (see Table 39).

If and when facilities were removed at Bearpaw Meadow and two utility corridors, these potential wilderness areas (66 acres) would become designated wilderness, a negligible, beneficial, long-term impact since this would constitute a 0.01% increase in designated wilderness. If remaining private property adjacent to Oriole Lake was acquired by the National Park Service from willing sellers and facilities removed (12 acres), the area would become wilderness. Removing facilities and road access would result in negligible, beneficial, long-term impacts on primitive recreation because this small area is used by few people.

As required by Congress, the Mineral King area would be studied through a public process to make a recommendation to Congress about possible future wilderness designation. However, the no-action alternative does not seek to maximize land compatible with management as wilderness in the Mineral King area.

Bearpaw Meadow currently contains a high Sierra camp, which is a small, very popular, concessioner run tent-camp that provides a different type of backcountry experience for visitors. The facility offers visitors more comfort and the choice to be less self-sufficient by providing beds, food service, restrooms, and showers.

Often, designated NPS wilderness areas are not delineated by signs, so some members of the public might not know where wilderness is or the extent of it. Opportunities to experience primeval areas and solitude by participating in

primitive or unconfined recreation would remain similar to today, a negligible, beneficial, long-term impact.

Cumulative Impacts

Cumulative impacts are based on an analysis of past, present, or reasonably foreseeable actions in the southern Sierra Nevada that would affect wilderness designation or values. As described under the “Regional Context,” adjacent designated wilderness areas contribute to the extensive nature of the Sequoia-Kings Canyon Wilderness. This second largest area of contiguous designated wilderness in the lower 48 states would continue to be managed as wilderness.

Since many park areas are managed to protect wilderness values under the no-action alternative, even though they are not designated wilderness, the intrinsic value of this contiguous wilderness area would not be affected, and wilderness values and experiences would be protected, a major, beneficial, long-term impact. Park managers would continue to work with adjacent agencies and managers to protect the values of contiguous wilderness through compatible regulation and management.

Conclusion

The no-action alternative would continue current management of designated wilderness and non-wilderness backcountry areas, with negligible, beneficial, long-term impacts. Nonwilderness backcountry areas would continue to be managed to preserve wilderness characteristics. Some visitors might be unaware of the wilderness designation.

On a cumulative basis the core of the second largest designated wilderness area in the lower 48 states would be protected, a major, beneficial, long-term impact.

Wilderness characteristics and values would not be impaired.

IMPACTS OF THE PREFERRED ALTERNATIVE

Analysis

Under the preferred alternative 83.56% of the parks would continue to be managed as designated wilderness (723,036 acres) and 12.54% (108,510 acres) would be compatible with management as wilderness, for a total of 831,554 acres (96.10% of the parks) that would be managed consistent with backcountry / wilderness prescriptions. Compared to the no-action alternative, areas compatible with management as wilderness would increase by about 43 acres.

Most areas suitable for wilderness would be managed to protect wilderness characteristics, including Redwood Canyon, Chimney Rock (Jennie Lakes addition), and the North Fork of the Kaweah. All of these areas include giant sequoia groves. Hockett Plateau would also be compatible for management as wilderness, with an exclusion of 40 acres (0.005% of the parks) to accommodate study for use as an additional high Sierra camp, resulting in negligible, adverse, long-term impacts on wilderness values since the area is so small and would remain roadless. Wilderness designation of Redwood Canyon would increase protection for park caves. Continuing to manage over 96% of the parks as wilderness would be consistent with the alternative vision for park resources.

The preferred alternative would retain the high Sierra camp at Bearpaw Meadow in Sequoia National Park, so 32 acres would continue to be excluded from wilderness.

If remaining private property adjacent to Oriole Lake was acquired by the National Park Service from willing sellers and facilities removed (12 acres), the area would become wilderness. Removing facilities and road access would result in negligible, beneficial, long-term impacts on primitive recreation because this small area is used by few people.

As described for the no-action alternative, the Mineral King area would be studied through a public process to make a recommendation to

Congress about possible future wilderness designation.

Under the preferred alternative visitor education would focus on resource protection, stewardship, and leave-no-trace backcountry skills, potentially making more visitors aware of wilderness designation and wilderness values. These wilderness recreational opportunities and values are highly valued by park visitors. Opportunities for recreation in protected wilderness, along with opportunities to experience primeval areas and solitude by participating in primitive or unconfined recreation, would expand, resulting in minor, beneficial, long-term impacts because many more visitors would be aware of wilderness characteristics, values, and recreational opportunities.

Cumulative Impacts

As described for the no-action alternative, cumulative impacts are based on an analysis of past, present, or reasonably foreseeable actions in the southern Sierra Nevada that could affect wilderness designation or values. Park managers would continue to work with adjacent agencies and managers to protect the values of contiguous wilderness through compatible regulation and management. Increased knowledge and understanding of wilderness characteristics and values would be a moderate, beneficial impact. In conjunction with designated wilderness in the region, the preferred alternative would result in major, beneficial, long-term impacts since it would help ensure that the values of this contiguous wilderness area and opportunities for wilderness recreation would be protected.

Conclusion

A very small additional amount of park land would be compatible and consistent with management as wilderness under the preferred alternative, which would protect ecosystem diversity, preserve park character, and accommodate sustainable growth. Primarily as a result of improving education about wilderness values, the preferred alternative would have negligible to minor, beneficial, long-term impacts on wilder-

ness values and recreational opportunities. At the same time, potentially expanding the popular backcountry high Sierra tent-hotel concept would result in a negligible, adverse, long-term impact.

The core of the second largest designated wilderness area in the lower 48 states would be protected, a major, beneficial, long-term impact.

Wilderness values would not be impaired.

IMPACTS OF ALTERNATIVE A

Analysis

Under alternative A 83.56% of the parks would continue to be managed as designated wilderness (723,036 acres) and 12.55% (108,582 acres) would be compatible with management as wilderness, for a total of 831,618 acres (96.11% of the parks) that would be managed consistent with backcountry / wilderness prescriptions. Compared to the no-action alternative, a small amount of additional land (107 acres) would be compatible for management as wilderness. Reduced park visitation under this alternative would be attuned with wilderness goals.

Redwood Canyon, Chimney Rock (the Jennie Lakes addition), the North Fork of the Kaweah, and Hockett Plateau would be compatible with designation as wilderness. All of these areas include giant sequoia groves. Designation of Redwood Canyon would increase protection for park caves. Managing these areas as wilderness would be compatible and consistent with the alternative vision to emphasize natural systems and biodiversity.

If and when facilities were removed at Bearpaw Meadow, this areas would be designated as wilderness. If remaining private property adjacent to Oriole Lake was acquired by the National Park Service from willing sellers and facilities removed (12 acres), the area would become wilderness. Removing facilities and road access would result in negligible, beneficial, long-term impacts on primitive recreation because these areas are used by few people.

As described for the no-action alternative, the Mineral King area would be studied through a public process to make a recommendation to Congress about possible future wilderness designation.

Visitor education focused on resource protection, stewardship, and leave-no-trace practices would likely better inform park visitors about wilderness and wilderness values. Wilderness recreational opportunities and values are highly valued by park visitors. Opportunities to experience primeval areas and solitude by participating in primitive or unconfined recreation could expand slightly, resulting in minor, beneficial, long-term impacts for park visitors.

Cumulative Impacts

As described for the no-action alternative, cumulative impacts are based on an analysis of past, present, or reasonably foreseeable actions in the southern Sierra Nevada that could affect wilderness designation or values. In conjunction with designated wilderness in the region, the actions of alternative A would result in no perceivable change. However, the values of this contiguous wilderness area and opportunities for wilderness recreation would be protected through compatible regulation and management by continuing to work with adjacent agencies and managers, a major, beneficial, long-term impact.

Conclusion

Reducing use and development could create a park environment slightly more attuned to wilderness values. Similar to the no-action alternative, over 96% of the parks would be designated wilderness or would be compatible with management as wilderness. Minor, beneficial, long-term impacts on wilderness values and recreation would result from reduced park visitation, management of slightly over 100 additional acres as compatible with wilderness, and increased education.

The core of the second largest designated wilderness area in the lower 48 states would be protected, a major, beneficial, long-term impact.

Wilderness values would not be impaired.

IMPACTS OF ALTERNATIVE C

Analysis

Under alternative C 83.56% of the parks would continue to be managed as designated wilderness (723,036 acres) and 12.53% (108,431 acres) would be compatible with management as wilderness, for a total of 831,467 acres (96.09% of the parks) that would be managed consistent with backcountry / wilderness prescriptions. Compared to the no-action alternative, areas compatible with management as wilderness could decrease by around 44 acres since the Bearpaw Meadow high Sierra camp and private property at Oriole Lake would remain, resulting in a negligible, adverse, long-term impact on wilderness values since the areas are small.

Redwood Canyon, Chimney Rock (Jennie Lakes addition), the majority of the North Fork of the Kaweah, and Hockett Plateau would be compatible with designation as wilderness. All of these areas include giant sequoia groves. Designation of Redwood Canyon would increase protection for park caves. Managing these areas as wilderness would be consistent with the alternative vision. Bearpaw Meadow would be retained as a representative of traditional backcountry use patterns, resulting in negligible impacts on wilderness values due to the small size of its facilities. Traditional ranger programs would be the primary means by which to reach park visitors with messages about wilderness values; however, since programs often take place in frontcountry campgrounds, they might not reach or inspire many backcountry users, resulting in negligible, adverse, long-term impacts on wilderness values and recreational opportunities.

Continuing private property at Oriole Lake and providing public access would result in negligible, adverse, long-term impacts on primitive recreation because this small area is used by few people.

As described for the no-action alternative, the Mineral King area would be studied through a

public process to make a recommendation to Congress about possible future wilderness designation.

Opportunities for recreation in protected wilderness and opportunities to experience primeval areas and solitude by participating in primitive or unconfined recreation would remain similar to the no-action alternative, resulting in a negligible, beneficial, long-term impact.

Cumulative Impacts

As described for the no-action alternative, cumulative impacts are based on an analysis of past, present, or reasonably foreseeable actions in the southern Sierra Nevada that could affect wilderness designation or values. In conjunction with designated wilderness in the region, the actions of alternative C would result in major, beneficial, long-term impacts and would help ensure that the values of this contiguous wilderness area and opportunities for wilderness recreation would be protected through compatible regulation and management by continuing to work with adjacent agencies and managers.

Conclusion

Like the other alternatives, over 96% of the parks would be managed as designated wilderness or would be compatible with management as wilderness. Negligible, adverse, long-term impacts on wilderness characteristics would result from reducing the amount of compatible area by 32 acres. Traditional ranger programs are not likely to reach or inspire many backcountry users, resulting in negligible, adverse, long-term impacts on wilderness values and recreational opportunities.

The core of the second largest designated wilderness area in the lower 48 states would be protected, a major, beneficial, long-term impact.

Wilderness values would not be impaired.

IMPACTS OF ALTERNATIVE D

Analysis

Under alternative D 83.56% of the parks would continue to be managed as designated wilderness (723,036 acres) and 5.81% (50,289 acres) would be compatible with management as wilderness, for a total of 773,325 acres (89.37% of the parks) that would be managed consistent with backcountry / wilderness prescriptions. Compared to the no-action alternative, areas compatible with wilderness management would be reduced by 58,186 acres, or 6.7% of the parks, a minor, adverse, long-term impact on wilderness values and recreational opportunities. The more social and backcountry focus of alternative D would allow larger group sizes but would concentrate use along major trails, resulting in minor, adverse, long-term impacts on solitude and unconfined recreation. Additional designated campsites would be likely along major trails, resulting in a minor, adverse, long-term impact on primitive recreation free from evidence of humans.

Wilderness designation would not be sought for Hockett Plateau or the Chimney Rock area of the Jennie Lakes addition so that additional primitive backcountry facilities could be provided. However, these areas would remain roadless, so the impact on wilderness values and recreational opportunities would be minor, adverse, and long term.

Under this alternative Hockett Plateau (56,315 acres) would generally continue to be managed compatibly with wilderness characteristics, but a change in management would be required to allow the establishment of an additional high Sierra camp in this area because this area is managed consistent with wilderness policies. Redwood Canyon and the majority of the North Fork of the Kaweah (except for 71 acres associated with the Colony Mill Road trail corridor, for which a change in management would be required to allow for bicycle use) would be compatible with designation as wilderness. The Chimney Rock area (Jennie Lakes addition) would be managed compatibly with wilderness, but designated primitive backcountry campsites

would be provided. These areas include giant sequoia groves. Designation of Redwood Canyon would increase protection for park caves. Managing these areas as wilderness would be consistent with the alternative vision to instill park conservation values.

If remaining private property adjacent to Oriole Lake was acquired from willing sellers, road access would be provided, along with a primitive picnic area and trail access. If wilderness values were affected, impacts would be negligible, adverse, and long term; however, this small area is used by few people.

As described for the no-action alternative, the Mineral King area would be studied through a public process to determine its wilderness suitability and to make a recommendation to Congress about possible future wilderness designation.

Educational programs for visitors would be emphasized under this alternative, and more people would likely learn about the values of wilderness resources. It is also more likely that designated wilderness areas would be delineated, making it more obvious to visitors when they entered wilderness. Park visitors highly value wilderness recreational opportunities and education. Alternative D would support a diverse educational thrust that would seek to make more visitors comfortable with their backcountry skills, resulting in minor to moderate, beneficial, long-term impacts on visitor understanding of wilderness values.

Cumulative Impacts

As described for the no-action alternative, cumulative impacts are based on an analysis of past,

present, or reasonably foreseeable actions in the southern Sierra Nevada that could affect wilderness designation or values. Additional facilities under alternative D would have a negligible to minor adverse effect on the values of this contiguous wilderness area. At the same time backcountry and wilderness education would increase, a minor, beneficial, impact for some visitors. In conjunction with designated wilderness in the region, alternative D would result in a major, beneficial, long-term impact because the core of the second largest wilderness area in the lower 48 states would be protected through compatible regulation and management by continuing to work with adjacent agencies and managers, similar to the other alternatives.

Conclusion

Under alternative D 89.37% of the parks would be managed as designated wilderness or as compatible with wilderness. A slight decrease in areas compatible with wilderness would be consistent with guided growth and adaptation to changing users under this alternative, while retaining the basic park character. Increased visitor education on resource protection and stewardship, as well as teaching backcountry skills, could make visitors more aware of wilderness designation and values. However, as a result of more concentrated use by larger groups, the impact of this alternative on wilderness values would be negligible to moderate, adverse, and long term.

The core of the second largest designated wilderness area in the lower 48 states would be protected, a major, beneficial, long-term impact.

Wilderness values would not be impaired.

Cultural Resources

GUIDING REGULATIONS AND POLICIES

Numerous acts, regulations, and NPS policies provide direction for the protection, preservation, and management of cultural resources on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan regardless of the final alternative chosen.

- *The NPS Organic Act* — The National Park Service is mandated to conserve historic objects within national park system areas and to provide for their enjoyment.
- *The National Historic Preservation Act of 1966 and “Regulations of the Advisory Council on Historic Preservation” (36 CFR Part 800)* — Section 106 of the National Historic Preservation Act requires that federal agencies take into account the effect of their undertakings on properties that are listed on, or eligible for listing on, the National Register of Historic Places, and it provides the Advisory Council on Historic Preservation a reasonable opportunity to comment. Section 110 of the act further requires federal land managers to establish programs in consultation with state historic preservation offices for the identification, evaluation, nomination, and protection of properties listed on or eligible for the national register. The National Park Service takes into account the effects of site planning and operations on historic properties under the provisions of the 1995 Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the Conference of State Historic Preservation Officers.
- *Archeological Resources Protection Act of 1979* — The Archeological Resources Protection Act requires the protection and preservation of archeological resources on public lands; establishes confidentiality provisions for sensitive site location information where the release of such information may endanger resources.
- *American Indian Religious Freedom Act* — The American Indian Religious Freedom Act protects and preserves for American Indians access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites
- *The Native American Graves Protection and Repatriation Act of 1990* — The Native American Graves Protection and Repatriation Act establishes procedures for determining the final disposition of any human remains, funerary objects, or objects of cultural patrimony that are discovered on public lands or during the course of a federal undertaking.
- *Executive Order 13007* — This executive order establishes responsibility (1) to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) to avoid adversely affecting the physical integrity of such sacred sites.
- *The 1995 Secretary of the Interior’s Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings (36 CFR 68)* (“Secretary’s Standards”) — This guideline sets forth standards to be used when planning, undertaking, and supervising projects involving the preservation, rehabilitation, restoration, and/or reconstruction of historic properties listed on or eligible for listing on the National Register of Historic Places.
- *“Curation of Federally Owned and Administered Archeological Collections” (36 CFR 79)* — This regulation stipulates guidelines and procedures for the proper curation and management of archeological

collections owned or administered by federal agencies.

- Applicable agency policies relevant to cultural resources include chapter 5 of the NPS *Management Policies 2001*, *Director's Order #28: Cultural Resource Management*, *NPS-28: Cultural Resource Management Guideline*, and *Director's Order #24: Museum Collections Management*.

METHODOLOGY FOR ANALYZING IMPACTS

Potential impacts (direct, indirect, and cumulative effects) are described in terms of type (are the effects beneficial or adverse?), duration (are the effects short-term — lasting up to 5 years, long-term — lasting 5–20 years, or permanent?), and intensity (is the degree or severity of effects negligible, minor, moderate, or major?). Because definitions of intensity (negligible, minor, moderate, or major) vary by cultural resource, intensity definitions are provided separately for each cultural resource analyzed.

Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act

Describing impacts to cultural resources in terms of type, duration, and intensity is consistent with the regulations of the Council on Environmental Quality that implement the National Environmental Policy Act. The following impact analyses are intended, however, to reflect the requirements of both the National Environmental Policy Act and section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing section 106 (36 CFR Part 800, "Protection of Historic Properties"), impacts to cultural resources were also identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed on or eligible to be listed on the National Register of Historic Places; (3) applying the criteria of adverse effect to affected, national register eligible or listed cultural re-

sources; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the advisory council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected resources listed on or eligible for the national register.

- An *adverse effect* occurs whenever an action would alter, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion on the national register, e.g., diminishing the integrity of its location (or the extent to which a resource retains its historic appearance), design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, "Assessment of Adverse Effects").
- A determination of *no adverse effect* means there is an effect, but the effect would not alter the characteristics of the cultural resource that qualify it for inclusion on the national register.

Mitigation Measures and Section 106

CEQ regulations and the NPS *Director's Order #12* also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation only under the National Environmental Policy Act. It does not suggest that the level of effect as defined by section 106 is similarly reduced. Cultural resources are non-renewable resources, and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under section 106 may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis sections. This is **an assessment of the effect of the undertaking (implementation of the alternative) only on cultural resources listed on or eligible for the National Register of Historic Places**, based on the criteria of effect and adverse effect found in the advisory council's regulations.

IMPACTS COMMON TO ALL ALTERNATIVES

As previously discussed, Public Law 108-447 (passed in 2004) authorized the secretary of the interior to permit the continuation of the Kaweah no. 3 hydroelectric facilities and special use permit cabins in the Mineral King area. The following discussion therefore applies to all alternatives.

Kaweah No. 3 Hydroelectric Facilities. Preserving facilities associated with the Kaweah no. 3 hydroelectric generation system will continue the historical use of this property, which is eligible for listing on the National Register of Historic Places. Two of three contributing structures are within the park — the Marble Fork conduit and the Marble Fork siphon. The facilities may also be interpreted, thus increasing the public's awareness of their historical significance. Impacts would be minor, beneficial, and long term.

Mineral King Permit Cabins — Cabin Cove, West Mineral King, East Mineral King. The National Park Service will manage special use permits in accordance with the provisions of Public Law 108-447, *NPS Management Policies 2001*, and *Director's Order #53* (see appendix G). Two-thirds of the approximately 60 permit cabins are contributing elements of the Mineral King Road Cultural Landscape District. A cultural resource preservation plan would be prepared for the cultural landscape district in consultation with the state historic preservation officer and the Mineral King Preservation Society. The plan would identify a viable management / maintenance strategy, including an appropriate treatment method according to the "Secretary's Standards"; measures for resource protection (e.g., addressing cabins in wetland locations or

within floodplains, or actions to make non-contributing cabins more compatible with the historical appearance of the landscape district); and a decision process for determining whether to repair, replace, or remove cabins in the event they are damaged by natural disaster (such as a tree fall, flood, or avalanche). Resulting impacts would be minor to moderate, long term, and beneficial because the cultural landscape district, as well as contributing historic resources, would be preserved.

HISTORIC STRUCTURES, DISTRICTS, AND CULTURAL LANDSCAPES

Impacts of the No-Action Alternative

Analysis

Under this alternative all potentially historic structures, districts, and landscapes would be inventoried and evaluated under National Register of Historic Places criteria to determine their eligibility for listing on the register, and the listing process would be completed for those resources that were determined eligible. Historic structures, districts, and landscapes would be preserved, rehabilitated, and adaptively used in accordance with the "Secretary's Standards." Where adverse effects such as removal or neglect were unavoidable, mitigation measures would be determined through consultation with the California state historic preservation officer.

Historic structures could suffer wear and tear from increased visitation, but the carrying capacity of historic structures would be monitored and visitation levels or constraints could be imposed that would contribute to the stability or integrity of the resources without unduly hindering interpretation for visitors. Unstaffed or minimally staffed structures could be more susceptible to vandalism. Any adverse impacts would range in intensity from negligible to minor and be long term or permanent. Careful design would ensure that the rehabilitation of parking areas and the expansion or development of trails would minimally affect the scale and visual relationships among landscape features. In addition, the topography, vegetation, circulation features, and land use patterns of any historic district or cul-

Impact Thresholds for Historic Structures, Districts, and Cultural Landscapes

Negligible — The impact would be at the lowest levels of detection, with neither adverse nor beneficial consequences. The determination of effect under section 106 of the National Historic Preservation Act would be *no adverse effect*.

Minor — Adverse impact: The alteration of a feature or features would not diminish the integrity of the resource. The determination of effect under section 106 would be no adverse effect.

Beneficial impact: Features would be stabilized or preserved in accordance with the *Secretary's Standards*. The determination of effect under section 106 would be *no adverse effect*.

Moderate — Adverse impact: The alteration of a feature or features would diminish the integrity of the resource. The determination of effect under section 106 would be *adverse effect*. A memorandum of agreement would be executed among the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation, in accordance with 36 CFR 800.6(b). Measures identified in the agreement to minimize or mitigate adverse impacts would reduce the intensity of impact under the National Environmental Policy Act from major to moderate.

Beneficial impact: A structure or landscape would be rehabilitated in accordance with the "Secretary's Standards." The determination of effect under section 106 would be *no adverse effect*.

Major — Adverse impact: The alteration of a feature or features would diminish the integrity of the resource. The determination of effect under section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts could not be agreed upon, and the National Park Service and applicable state or tribal historic preservation officer and/or the Advisory Council on Historic Preservation would be unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Beneficial impact: A structure or landscape would be restored in accordance with the "Secretary's Standards." The determination of effect under section 106 would be *no adverse effect*.

Criteria for Determining Impairment

An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

tural landscape would remain largely unaltered. Any adverse impacts would range in intensity from negligible to minor and would be long term or permanent.

Generals Highway. Continuing to rebuild the Generals Highway pursuant to an existing memorandum of agreement among the National Park Service, the state historic preservation officer, and the Advisory Council on Historic Preservation would sustain existing traffic volume and preserve the historical character of

the road and its corridor. Historic resources that contribute to the significance of the Generals Highway would be preserved, including the Ash Mountain entrance sign, the Hospital Rock automobile watering station and stone water fountain, Tunnel Rock, the Clover Creek and Marble Fork bridges, as well as CCC rock work along the roadway. Operations associated with rebuilding the road would have negligible to minor, adverse visual impacts during construction. Even though rebuilding the road would have some minor, permanent, adverse impacts

because some historic fabric would be lost, rebuilding the road would result in overall minor to moderate, beneficial, and long-term impacts for the preservation and safe use of this historically significant highway.

Backcountry. Historic structures, districts, and landscapes in the backcountry, such as historic ranger cabins, the Smithsonian Institution shelter (the Mount Whitney shelter), the Pear Lake ski hut, and the Shorty Lovelace Historic District cabins, would be preserved. The result would be minor, beneficial, long-term impacts on these resources.

The surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places are a prerequisite for understanding the resource's significance, as well as the basis of informed decision-making in the future regarding how the resource should be managed. Such surveys and research would result in negligible to minor, beneficial, long-term impacts.

Kings Canyon National Park. *Cedar Grove and the Floor of the Kings Canyon* — Preserving Knapp's cabin would result in minor, beneficial, long-term impacts. The surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places are a prerequisite for understanding the resource's significance, as well as the basis of informed decision-making in the future regarding how the resource should be managed. Such surveys and research would result in negligible to minor, beneficial, long-term impacts.

Grant Grove — Completing the national register process for General Grant National Park Historic District would help ensure that historic structures that contribute to the significance of the historic district would be preserved and adaptively used for essential services, such as lodging, housing, and park operations. Impacts on historic resources that were preserved would be minor to moderate, beneficial, and long term. Preserving the Redwood Mountain residence and historic structures in the vicinity of the

General Grant Tree, such as the Gamlin cabin, would result in minor, beneficial, long-term impacts to these historic resources. Retaining NPS-owned historic structures in the Wilsonia Historic District could result in minor, beneficial, long-term impacts on the district's resources if they were stabilized or preserved. Privately owned structures in the Wilsonia Historic District would remain, resulting in minor, beneficial, long-term impacts since the district would retain its historical integrity.

Big Stump Basin — Big Stump Basin would be assessed to determine its eligibility for listing on the National Register of Historic Places as a cultural landscape. Managing the basin to illustrate a recovering giant sequoia grove would result in the area gradually becoming overgrown with vegetation, reducing the visual impact of logging. The impact on the cultural landscape would be moderate to major, adverse, and permanent because cultural landscape features would inevitably be overgrown.

Sequoia National Park. *Lodgepole-Wuksachi (including Dorst campground, Wuksachi village, Lodgepole village, and Wolverton vicinities)* — Evaluating historic structures at Lodgepole and Wolverton to determine their eligibility for listing on the National Register of Historic Places, and preserving and adaptively reusing them if they were eligible, would have moderate, beneficial, long-term impacts. Preserving historic structures at Wolverton, the Cabin Creek ranger residence and dormitory, and the Lost Grove comfort station would have minor, beneficial, long-term impacts.

Giant Forest — Continuing to adaptively use the market as a museum; rehabilitating and interpreting the ranger's residence and comfort station; and preserving and interpreting the Cattle cabin, Squatter's cabin, and Tharp's Log would continue to result in minor to moderate, beneficial, long-term impacts on historic structures in Giant Forest.

Ash Mountain / Foothills — Preserving historic residences in the upper Ash Mountain housing area and the landscape of the potential Ash

Mountain historic district would have minor, beneficial, long-term impacts. Preservation and continued use of the CCC recreation hall at Ash Mountain for that purpose would have minor, beneficial, long-term impacts. Inventorying and evaluating Mission '66 structures and preserving any that were determined eligible for listing on the National Register of Historic Places would have minor, beneficial, long-term impacts.

Retaining trailer sites at the potential Sycamore CCC camp historic district would have a minor, adverse impact on the integrity of the historic district. If determined eligible for listing on the national register, structures in the potential historic district (including the recreation hall) would be preserved, thus having minor, beneficial, long-term impacts on these resources.

Preserving the historic Colony Mill Road as a historic right-of-way would have minor, beneficial, long-term impacts.

Mineral King — Preserving contributing resources of the Mineral King Road Cultural Landscape District, including the historical character of the road corridor, NPS historic facilities, the Atwell Mill ranger station and garage, the Atwell Mill site, and the Lookout Point residence and garage, would generally have minor, beneficial, long-term impacts.

The historic character (alignment and width) of the Mineral King Road corridor would be preserved. This would result in minor, beneficial, long-term impacts to the roadway and the appurtenances associated with its immediate right-of-way.

The recreational community of Silver City (an inholding within the park) is historically similar to the Cabin Cove, West Mineral King, and East Mineral King permit cabin areas. The community consists of privately owned properties and has not been evaluated for national register eligibility. Evaluating these properties would have minor, beneficial, long-term impacts. While privately owned property can be evaluated for the national register, properties cannot be listed without the owner's permission.

Because the National Park Service would allow mining remnants at Mineral King to continue to molder, these resources would be ultimately lost, resulting in moderate to major, adverse, permanent impacts.

Dillonwood — Facilities at Dillonwood would be assessed to determine if they are eligible for listing on the National Register of Historic Places. The preservation of any historic properties would result in minor, beneficial, long-term impacts.

Cumulative Impacts

Over the years historic structures, districts, and cultural landscapes have been adversely impacted by the wear and tear associated with visitor access, natural processes such as weathering and erosion, development, and the restoration of natural conditions in sequoia groves. Past construction projects such as the Generals Highway improvements, hydroelectric production, and the development associated with Grant Grove, Cedar Grove, Lodgepole, and Mineral King resulted in the loss of historic structures and the loss or alteration of landscape elements (structures, vegetation, circulation features, spatial organization, or land use patterns). In addition, to protect and preserve the internationally significant sequoia groves (the primary reason that the parks were established), locally significant structures, districts, and landscapes in Sequoia and Kings Canyon National Parks were removed and/or altered. During 1998–99 most structures in the Giant Forest area (some of which dated back to the 1920s) were removed pursuant to a memorandum of agreement among the National Park Service, the California state historic preservation officer, and the Advisory Council on Historic Preservation. Only the ranger's residence, the comfort station, the market, and the Beetle Rock assembly hall were preserved. Adverse impacts associated with visitor access and natural processes were generally long term and negligible to minor in intensity, but the adverse impacts associated with the removal of historic structures and loss or alteration of landscape elements were long term or permanent and of moderate to major intensity.

Concurrent or reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65 by Caltrans, have the potential to disturb historic structures, districts, and cultural landscapes outside the parks' boundaries. Unavoidable adverse impacts to resources eligible for the national register could range in intensity from minor to major, depending on the resource affected.

Implementation of the no-action alternative would contribute minor to moderate, beneficial, long-term impacts, as well as moderate to major, adverse, long-term or permanent impacts, to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The overall cumulative impact associated with the no-action alternative, however, would be adverse.

Conclusion

The no-action alternative would result in minor to moderate, beneficial, long-term impacts on historic structures, districts, and landscapes that would be preserved and adaptively used by the National Park Service for interpretive purposes or park operations.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

In accordance with the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) that address the criteria of effect and adverse effect, the following actions under this alternative would have no adverse effects within the national parks:

- inventorying and evaluating all potentially eligible cultural resources in Sequoia and Kings Canyon National Parks to determine their eligibility for listing on the National Register of Historic Places, and submitting

nomination forms to the keeper of the national register for listing

- rebuilding the Generals Highway and its appurtenant structures, preserving historic structures in the vicinity of Giant Forest, or preserving historic properties in the backcountry (including historic ranger cabins, the Mount Whitney shelter, and the Pear Lake ski hut)
- preserving and adaptively using Knapp's cabin, structures in the General Grant National Park Historic District, the Redwood Mountain residence, and NPS historic structures in the Wilsonia Historic District
- preserving the Lost Creek comfort station; preserving and adaptively using the Cabin Creek ranger residence and dormitory; stabilizing or preserving identified historic structures and landscapes in the potential Lodgepole, Wolverton, Ash Mountain, and Sycamore CCC camp historic districts; and preserving the Colony Mill Road as a historic right-of-way
- preserving the Atwell Mill ranger station and garage, the Atwell Mill site, the Lookout Point residence, and resources contributing to the Mineral King Road Cultural Landscape District; and maintaining / preserving the historic character of the Mineral King Road corridor (alignment and width)

This alternative would result in adverse effects to historic structures, districts, and landscapes in the national parks from the following actions:

- managing the Big Stump Basin (if determined eligible as a historic landscape) as a recovering giant sequoia grove, resulting in the area gradually returning to natural conditions
- allowing mining remnants at Mineral King to continue to molder

Impacts of the Preferred Alternative

Analysis

Under this alternative, as described for the no-action alternative, all potentially historic struc-

tures, districts, and landscapes would be inventoried and evaluated under National Register of Historic Places criteria to determine their eligibility for listing on the register, and the listing process would be completed for those resources determined to be eligible. Historic structures, districts, and landscapes would be preserved, restored, rehabilitated, and adaptively used in accordance with the “Secretary’s Standards.” Where adverse effects such as removal or neglect were unavoidable, mitigation measures would be determined through consultation with the California state historic preservation officer.

Numerous diverse historic facilities would be preserved and adaptively reused, resulting in minor to moderate, beneficial impacts to cultural resources over the long term.

The undergrounding of utilities would have minimal, if any, effects on topography, spatial organization, or land use patterns of historic districts or cultural landscapes. If the aboveground utilities were contributing elements to a historic district or cultural landscape, placing them underground would be a minor, adverse, long-term impact. Once the underground utility line was installed and the trench backfilled, the disturbed ground would be restored to its pre-construction contour and condition. Any adverse impacts associated with construction during the installation of underground utilities would be negligible and short term.

Historic structures could suffer wear and tear from increased visitation, but the carrying capacity of historic structures would be monitored, and visitation levels or constraints could be imposed that would contribute to the stability or integrity of the resources without unduly hindering interpretation for visitors. Unstaffed or minimally staffed structures could be more susceptible to vandalism. Any adverse impacts would be negligible to minor in intensity and long term or permanent in duration.

Generals Highway. Like the no-action alternative, the Generals Highway would continue to be rebuilt. Operations associated with rebuilding the road would have negligible to minor, adverse

visual impacts during construction. Even though rebuilding the road would have some minor, permanent, adverse impacts because some historic fabric would be lost, rebuilding the road would result in overall minor to moderate, beneficial, and long-term impacts for the preservation and safe use of this historically significant highway. Although actions under this alternative could result in changing use and visitor experience of Generals Highway, historic structures and landscapes associated with the highway would not change.

Backcountry. The following impacts would be similar to the no-action alternative:

- preserving historic structures, districts and landscapes in the backcountry (such as historic ranger cabins, the Mount Whitney shelter, the Pear Lake ski hut, and the Shorty Lovelace Historic District cabins) — minor, beneficial, long-term impacts
- conducting surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places (a prerequisite for understanding the resource’s significance, as well as the basis of informed decision-making in the future regarding how the resource should be managed) — negligible to minor, beneficial, long-term impacts.

Kings Canyon National Park. *Cedar Grove and the Floor of the Kings Canyon* — The impacts of this alternative would be the same as for the no-action alternative:

- preserving Knapp’s cabin — minor, beneficial, long-term impact
- conducting surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places — negligible to minor, beneficial, long-term impacts

Grant Grove — Under the preferred alternative NPS-owned historic structures in the Wilsonia Historic District would be evaluated for preservation and adaptive reuse. This would result in

minor to moderate, beneficial, long-term impacts. Privately owned historic structures would remain, resulting in minor, beneficial impacts to the integrity of the Wilsonia Historic District. The *Land Protection Plan* would be updated to acknowledge the national register status of the Wilsonia Historic District.

The following impacts would be similar to those for the no-action alternative:

- preserving and adaptively using structures contributing to the significance of the General Grant National Park Historic District — minor to moderate, beneficial, long-term impacts
- preserving and adaptively using the Redwood Mountain residence and historic structures in the vicinity of the General Grant Tree (such as the Gamlin cabin) — minor to moderate, beneficial, long-term impacts

Big Stump Basin — As described under the no-action alternative, the National Park Service would evaluate the Big Stump Basin under National Register of Historic Places criteria to determine its eligibility for listing on the national register as a historic landscape. If eligible, managing a portion of the basin to preserve its visible logging history would result in minor, beneficial, long-term impacts on potential cultural landscape features. However, the inevitable loss of cultural landscape values in part of the basin managed as a recovering sequoia grove would have moderate to major, adverse, long-term impacts on potential cultural landscape features.

Sequoia National Park. Lodgepole-Wuksachi — The impacts of preserving and adaptively using the Cabin Creek ranger residence and dormitory and preserving the Lost Grove comfort station would be minor to moderate, long term, and beneficial, as described for the no-action alternative.

Surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic

Places (a prerequisite for understanding the resource's significance, as well as the basis of informed decision-making in the future regarding how the resource should be managed) would result in negligible to minor, beneficial, long-term impacts. Preserving historic structures at Lodgepole and Wolverton that could be adaptively reused would have minor to moderate, beneficial, long-term impacts. In order to meet critical housing needs for the parks, new infill housing at Lodgepole and relocated housing from Wolverton would be provided, resulting in minor, adverse, long-term impacts on the setting of the potential historic district, but this action would be mitigated through consultation with the state historic preservation officer.

Giant Forest — As described for the no-action alternative, impacts as a result of preserving, rehabilitating, adaptively using, and interpreting the market, the ranger's residence and comfort station, and the Cattle cabin, Squatter's cabin, and Tharp's Log would continue to result in minor to moderate, beneficial, long-term impacts.

Ash Mountain / Foothills — Under the preferred alternative retaining trailers in the Sycamore housing area would result in a minor, adverse impact on the integrity of the potential Sycamore CCC camp historic district.

Other impacts on historic structures in the Ash Mountain / Foothills vicinity would be the same as those described for the no-action alternative:

- evaluating and preserving historic residences in the upper Ash Mountain housing area, the landscape of the potential Ash Mountain historic district, and structures in the potential Sycamore CCC camp historic district, including the recreation hall (if determined eligible for listing on the national register) — minor, beneficial, long-term impacts
- evaluating and preserving the historic Colony Mill Road as a trail — minor, beneficial, long-term impacts
- inventorying and evaluating Mission '66 structures and preserving any that were

determined eligible for listing on the National Register of Historic Places — minor to moderate, beneficial, long-term impacts

Mineral King — Impacts would be the same as for the no-action alternative:

- preserving contributing resources of the Mineral King Road Cultural Landscape District (the Atwell Mill ranger station, garage, and mill site, and the Lookout Point residence) — minor, beneficial, long-term impacts
- preserving the historic character (alignment and width) of the Mineral King Road corridor — minor, beneficial impacts over the long term
- allowing some mining remnants at Mineral King to molder — moderate to major, adverse, long-term impacts
- evaluating privately owned properties in Silver City for their national register eligibility — minor, beneficial, long-term impacts (properties cannot be listed without the owner's permission)

Dillonwood — As described for the no-action alternative, preserving any historic properties determined eligible for listing on the national register would result in direct, minor, long-term, beneficial impacts.

Cumulative Impacts

As described for the no-action alternative, over the years historic structures, districts, and cultural landscapes have been adversely impacted by wear and tear associated with visitor access, natural processes such as weathering and erosion, development, and the restoration of natural conditions in sequoia groves. Past construction projects, such as the Generals Highway improvements, hydroelectric production, and the development associated with Grant Grove, Cedar Grove, Lodgepole, and Mineral King, resulted in the loss of historic structures and the loss or alteration of landscape elements (structures, vegetation, circulation features, spatial organization, or land use patterns). In addition,

to protect and preserve the internationally significant sequoia groves (the primary reason that the parks were established), locally significant structures, districts, and landscapes in Sequoia and Kings Canyon National Parks were removed or altered. During 1998–99 most structures in the Giant Forest area (some of which dated back to the 1920s) were removed pursuant to a memorandum of agreement among the National Park Service, the California state historic preservation officer, and the Advisory Council on Historic Preservation. Only the ranger's residence, the comfort station, the market, and the Beetle Rock assembly hall were preserved. Adverse impacts associated with visitor access and natural processes were generally long term and negligible to minor in intensity, but the adverse impacts associated with the removal of historic structures and the loss or alteration of landscape elements were long term or permanent and of moderate to major intensity.

Concurrent or reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65 by Caltrans, have the potential to disturb historic structures, districts, and cultural landscapes outside the parks' boundaries. Unavoidable impacts to resources eligible for the national register could be adverse and range in intensity from minor to major, depending on the resources affected.

As described above, the preferred alternative would contribute minor to moderate, beneficial, long-term impacts, as well as moderate to major, adverse, long-term or permanent impacts, to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The overall cumulative impact associated with the preferred alternative, however, would be adverse.

Conclusion

The preferred alternative would preserve cultural resources that portray the parks' diverse cultural

themes, with minor to moderate, beneficial, long-term effects for these properties. Removing some historic structures would generally have moderate to major, adverse, short- and long-term or permanent effects.

Despite some moderate to major, adverse, permanent impacts on individual locally significant cultural resource sites or districts, there would be no major adverse impacts on resources or values necessary to fulfill specific purposes identified in the enabling legislation or proclamations for the parks, or key to the natural or cultural integrity of the parks or to opportunities for the enjoyment of the parks. There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

In accordance with the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5), the following actions within the parks would have no adverse effects:

- inventorying and evaluating all potentially eligible cultural resources in Sequoia and Kings Canyon National Parks to determine their eligibility for listing on the National Register of Historic Places, and submitting nomination forms to the keeper of the national register
- rebuilding the Generals Highway and its appurtenant structures, preserving historic structures in the vicinity of Giant Forest, or preserving historic properties in the backcountry (ranger cabins, the Mount Whitney shelter, the Pear Lake ski hut, cabins associated with the Shorty Lovelace Historic District)
- retaining, stabilizing, preserving, and adaptively using Knapp's cabin, structures in the potential General Grant National Park Historic District, the Redwood Mountain residence, and NPS historic structures in the Wilsonia Historic District; managing the Big Stump Basin to maintain its visible logging history, as well as to illustrate a recovering giant sequoia grove

- preserving the Lost Creek comfort station and preserving and adaptively using the Cabin Creek ranger residence and dormitory; stabilizing / preserving historic structures in the potential Lodgepole, Wolverton, Ash Mountain, and Sycamore CCC camp historic districts; preserving the Colony Mill Road as a trail
- preserving the Atwell Mill ranger station and garage, the Atwell Mill site, the Lookout Point residence, and resources contributing to the Mineral King Road Cultural Landscape District; and maintaining / preserving the historic character of the Mineral King Road corridor (alignment and width)

This alternative would result in adverse effects to historic structures, districts, and landscapes within the parks from the following actions:

- removing structures at Lodgepole and Wolverton that could not be adaptively used (effects on the historic structures that were removed as well as the historic landscapes of those potential historic districts)
- allowing mining remnants at Mineral King to continue to molder

Impacts of Alternative A

Analysis

Under this alternative, as described for the no-action alternative, all potentially historic structures, districts, and landscapes would be inventoried and evaluated under National Register of Historic Places criteria to determine their eligibility for listing on the register, and the listing process would be completed for those resources that were determined eligible. Historic structures, districts, and landscapes would be preserved, rehabilitated, and adaptively used in accordance with the "Secretary's Standards" and section 106 of the National Historic Preservation Act. Where adverse effects such as removal or neglect were unavoidable, mitigation measures would be determined through consultation with the California state historic preservation officer.

Key historic resources would be preserved and adaptively reused under alternative A, resulting in minor to moderate, beneficial, long-term impacts on those structures, districts, and landscapes afforded preservation treatment. However, implementation of this alternative could result in the removal of a number of historic structures that are associated with patterns of local history (private or permit recreation cabin communities at Wilsonia, Silver City, and Mineral King). Such removal would result in moderate to major, adverse, and long-term to permanent impacts on affected historic structures, districts, and landscapes.

As previously described, the undergrounding of utilities would have minimal, if any, effect on topography, spatial organization, or land use patterns of historic districts or cultural landscapes. If aboveground utilities were contributing elements to a historic district or cultural landscape, placing them underground would be a minor, adverse, long-term effect. Once the action was completed and the trench backfilled, the disturbed ground would be restored to its pre-construction contour and condition. Any adverse impacts associated with construction would be short term and negligible.

Historic structures could suffer wear and tear from increased visitation. Monitoring the carrying capacity of historic structures could result in the imposition of visitation levels or constraints that would contribute to the stability or integrity of the resources without unduly hindering interpretation for visitors. Unstaffed or minimally staffed structures could be more susceptible to vandalism. Any adverse impacts would be long term or permanent and range in intensity from negligible to minor.

Generals Highway. Continued rebuilding of the Generals Highway, as described under the no-action alternative, would have negligible to minor, adverse visual impacts during construction. Even though rebuilding the road would have some minor, permanent, adverse impacts because some historic fabric would be lost, rebuilding the road would result in overall minor to moderate, beneficial, and long-term impacts

for the preservation and safe use of this historically significant highway. Although actions under this alternative could result in changing use and visitor experience of Generals Highway, historic structures and landscapes associated with the highway would not change.

Backcountry. Preserving historic structures in the backcountry (such as historic ranger cabins, the Mount Whitney shelter, and the Pear Lake ski hut) if they were needed for park operations, would result in minor, beneficial, long-term impacts on those structures that were preserved. If structures could not be used, they would be recorded and allowed to deteriorate, subject to consultation with the state historic preservation officer, resulting in moderate to major, adverse, long-term impacts.

The surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places, as well as establish a basis for future resource management. Such surveys and research would result in negligible to minor, beneficial, long-term impacts.

Kings Canyon National Park. *Cedar Grove and the Floor of the Kings Canyon* — Conducting surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places, as well as establishing a basis for future resource management, would result in negligible to minor, beneficial, long-term impacts, the same as under the no-action alternative. Under alternative A, however, allowing Knapp's cabin to molder would have a moderate to major, adverse, long-term impact.

Grant Grove — Preserving some historic structures in the potential General Grant National Park Historic District, particularly structures in the Grant Grove village area that could be adaptively used for park operations and administration or for visitor services, would have minor to moderate, beneficial, long-term impacts on some historic structures. All other contributing resources in the historic district would eventually be recorded and removed, subject to consultation

with the state historic preservation officer, resulting in moderate to major, adverse, permanent impacts on the structures that were removed. Depending on how many structures were removed, the integrity of the historic district could be affected, with moderate to major, adverse, permanent impacts.

Preserving historic properties in the vicinity of the General Grant Tree, such as the Gamlin cabin, would result in minor, beneficial, long-term impacts.

Recording the Redwood Mountain residence and then removing it, subject to consultation with the state historic preservation officer, would result in a moderate to major, adverse, permanent impact because a historic resource would be lost.

Recording and removing NPS structures in the Wilsonia Historic District, subject to consultation with the state historic preservation officer, would result in moderate to major, adverse, permanent impacts to the historic district. Since all privately owned land would be acquired, all cabins in the Wilsonia Historic District would eventually be removed and the area returned to natural conditions. The removal of all cabins in the district would result in a moderate to major, adverse, permanent impact since the integrity of the district would be lost.

Big Stump Basin — If Big Stump Basin was determined eligible for listing on the National Register of Historic Places as a cultural landscape, managing the basin to illustrate a recovering giant sequoia grove would result in the area gradually becoming overgrown with vegetation and reducing the visual impact of logging. As described for the no-action alternative, the impact would be indirect, moderate to major, adverse, and permanent.

Sequoia National Park. Lodgepole-Wuksachi — Similar to the no-action alternative, the Lost Grove comfort station would be preserved, resulting in minor, beneficial, long-term impacts. However, under alternative A the Cabin Creek ranger residence and dormitory would be recorded and removed, subject to consultation

with the state historic preservation officer, resulting in moderate to major, adverse, permanent impacts to historic properties.

Historic structures, districts, and landscapes at Lodgepole and Wolverton would be surveyed and evaluated to determine their eligibility for listing on the National Register of Historic Places. At Lodgepole only historic structures that could be adaptively used would be preserved, resulting in minor to moderate, beneficial, long-term impacts for selected structures. However, the removal of other historic structures in consultation with the state historic preservation officer would result in moderate to major, adverse, permanent impacts. Recording and removing historic structures at Wolverton, subject to consultation with the state historic preservation officer, would result in moderate to major, adverse, permanent impacts to the potential historic district.

Giant Forest — As described for the no-action alternative, preserving, rehabilitating, and adaptively using historic Giant Forest structures (the market, the ranger's residence and comfort station, the Cattle cabin, Squatter's cabin, and Tharp's Log) would continue to result in minor to moderate, beneficial, long-term impacts since national register properties would be preserved.

Ash Mountain / Foothills — As described for the no-action alternative, historic structures and landscapes at Ash Mountain and the Sycamore CCC camp, as well as the Colony Mill Road, would be inventoried and evaluated to determine their eligibility for listing on the national register as historic districts and/or landscapes. A minimum number of housing units would be preserved in the upper Ash Mountain housing area, having minor, beneficial, long-term impacts on the potential historic district. Recording and removing other historic residential structures at Ash Mountain, along with historic residential structures at the Sycamore CCC camp and the CCC recreation hall at Ash Mountain, would result in moderate to major, adverse, permanent impacts. Maintaining and preserving the Colony Mill Road as a trail would result in minor, beneficial, long-term impacts to that resource.

Mineral King — Stabilizing and preserving historic structures that could be used for essential NPS functions and that contribute to the significance of the cultural landscape district (the Atwell Mill ranger station and garage, the mill site, and the Lookout Point residence) would result in minor, beneficial, long-term impacts to those resources, similar to the preferred alternative.

Evaluating privately owned properties in Silver City for their national register eligibility would result in minor, beneficial, long-term impacts, as described for the no-action alternative. (Properties cannot be listed without the owner's permission.)

Mining remnants at Mineral King would continue to be allowed to deteriorate, resulting in moderate to major, adverse, permanent impacts.

Dillonwood — The preservation of any historic properties that were determined to be eligible for listing on the National Register of Historic Places would result in minor, beneficial, long-term impacts, as described for the no-action alternative.

Cumulative Impacts

As described for the no-action alternative, over the years historic structures, districts, and cultural landscapes have been adversely impacted by wear and tear associated with visitor access, natural processes such as weathering and erosion, development, and the restoration of natural conditions in sequoia groves. Past construction projects, such as the Generals Highway improvements, hydroelectric production, and the development associated with Grant Grove, Cedar Grove, Lodgepole, and Mineral King, resulted in the loss of historic structures and the loss or alteration of landscape elements (structures, vegetation, circulation features, spatial organization, or land use patterns). In addition, to protect and preserve the internationally significant sequoia groves (the primary reason that the parks were established), locally significant structures, districts, and landscapes in Sequoia and Kings Canyon National Parks were removed

or altered. During 1998–99 most structures in the Giant Forest area (some of which dated back to the 1920s) were removed pursuant to a memorandum of agreement among the National Park Service, the California state historic preservation officer, and the Advisory Council on Historic Preservation. Only the ranger's residence, the comfort station, the market, and the Beetle Rock assembly hall were preserved. Adverse impacts associated with visitor access and natural processes were generally long term and negligible to minor in intensity, but the adverse impacts associated with the removal of historic structures and the loss or alteration of landscape elements were long term or permanent and of moderate to major intensity.

Concurrent or reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65 by Caltrans, have the potential to disturb historic structures, districts, and cultural landscapes outside the parks' boundaries. Unavoidable impacts to resources eligible for the national register could be adverse and range in intensity from minor to major, depending on the resources affected.

Alternative A would contribute minor to moderate, beneficial, long term impacts, as well as moderate to major, adverse, long-term or permanent impacts, to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The overall cumulative impact associated with alternative A, however, would be adverse.

Conclusion

Alternative A would result in minor to moderate, beneficial, long-term impacts on historic structures, districts, and landscapes that would be preserved and adaptively used by the National Park Service for interpretive purposes or park operations. However, preserving only key cultural resources and removing others, or allowing them

to deteriorate, would generally have moderate to major, adverse, long-term to permanent impacts.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

In accordance with the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5), the following actions within the parks would have no adverse effects:

- inventorying and evaluating all potentially eligible cultural resources in Sequoia and Kings Canyon National Parks to determine their eligibility for listing on the National Register of Historic Places, and submitting nomination forms to the keeper of the national register
- rebuilding the Generals Highway and its appurtenant structures, preserving historic structures in the vicinity of Giant Forest, or preserving historic properties in the backcountry that could be utilized (e.g., ranger cabins, the Mount Whitney shelter, the Pear Lake ski hut)
- preserving and adaptively using selected structures in the potential General Grant National Park Historic District
- preserving the Lost Creek comfort station, structures at Lodgepole that could be adaptively used, and a minimum number of housing units in the upper Ash Mountain housing area; preserving the Colony Mill Road as a trail
- preserving the Atwell Mill ranger station and garage, the Atwell Mill site, the Look-out Point residence and garage, and resources contributing to the Mineral King Road Cultural Landscape District; and maintaining / preserving the historic character of the Mineral King Road corridor (alignment and width)

This alternative would result in adverse effects to historic structures, districts, and landscapes within the parks from the following actions:

- removing the Redwood Mountain residence, structures in the potential General Grant National Park Historic District that could not be used, and NPS and privately owned structures in the Wilsonia Historic District; managing the Big Stump Basin (if determined eligible as a historic landscape) as a recovering giant sequoia grove, resulting in the area gradually returning to natural conditions
- removing the Cabin Creek ranger residence and dormitory, historic structures at Lodgepole and the upper Ash Mountain housing area that could not be used, and all historic structures at Wolverton, the Sycamore CCC camp, and the CCC recreation hall at Ash Mountain
- removing backcountry structures if they could not be adaptively reused
- allowing mining remnants at Mineral King to continue to molder

Impacts of Alternative C

Analysis

Under this alternative, as described for the no-action alternative, all potentially historic structures, districts, and landscapes would be inventoried and evaluated under National Register of Historic Places criteria to determine their eligibility for listing on the register, and the listing process would be completed for those resources that were determined eligible. Historic structures, districts, and landscapes would be preserved, rehabilitated, and adaptively used in accordance with the “Secretary’s Standards” and section 106 of the National Historic Preservation Act. Where adverse effects such as removal or neglect were unavoidable, mitigation measures would be determined through consultation with the California state historic preservation officer.

As previously described, the undergrounding of utilities would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of historic districts or cultural landscapes. If aboveground utilities were contributing elements to a historic district or cultural

landscape, placing them underground would be a minor, adverse, long-term effect. Once the action was completed and the trench backfilled, the disturbed ground would be restored to its pre-construction contour and condition. Any adverse impacts associated with construction would be short term and negligible.

Careful design would ensure that the rehabilitation of parking areas and the expansion or development of trails would minimally affect the scale and visual relationships among landscape features. In addition, the topography, vegetation, circulation features, and land use patterns of any historic district or cultural landscape would remain largely unaltered. Any adverse impacts would be long term or permanent and range in intensity from negligible to minor.

Historic structures could suffer wear and tear from increased visitation. Monitoring the carrying capacity of historic structures could result in the imposition of visitation levels or constraints that would contribute to the stability or integrity of the resources without unduly hindering interpretation for visitors. Unstaffed or minimally staffed structures could be more susceptible to vandalism. Any adverse impacts would be long term or permanent and range in intensity from negligible to minor.

Generals Highway. Continued rebuilding of the Generals Highway, as described under the no-action alternative, would have negligible to minor, adverse visual impacts during construction. Even though rebuilding the road would have some minor, permanent, adverse impacts because some historic fabric would be lost, rebuilding the road would result in overall minor to moderate, beneficial, and long-term impacts for the preservation and safe use of this historically significant highway. Although actions under this alternative could result in changing use and visitor experience of Generals Highway, historic structures and landscapes associated with the highway would not change.

Backcountry. The impacts of preserving historic structures in the backcountry would be minor, beneficial, and long term, the same as for

the no-action alternative. However, information would be provided to park visitors regarding selected historic backcountry areas, which could cause increased use in these areas and result in indirect, negligible to minor, long-term, adverse impacts on these resources.

Kings Canyon National Park. *Cedar Grove and the Floor of the Kings Canyon* — Impacts would be the same as for the no-action alternative:

- preserving Knapp's cabin — minor, beneficial, long-term impact
- conducting surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places, as well as establishing a basis for future resource management — negligible to minor, beneficial, long-term impacts

Grant Grove — Under this alternative NPS-owned historic structures in the Wilsonia Historic District would be preserved and adaptively reused. Privately owned structures would not be affected. This would result in minor to moderate, beneficial, long-term impacts (the same as the preferred alternative).

The following impacts would be the same as the no-action alternative:

- preserving and adaptively using structures contributing to the significance of the General Grant National Park Historic District — minor to moderate, beneficial, long-term impacts
- preserving the Redwood Mountain residence and historic structures in the vicinity of the General Grant Tree (such as the Gamlin cabin) — minor, beneficial, long-term impacts

Big Stump Basin — If Big Stump Basin was determined eligible for listing on the National Register of Historic Places, managing the basin to maintain its visible logging history would result in minor, beneficial, long-term impacts on the historic landscape.

Sequoia National Park. Lodgepole-Wuksachi

— As described for the no-action alternative, the impacts of preserving the Cabin Creek ranger residence and dormitory and the Lost Grove comfort station would be minor to moderate, long term, and beneficial.

Surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places, as well as establishing a basis for future resource management, would result in negligible to minor, beneficial, long-term impacts. However, as a result of a housing shortage, new infill housing at Lodgepole and relocated housing (from Wolverton) would result in minor to moderate, adverse, long-term impacts on the potential historic district (the same as the preferred alternative). Other structures at Wolverton would be removed if they could not be rehabilitated and adaptively used, resulting in moderate to major, adverse, permanent impacts. These actions would be taken in consultation with the state historic preservation officer.

Giant Forest — As described for the no-action alternative, preserving, rehabilitating, and adaptively using historic Giant Forest structures (the market, the ranger's residence and comfort station, the Cattle cabin, Squatter's cabin, and Tharp's Log) would continue to result in minor to moderate, beneficial, long-term impacts.

Ash Mountain / Foothills — The following impacts on historic structures in the Ash Mountain / foothills vicinity would be the same as for the no-action alternative:

- evaluating and preserving historic residences in the upper Ash Mountain housing area, the landscape of the potential Ash Mountain historic district, and structures in the potential Sycamore CCC camp historic district, including the recreation hall (if determined eligible for listing on the national register) — minor, beneficial, long-term impacts
- rehabilitating the historic Colony Mill Road as a historic right-of-way — moderate, beneficial, long-term impacts

- inventorying and evaluating Mission '66 structures and preserving any that were determined eligible for listing on the National Register of Historic Places — minor, beneficial, long-term impacts

Mineral King — The following impacts would be the same as the no-action alternative:

- preserving contributing resources of the Mineral King Road Cultural Landscape District (the Atwell Mill ranger station and mill site, and the Lookout Point residence) — minor, beneficial, long-term impacts
- allowing mining remnants at Mineral King to continue to molder — moderate to major, adverse, long-term impacts
- preserving the historic character (alignment and width) of the Mineral King Road corridor — minor, beneficial impacts over the long term
- evaluating privately owned properties in Silver City for their national register eligibility — minor, beneficial, long-term impacts (properties cannot be listed without the owner's permission)

Dillonwood — As described for the no-action alternative, preserving any historic properties determined eligible for the national register would result in minor, beneficial, long-term impacts.

Cumulative Impacts

As described for the no-action alternative, over the years historic structures, districts, and cultural landscapes have been adversely impacted by wear and tear associated with visitor access, natural processes such as weathering and erosion, development, and the restoration of natural conditions in sequoia groves. Past construction projects, such as the Generals Highway improvements, hydroelectric production, and the development associated with Grant Grove, Cedar Grove, Lodgepole, and Mineral King, resulted in the loss of historic structures and the loss or alteration of landscape elements (structures, vegetation, circulation features, spatial organization, or land use patterns). In addition,

to protect and preserve the internationally significant sequoia groves (the primary reason that the parks were established), locally significant structures, districts, and landscapes in Sequoia and Kings Canyon National Parks were removed or altered. During 1998–99 most structures in the Giant Forest area (some of which dated back to the 1920s) were removed pursuant to a memorandum of agreement among the National Park Service, the California state historic preservation officer, and the Advisory Council on Historic Preservation. Only the ranger’s residence, the comfort station, the market, and the Beetle Rock assembly hall were preserved. Adverse impacts associated with visitor access and natural processes were generally long term and negligible to minor in intensity, but the adverse impacts associated with the removal of historic structures and the loss or alteration of landscape elements were long term or permanent and of moderate to major intensity.

Concurrent or reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65 by Caltrans, have the potential to disturb historic structures, districts, and cultural landscapes outside the parks’ boundaries. Unavoidable impacts to resources eligible for the national register could be adverse and range in intensity from minor to major, depending on the resources affected.

Alternative C would contribute minor to moderate, beneficial, long-term impacts, as well as moderate to major, adverse impacts that were long term or permanent, to the cumulative impacts of other past, present, and reasonably foreseeable future actions. Because of the greater emphasis on the preservation of historic resources under alternative C, the beneficial impacts associated with this alternative would be a larger component of any overall cumulative impact than with any of the other alternatives.

Conclusion

This alternative would provide for the preservation of more historic structures, districts, and landscapes than under any of the other alternatives, and impacts would be generally minor to moderate, beneficial, and long term.

Despite some moderate to major, adverse, permanent impacts on individual locally significant cultural resource sites or districts, there would be no major adverse impacts on resources or values necessary to fulfill specific park purposes, or key to the natural or cultural integrity of the parks or to opportunities for the enjoyment of the parks. There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

In accordance with the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5), the following actions would have no adverse effects within the parks:

- inventorying and evaluating all potentially eligible cultural resources in Sequoia and Kings Canyon National Parks to determine their eligibility for listing on the National Register of Historic Places, and submitting nomination forms to the keeper of the national register
- rebuilding the Generals Highway and its appurtenant structures, preserving historic structures in the vicinity of Giant Forest, or preserving historic properties in the backcountry (ranger cabins, the Mount Whitney shelter, the Pear Lake ski hut, cabins associated with the Shorty Lovelace Historic District)
- stabilizing, preserving, and adaptively using Knapp’s cabin, structures in the potential General Grant National Park Historic District, the Redwood Mountain residence, and NPS historic structures in the Wilsonia Historic District; managing the Big Stump Basin to maintain its visible logging history
- preserving the Lost Creek comfort station and preserving and adaptively using the

Cabin Creek ranger residence and dormitory; preserving / adaptively using eligible structures in the potential Lodgepole, Wolverton, Ash Mountain, and Sycamore CCC camp historic districts; rehabilitating the Colony Mill Road as a historic right-of-way

- preserving the Atwell Mill ranger station and garage, the Atwell Mill site, the Look-out Point residence, and resources contributing to the Mineral King Road Cultural Landscape District; and maintaining / preserving the historical character of the Mineral King Road corridor (alignment and width)

This alternative would result in adverse effects to historic structures, districts, and landscapes within the parks from the following actions:

- relocating a residence from Wolverton to Lodgepole, and removing structures at Lodgepole and Wolverton that could not be adaptively reused
- allowing mining remnants in the Mineral King area to continue to molder

Impacts of Alternative D

Analysis

Under this alternative, as described for the no-action alternative, all potentially historic structures, districts, and landscapes would be inventoried and evaluated under National Register of Historic Places criteria to determine their eligibility for listing on the register, and the listing process would be completed for those resources that were determined eligible. Historic structures, districts, and landscapes would be preserved, rehabilitated, and adaptively used in accordance with the “Secretary’s Standards” and section 106 of the National Historic Preservation Act. Where adverse effects such as removal or neglect were unavoidable, mitigation measures would be determined through consultation with the California state historic preservation officer.

Actions related to cultural resources under alternative D would generally be minor to moderate, beneficial, and long term since most historic resources would be retained and preserved (with

the exception of the potential historic district at Lodgepole).

As previously described, the undergrounding of utilities would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of historic districts or cultural landscapes. If aboveground utilities were contributing elements to a historic district or cultural landscape, placing them underground would be a minor, adverse, long-term effect. Once the action was completed and the trench backfilled, the disturbed ground would be restored to its pre-construction contour and condition. Any adverse impacts associated with construction would be short term and negligible.

Careful design would ensure that the rehabilitation of parking areas and the expansion or development of trails would minimally affect the scale and visual relationships among landscape features. In addition, the topography, vegetation, circulation features, and land use patterns of any historic district or cultural landscape would remain largely unaltered. Any adverse impacts would be long term or permanent and range in intensity from negligible to minor.

Historic structures could suffer wear and tear from increased visitation. Monitoring the structures’ carrying capacity could result in the imposition of visitation levels or constraints that would contribute to the stability or integrity of the resources without unduly hindering interpretation for visitors. Unstaffed or minimally staffed structures could be more susceptible to vandalism. Any adverse impacts would be long term or permanent and range in intensity from negligible to minor.

Generals Highway. Continued rebuilding of the Generals Highway, as described under the no-action alternative, would have negligible to minor, adverse visual impacts during construction. Even though rebuilding the road would have some minor, permanent, adverse impacts because some historic fabric would be lost, rebuilding the road would result in overall minor to moderate, beneficial, and long-term impacts for the preservation and safe use of this historically significant

highway. Although actions under this alternative could result in changing use and visitor experience of Generals Highway, historic structures and landscapes associated with the highway would not change.

Under alternative D steps would be undertaken to identify and facilitate the use of additional features (some of which were previously closed sites, e.g., sequoia groves) along the highway corridor to disperse visitation and facilitate its use as a bus transportation corridor. Efforts would also be undertaken to have the highway designated as an “All-American Road.” Although these actions could result in changing use and visitor experience of the roadway, the impacts of this alternative on historic structures and landscapes associated with the Generals Highway would be the same as those described for the no-action alternative.

Backcountry. The impacts of preserving historic structures in the backcountry would be minor, beneficial, and long term, the same as for the no-action alternative. However, similar to alternative C, information would be provided to park visitors regarding selected historic backcountry areas, which could cause increased use in these areas and result in negligible to minor, adverse, long-term impacts on these resources.

Kings Canyon National Park. *Cedar Grove and the Floor of the Kings Canyon* — Impacts would be the same as for the no-action alternative:

- preserving Knapp’s cabin — minor, beneficial, long-term impact
- conducting surveys and research necessary to determine the eligibility of a structure, district, or landscape for listing on the National Register of Historic Places, as well as establishing a basis for future resource management — negligible to minor, beneficial, long-term impacts

Grant Grove — The following impacts would be the same as the no-action alternative:

- preserving and adaptively using structures contributing to the significance of the Gen-

eral Grant National Park Historic District — minor to moderate, beneficial, long-term impacts

- preserving the Redwood Mountain residence and historic structures in the vicinity of the General Grant Tree (such as the Gamlin cabin) — minor, beneficial, long-term impacts

Under this alternative NPS-owned historic structures in the Wilsonia Historic District would be preserved and adaptively reused. This would result in minor to moderate, beneficial, long-term impacts (the same as the preferred alternative and alternative C). Privately owned structures in the Wilsonia Historic District could either (1) be removed for public use of the land, resulting in major, adverse, permanent impacts since the historic district would not retain its integrity, or (2) be preserved with no change in management, resulting in minor, beneficial, long-term impacts on the historic district.

Big Stump Basin — As described under the no-action alternative, the National Park Service would evaluate the Big Stump Basin under the criteria of the National Register of Historic Places to determine its eligibility for listing on the national register as a historic landscape. Like the preferred alternative, if this area was eligible for listing, management of the basin to maintain its visible logging history, as well as to illustrate a recovering giant sequoia grove, would result in minor, beneficial, long-term impacts on the historic landscape. However, the inevitable loss of cultural landscape values in part of the basin managed as a recovering sequoia grove would have moderate to major, adverse, long-term impacts on potential cultural landscape features.

Sequoia National Park. *Lodgepole-Wuksachi* — The impacts of adaptively using the Cabin Creek ranger residence and dormitory and preserving the Lost Grove comfort station would be minor to moderate, beneficial, and long term, as described for the no-action alternative.

Residential areas at Lodgepole would be removed to provide additional public use space, adversely affecting a potential historic district.

Recording and removing all structures and landscapes at Lodgepole under this alternative would have moderate to major, adverse, permanent impacts since the resources that contribute to the significance of the potential district would be lost. At Wolverton recording and removing historic structures and landscapes that cannot be rehabilitated and adaptively used would also result in moderate to major, adverse, permanent impacts.

Giant Forest — As described for the no-action alternative, preserving, rehabilitating, and adaptively using historic Giant Forest structures (the market, the ranger's residence and comfort station, the Cattle cabin, Squatter's cabin, and Tharp's Log) would continue to result in minor to moderate, beneficial, long-term impacts.

Ash Mountain / Foothills — Under alternative D preserving some historic residences in the upper Ash Mountain housing area to provide seasonal and required housing would have minor, beneficial, long-term impacts. However, recording and removing other historic residential structures at Ash Mountain, along with historic residential structures at the Sycamore CCC camp, would result in moderate to major, adverse, permanent impacts on any potential historic landscape districts at Ash Mountain and the CCC camp. Preserving the CCC recreation hall at Ash Mountain would have a minor, beneficial, long-term impact (the same as the no-action alternative). Preserving Colony Mill Road and designating it as a bicycle trail would have a minor, beneficial, long-term impact.

Mineral King — The following impacts would be the same as the no-action alternative:

- preserving contributing resources of the Mineral King Road Cultural Landscape District (the Atwell Mill ranger station and mill site, the Lookout Point residence) — minor, beneficial, long-term impacts
- allowing mining remnants at Mineral King to continue to molder — moderate to major, adverse, long-term impacts
- evaluating privately owned properties in Silver City for their national register eligi-

bility — minor, beneficial, long-term impacts (properties cannot be listed without the owner's permission)

Dillonwood — As described for the no-action alternative, preserving any historic properties determined eligible for the national register would result in minor, beneficial, long-term impacts.

Cumulative Impacts

As described for the no-action alternative, over the years historic structures, districts, and cultural landscapes have been adversely impacted by wear and tear associated with visitor access, natural processes such as weathering and erosion, development, and the restoration of natural conditions in sequoia groves. Past construction projects, such as the Generals Highway improvements, hydroelectric production, and the development associated with Grant Grove, Cedar Grove, Lodgepole, and Mineral King, resulted in the loss of historic structures and the loss or alteration of landscape elements (structures, vegetation, circulation features, spatial organization, or land use patterns). In addition, to protect and preserve the internationally significant sequoia groves (the primary reason that the parks were established), locally significant structures, districts, and landscapes in Sequoia and Kings Canyon National Parks were removed or altered. During 1998–99 most structures in the Giant Forest area (some of which dated back to the 1920s) were removed pursuant to a memorandum of agreement among the National Park Service, the California state historic preservation officer, and the Advisory Council on Historic Preservation. Only the ranger's residence, the comfort station, the market, and the Beetle Rock assembly hall were preserved. Adverse impacts associated with visitor access and natural processes were generally long term and negligible to minor in intensity, but the adverse impacts associated with the removal of historic structures and the loss or alteration of landscape elements were long term or permanent and of moderate to major intensity.

Concurrent or reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in

Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65 by Caltrans, have the potential to disturb historic structures, districts, and cultural landscapes outside the parks' boundaries. Unavoidable impacts to resources eligible for the national register could be adverse and range in intensity from minor to major, depending on the resources affected.

Alternative D would contribute minor to moderate, beneficial, long-term impacts, as well as moderate to major, adverse, long-term or permanent impacts, to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The overall cumulative impact associated with alternative D, however, would be adverse.

Conclusion

Under alternative D preserving a full spectrum of cultural resources that portray diverse park themes would result in generally minor to moderate, beneficial, long-term impacts. Loss of resources contributing to the significance of the potential Lodgepole historic district would result in moderate to major, adverse, permanent impacts.

Despite some moderate to major, adverse, permanent impacts on individual locally significant cultural resource sites or districts, there would be no major adverse impacts on resources or values necessary to fulfill specific park purposes, or key to the natural or cultural integrity of the parks or to opportunities for the enjoyment of the parks. There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

In accordance with the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5), the following actions would have no adverse effects within the national parks:

- inventorying and evaluating all potentially eligible cultural resources in Sequoia and

Kings Canyon National Parks to determine their eligibility for listing on the National Register of Historic Places, and submitting nomination forms to the keeper of the national register

- rebuilding Generals Highway and appurtenant structures, preserving historic structures in the vicinity of Giant Forest, or preserving historic properties in the backcountry (ranger cabins, the Mount Whitney shelter, the Pear Lake ski hut)
- preserving, and adaptively using Knapp's cabin, structures in the potential General Grant National Park Historic District, the Redwood Mountain residence, and NPS historic structures in the Wilsonia Historic District; managing the Big Stump Basin to maintain its visible logging history as well as a recovering sequoia grove
- preserving the Lost Creek comfort station; preserving and adaptively using the Cabin Creek ranger residence and dormitory; preserving the CCC-era recreation hall at Ash Mountain; preserving the Colony Mill Road as a bike trail
- preserving the Atwell Mill ranger station and garage, the Atwell Mill site, the Lookout Point residence, and resources contributing to the Mineral King Road Cultural Landscape District; and maintaining / preserving the historical character of the Mineral King Road corridor (alignment and width)

This alternative would result in adverse effects to historic structures, districts, and landscapes from the following actions:

- removing historic structures at Wolverton if they could not be adaptively used; recording and removing historic residential structures at Lodgepole
- removing structures at the Ash Mountain residential area and the Sycamore CCC camp

ARCHEOLOGICAL RESOURCES

Impacts of the No-Action Alternative

Analysis

Prior to the demolition of any structure listed on or eligible for the National Register of Historic Places, a survey for archeological resources in the general vicinity of the affected structure would be conducted. The excavation, recordation, and mapping of any significant cultural remains, if present, would be completed prior to demolition to ensure that important archeological data that otherwise would be lost was recovered and documented. Any impacts to archeological resources would be adverse, minor to moderate in intensity, and permanent.

As appropriate, archeological surveys and/or monitoring would precede any construction. Known archeological resources would be avoided to the greatest extent possible. If national register eligible or listed archeological resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes. Any adverse impacts to archeological resources would be minor to moderate in intensity and long term or permanent in duration.

If during construction previously undiscovered archeological resources were uncovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes. Any adverse impacts to archeological resources associated with inadvertent discoveries would be minor to moderate in intensity and long term or permanent in duration.

The Groenfeldt archeological site, which is listed on the National Register of Historic Places, is in a remote, backcountry area on sloping terrain and away from any trails. Incidences of inadvertent disturbance and vandalism

are unlikely. Any adverse impacts to this site would be negligible to minor and long term.

Continued visitation to the Hospital Rock archeological site, which is also listed on the National Register of Historic Places, could result in negligible to minor, adverse, and long-term impacts from incidences of inadvertent disturbance and vandalism.

Potential impacts to archeological resources resulting from stock use and erosion would be negligible to minor in intensity, adverse, and long term or permanent.

Cumulative Impacts

Archeological resources at Sequoia and Kings Canyon National Parks are subject to potential damage from development, stock grazing and horse use, visitor access, and natural processes such as erosion. Past development in the parks, and associated excavation and construction activities — for example the recent construction of visitor facilities in the Giant Forest and at Grant Grove and Wuksachi, as well as the past construction of the Generals Highway, the Potwisha campground, CCC camps, and hydroelectric facilities — resulted in ground disturbance near archeological resources. Incidences of inadvertent disturbance or vandalism associated with visitor access, as well as the erosional impacts related to stock grazing, horse use, and weather, have also disturbed archeological resources. Impacts to archeological resources resulting from past development, stock grazing, visitor access, and erosion were minor to major, adverse, and long term or permanent.

Reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65, have the potential to disturb archeological resources outside the parks' boundaries. Unavoidable adverse impacts to archeological resources that are eligible for listing on the National Register of Historic

Impact Thresholds for Archeological Resources

Negligible — The impact would be at the lowest levels of detection, with neither adverse nor beneficial consequences. The determination of effect under section 106 of the National Historic Preservation Act would be *no adverse effect*.

Minor — Adverse impact: Disturbance of a site or sites would result in little, if any, loss of integrity. The determination of effect under section 106 would be *no adverse effect*.

Beneficial impact: A site or sites would be maintained and preserved. The determination of effect under section 106 would be *no adverse effect*.

Moderate — Adverse impact: Disturbance of a site or sites would result in the loss of integrity. The determination of effect under section 106 would be *adverse effect*. A memorandum of agreement would be executed among the National Park Service and the applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the agreement to minimize or mitigate adverse impacts would reduce the intensity of impact under the National Environmental Policy Act from major to moderate.

Beneficial impact: A site or sites would be stabilized. The determination of effect under section 106 would be *no adverse effect*.

Major — Adverse impact: Disturbance of a site or sites would result in the loss of integrity. The determination of effect under section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts could not be agreed upon, and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council on Historic Preservation would be unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Beneficial impact: There would be active intervention to preserve a site or sites. The determination of effect under section 106 would be *no adverse effect*.

Criteria for Determining Impairment

An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Places could range in intensity from minor to major, and long term or permanent in duration.

The no-action alternative would potentially contribute negligible to moderate, adverse, long-term or permanent impacts to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The adverse impacts to archeological resources associated with the no-action alternative, however, would be a relatively small component of any overall cumulative impact.

Conclusion

Potential impacts to archeological resources associated with the removal of historic structures would be adverse, minor to moderate in intensity, and permanent. Known archeological resources would be avoided to the greatest extent possible during the construction of picnic areas and the rehabilitation of parking areas and trails. If national register eligible or listed archeological resources could not be avoided, any adverse impacts would be minor to moderate in intensity and long term or permanent. Long-term, potential impacts to archeological sites from visitor

use would be adverse but negligible to minor in intensity. Potential impacts to archeological resources resulting from stock use and erosion would be negligible to minor in intensity, adverse, and long term or permanent.

Because there would be no major, adverse impacts to a resource or value necessary to fulfill specific purposes identified in the enabling legislation for the parks, or that is key to the natural or cultural integrity of the parks or for opportunities for the enjoyment of the parks, there would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that this alternative would have no adverse effect on the Groenfeldt and Hospital Rock archeological sites, both of which are listed on the national register.

Impacts of the Preferred Alternative

Analysis

Prior to demolition of any structure listed on or eligible for listing on the National Register of Historic Places, a survey for archeological resources in the general vicinity of the affected structure would be conducted. The excavation, recordation, and mapping of any significant cultural remains, if present, would be completed prior to demolition to ensure that important archeological data that otherwise would be lost would be recovered and documented. Any impacts to archeological resources would be adverse, minor to moderate in intensity, and permanent.

As appropriate, archeological surveys and/or monitoring would precede any construction. Known archeological resources would be avoided to the greatest extent possible during the undergrounding of utilities, the construction of picnic areas, the rehabilitation of parking areas and trails, and the upgrading of visitor facilities.

If archeological resources eligible for or listed on the national register could not be avoided, an appropriate mitigation strategy would be developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes. Any adverse impacts to archeological resources would be minor to moderate in intensity and long term or permanent in duration.

If previously undiscovered archeological resources were uncovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes. Any adverse impacts to archeological resources associated with inadvertent discoveries would be minor to moderate in intensity and long term or permanent in duration.

The Groenfeldt archeological site, which is listed on the National Register of Historic Places, is in a remote, backcountry area on sloping terrain and away from any trails. Incidences of inadvertent disturbance and vandalism are unlikely. Any adverse impacts to this site would be negligible to minor and long term.

Continued visitation to the Hospital Rock archeological site, which is also listed on the National Register of Historic Places, could result in negligible to minor, adverse, and long term impacts from incidences of inadvertent disturbance and vandalism.

Potential impacts to archeological resources resulting from stock use and erosion would be adverse, long term or permanent, and negligible to minor in intensity.

Cumulative Impacts

As described for the no-action alternative, past development in the parks, and associated excavation and construction activities — for example the recent construction of visitor facilities in the

Giant Forest and at Grant Grove and Wuksachi, as well as the past construction of the Generals Highway, the Potwisha campground, CCC camps, and hydroelectric facilities — resulted in ground disturbance near archeological resources. Incidences of inadvertent disturbance or vandalism associated with visitor access, as well as the erosional impacts related to stock grazing, horse use, and weather, have also disturbed archeological resources. Resulting impacts were minor to major, adverse, and long term or permanent.

Reasonably foreseeable future actions occurring throughout the region, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65, have the potential to disturb archeological resources outside the parks' boundaries. Unavoidable adverse impacts to archeological resources that are eligible for listing on the National Register of Historic Places could range in intensity from minor to major, and could be long term or permanent in duration.

The preferred alternative would potentially contribute negligible to moderate, adverse, long-term or permanent impacts to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The adverse impacts to archeological resources associated with the preferred alternative, however, would be a small component of any overall adverse cumulative impacts.

Conclusion

Potential impacts to archeological resources associated with the removal of historic structures would be adverse, minor to moderate in intensity, and permanent. Known archeological resources would be avoided to the greatest extent possible during the undergrounding of utilities, the construction of picnic areas, the rehabilitation of parking areas and trails, and the upgrading of visitor facilities. If archeological resources eligible for or listed on the national register could not be avoided, any adverse im-

acts would be minor to moderate in intensity and long term or permanent in duration. Long-term, potential impacts to archeological sites from visitor use would be adverse but negligible to minor in intensity. Potential impacts to archeological resources from stock use and erosion could be adverse, negligible to minor in intensity, and long term or permanent.

Because there would be no major, adverse impacts to a resource or value necessary to fulfill specific purposes identified in the parks' enabling legislation, or that is key to the natural or cultural integrity of the parks or for opportunities for the enjoyment of the parks, there would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that implementation of this alternative would have no adverse effect on the Groenfeldt and Hospital Rock archeological sites, both of which are listed on the national register.

Impacts of Alternative A

Analysis

Similar to the no-action alternative, archeological surveys and/or monitoring would precede any construction, as appropriate. During the rehabilitation of parking areas and the removal of trails or campgrounds under alternative A known archeological resources would be avoided to the greatest extent possible. If archeological resources eligible for or listed on the national register could not be avoided, an appropriate mitigation strategy would be developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes. Similar to the no-action alternative, any adverse impacts to archeological resources would be minor to moderate in intensity and long term or permanent in duration.

The following actions and resulting impacts on archeological resources would be similar to those described for the no-action alternative:

- conducting a survey for archeological resources in the general vicinity of any structure to be demolished and that is listed on or eligible for the National Register of Historic Places, and recording and mapping any significant cultural remains, if present, to recover and document important archeological data — adverse, minor to moderate, permanent impacts if archeological resources were present
- halting construction work if previously undiscovered archeological resources were uncovered until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes — minor to moderate, adverse, long-term or permanent impacts if resources were present
- continued access to the Groenfeldt archeological site — negligible to minor, adverse, long-term impacts because of its remote location and unlikely incidences of inadvertent disturbance or vandalism
- continued use at the Hospital Rock archeological site — negligible to minor, adverse, long-term impacts from incidences of inadvertent disturbance and vandalism as a result of continued visitation
- stock use and erosion — negligible to minor, adverse, long-term or permanent impacts

Cumulative Impacts

As described for the no-action alternative, past development in the parks, and associated excavation and construction activities resulted in ground disturbance near archeological resources. Incidences of inadvertent disturbance or vandalism associated with visitor access, as well as the erosional impacts related to stock grazing, horse use, and weather, have also disturbed archeo-

logical resources. Resulting impacts were minor to major, adverse, and long term or permanent.

Reasonably foreseeable future actions, such as the potential expansion of visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65, could disturb archeological resources outside the parks' boundaries. Unavoidable adverse impacts to archeological resources that are eligible for listing on the National Register of Historic Places could range from minor to major in intensity and be long term or permanent in duration.

Alternative A would potentially contribute negligible to moderate, adverse, long-term or permanent impacts to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The adverse impacts to archeological resources associated with alternative A, however, would be a relatively small component of any overall adverse cumulative impact.

Conclusion

Potential impacts to archeological resources associated with the removal of historic structures would be adverse, minor to moderate in intensity, and permanent. Known archeological resources would be avoided to the greatest extent possible during the rehabilitation of parking areas and the removal of trails or campgrounds. If archeological resources eligible for or listed on the national register could not be avoided, any adverse impacts would be minor to moderate in intensity, and long term or permanent in duration. Long-term, potential impacts to archeological sites from visitor use would be adverse but negligible to minor in intensity. Potential impacts to archeological resources resulting from stock use and erosion would be negligible to minor, adverse, and long term or permanent.

As described for the no-action alternative, there would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that implementation of this alternative would have no adverse effect on the Groenfeldt and Hospital Rock archeological sites, both of which are listed on the national register.

Impacts of Alternative C

Analysis

Impacts would be the same as those described for the preferred alternative, as summarized below:

- conducting a survey for archeological resources in the general vicinity of any structure to be demolished and that is listed on or eligible for the National Register of Historic Places, and recording and mapping any significant cultural remains, if present, to recover and document important archeological data — adverse, minor to moderate, permanent impacts if archeological resources were present
- conducting archeological surveys and/or monitoring, as appropriate, before the undergrounding of utilities, the construction of picnic areas, the rehabilitation of parking areas and trails, and the upgrading of visitor facilities; avoiding known archeological resources to the greatest extent possible during construction; and if national register eligible or listed resources could not be avoided, developing an appropriate mitigation strategy in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes — minor to moderate, adverse, long-term or permanent impacts if resources were present
- halting construction work if previously undiscovered archeological resources were uncovered until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer and, if necessary, associated Amer-

ican Indian tribes — minor to moderate, adverse, long-term or permanent impacts if resources were present

- continued access to the Groenfeldt archeological site —negligible to minor, adverse, long-term impacts because of its remote location and unlikely incidences of inadvertent disturbance or vandalism
- continued use at the Hospital Rock archeological site — negligible to minor, adverse, long-term impacts from incidences of inadvertent disturbance and vandalism as a result of continued visitation
- stock use and erosion — negligible to minor, adverse, long-term or permanent impacts

Cumulative Impacts

As described for the no-action alternative, archeological resources have been disturbed in the past by construction activities, incidences of inadvertent disturbance and vandalism, and erosional impacts related to stock grazing, horse use, and weather. Resulting impacts to archeological resources were minor to major, adverse, and long term or permanent.

Reasonably foreseeable future actions, such as expanded visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65, could disturb resources outside park boundaries. Impacts could be minor to major and long term or permanent.

Alternative C would potentially contribute negligible to moderate, adverse, long-term or permanent impacts to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The adverse impacts to archeological resources associated with alternative C, however, would be a small component of any overall adverse cumulative impact.

Conclusion

Potential impacts to archeological resources associated with the removal of historic structures

would be adverse, minor to moderate, and permanent. Known archeological resources would be avoided to the greatest extent possible during the undergrounding of utilities, the construction of picnic areas, the rehabilitation of parking areas and trails, and the upgrading of visitor facilities. If archeological resources eligible for or listed on the national register could not be avoided, any adverse impacts would be minor to moderate and long term or permanent. Long-term, potential impacts to archeological sites from visitor use would be adverse but negligible to minor in intensity. Potential impacts to archeological resources resulting from stock use and erosion would be adverse, long term or permanent, and negligible to minor.

As described for the no-action alternative, there would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that implementation of this alternative would have no adverse effect on the Groenfeldt and Hospital Rock archeological sites, both of which are listed on the national register.

Impacts of Alternative D

Analysis

Actions and related impacts would be similar to those described for the preferred alternative, as summarized below:

- conducting a survey for archeological resources in the general vicinity of any structure to be demolished and that is listed on or eligible for the National Register of Historic Places, and recording and mapping any significant cultural remains, if present, to recover and document important archeological data — adverse, minor to moderate, permanent impacts if archeological resources were present

- conducting archeological surveys and/or monitoring, as appropriate, before the construction under this alternative of three proposed visitor centers (Wye, Potwisha, and Cedar Grove), the bypass road around Grant Grove, and the gasoline station, in addition to the undergrounding of utilities, the construction of picnic areas, the rehabilitation of parking areas and trails, and the upgrading of visitor facilities; avoiding known archeological resources to the greatest extent possible during construction; and if national register eligible or listed resources could not be avoided, developing an appropriate mitigation strategy in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes — minor to moderate, adverse, long-term or permanent impacts if resources were present
- halting construction work if previously undiscovered archeological resources were uncovered until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes — minor to moderate, adverse, long-term or permanent impacts if resources were present
- continued access to the Groenfeldt archeological site — negligible to minor, adverse, long-term impacts because of its remote location and unlikely incidences of inadvertent disturbance or vandalism
- continued use at the Hospital Rock archeological site — negligible to minor, adverse, long-term impacts from incidences of inadvertent disturbance and vandalism as a result of continued visitation
- stock use and erosion — negligible to minor, adverse, long-term or permanent impacts

Cumulative Impacts

As described for the no-action alternative, archeological resources have been disturbed by con-

struction activities, incidences of inadvertent disturbance and vandalism, and erosional impacts related to stock grazing, horse use, and weather. Resulting impacts to archeological resources were minor to major, adverse, and long term or permanent.

Reasonably foreseeable future actions, such as expanded visitor facilities in Giant Sequoia National Monument, the growth of communities and subdivision development in Tulare County, and proposed improvements to California Highways 180 and 65, could disturb resources outside park boundaries. Impacts could range from minor to major and would be long term or permanent.

Alternative D would potentially contribute negligible to moderate, adverse, long-term or permanent impacts to the cumulative impacts of other past, present, and reasonably foreseeable future actions. The adverse impacts to archeological resources associated with alternative D, however, would be a potentially larger component of any overall adverse cumulative impact than any of the other alternatives.

Conclusion

Potential impacts to archeological resources associated with the removal of historic structures would be adverse, minor to moderate, and permanent. Known archeological resources would be avoided during the construction of the three proposed visitor centers (Wye, Potwisha, and Cedar Grove), the bypass road around Grant Grove, and the gasoline station, as well as during the undergrounding of utilities, the construction of picnic areas, the rehabilitation of parking areas and trails, and the upgrading of visitor facilities. If archeological resources eligible for or listed on the national register could not be avoided, any adverse impacts would be minor to moderate in intensity and long term or permanent in duration. Potential impacts to archeological resources resulting from stock use and erosion would be adverse, negligible to minor, and long term or permanent.

As described for the no-action alternative, no park resources or values would be impaired.

Summary: National Historic Preservation Act, Section 106

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that implementation of this alternative would have no adverse effect on the Groenfeldt and Hospital Rock archeological sites, both of which are listed on the national register.

ETHNOGRAPHIC RESOURCES AND LANDSCAPES

Native American consultations have revealed that tribes such as the Wuksachi use particular locations in both parks to gather plants for traditional cultural uses, such as making baskets. However, the Wuksachi Tribe and others have not shared specific information about particular places where plant gathering occurs, about what species are picked during what seasons for what purposes, or about what parts of a plant might be taken and how. The latter is important to practice conservation for the future propagation of relevant plants.

Impacts of the No-Action Alternative

Analysis

Visitors to Hospital Rock would continue to be able to walk among the various features of the rock formation and adjacent interpretive waysides to learn of Hospital Rock's importance prehistorically, historically, and culturally. American Indian visitors in particular would continue to be able to access the Hospital Rock and Potwisha areas freely for traditional purposes. Because there would be no change, there would be no impact on how visitors have access to or use Hospital Rock or the Potwisha campground.

Some visitors would continue to be unknowingly intrusive to American Indians paying homage, meditating, or otherwise engaging in traditional

Impact Thresholds for Ethnographic Resources

Negligible — The impact would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group’s body of practices and beliefs. The determination of effect on traditional cultural properties (ethnographic resources eligible for the National Register of Historic Places) under section 106 of the National Historic Preservation Act would be *no adverse effect*.

Minor — Adverse impact: The impact would be slight but noticeable, but it would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group’s body of practices and beliefs. The determination of effect on traditional cultural properties (eligible to be listed on the national register) under section 106 would be *no adverse effect*.

Beneficial impact: The action would allow access to and/or accommodate a group’s traditional practices or beliefs. The determination of effect on traditional cultural properties under section 106 would be *no adverse effect*.

Moderate — Adverse impact: The impact would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group’s practices and beliefs, even though the group’s practices and beliefs would survive. The determination of effect on traditional cultural properties (eligible to be listed on the national register) under section 106 would be *adverse effect*.

Beneficial impact: The action would facilitate traditional access and/or accommodate a group’s practices or beliefs. The determination of effect on traditional cultural properties under section 106 would be *no adverse effect*.

Major — Adverse impact: The impact would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group’s body of practices and beliefs, to the extent that the survival of a group’s practices and/or beliefs would be jeopardized. The determination of effect on traditional cultural properties (eligible to be listed on the national register) under section 106 would be *adverse effect*.

Beneficial impact: The action would encourage traditional access and/or accommodate a group’s practices or beliefs. The determination of effect on traditional cultural properties under section 106 would be *no adverse effect*.

Criteria for Determining Impairment

An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park’s general management plan or other relevant NPS planning documents.

activities at Hospital Rock or Potwisha. Impacts from inadvertent visitor encounters with American Indian practitioners would be minor, adverse (in that inadvertent encounters would be distracting to practitioners), and short term. Similar adverse impacts resulting from inadvertent visitor encounters with American Indian prac-

tioners gathering plants throughout the parks could also occur.

Continued Native American consultations between the park staff and neighboring American Indian tribes could result in the sharing of some knowledge about indigenous plants that would lead to better resource management of certain

plants and plant areas as ethnographic resources in the parks. Impacts from increased NPS awareness of such knowledge would be minor, beneficial, and long term.

Cumulative Impacts

Today, as in the past, minor, adverse, long-term impacts to ethnographic resources result from the inadvertent interruption of traditional practices by visitors in the parks. Ongoing Native American consultations could result in the beneficial sharing of knowledge of indigenous plants with park staff. Consultations with associated tribes by the parks, with other neighboring units of the national park system (e.g., Yosemite National Park and Manzanar National Historic Site), and with neighboring units of the national forest system (Sierra, Sequoia, and Inyo national forests, and Sequoia National Monument), all contribute to the enhancement of mutual respect and the sharing of ethnographic knowledge. The beneficial impacts resulting from such consultations would be minor and long term.

Reasonably foreseeable actions, such as expanded visitor facilities in Giant Sequoia National Monument, regional population growth, and continued development in Tulare County, could impact natural resources and intrude on gathering areas or places of traditional cultural importance. Increased tourism and outdoor recreation could also intrude on American Indians engaging in traditional activities. Over the long term impacts to ethnographic resources could be adverse and minor to moderate.

Because existing conditions would remain under the no-action alternative, there would be no contribution to the cumulative impacts of other actions. Consequently, there would be no cumulative impacts to ethnographic resources under this alternative.

Conclusion

The continuing impacts of visitors interrupting or distracting traditional American Indian practitioners would be minor, adverse, and long term. The extent to which knowledge was shared

by American Indians with park staff about indigenous plants would lead to better resource management of certain plants and plant areas as ethnographic resources, resulting in minor, beneficial, long-term impacts.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

The eligibility of Hospital Rock to be listed on the National Register of Historic Places as a traditional cultural property is undetermined. However, after applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that there would be no adverse effect on the resource.

Impacts of the Preferred Alternative

Impacts on ethnographic resources under the preferred alternative would be the same as those described for the no-action alternative.

- Visitors would continue to be able to walk among the various features at Hospital Rock, and American Indian visitors in particular would continue to be able to access the Hospital Rock and Potwisha areas freely for traditional purposes. Continuing present uses would have no impact.
- Impacts from inadvertent visitor encounters with American Indian practitioners at Hospital Rock or Potwisha, or those gathering plants throughout the parks, would be minor, adverse, and short term.
- Continued consultations with neighboring American Indian tribes could result in better resource management of certain plants and plant areas as ethnographic resources in the parks, with minor, beneficial, long-term impacts.

Cumulative Impacts

Ongoing consultations with associated tribes, with other neighboring units of the national park

system (e.g., Yosemite National Park and Manzanar National Historic Site), and with neighboring units of the national forest system (Sierra, Sequoia, and Inyo national forests, and Sequoia National Monument) could all enhance mutual respect and the sharing of ethnographic knowledge. The resulting impacts would be minor, beneficial, and long term.

Reasonably foreseeable actions (e.g., expanded visitor facilities in Giant Sequoia National Monument, regional population growth, and continued development in Tulare County) could impact natural resources and intrude on gathering areas or places of traditional cultural importance. Increased tourism and outdoor recreation could also intrude on traditional American Indian activities. Long-term impacts could be adverse and minor to moderate in intensity.

This alternative would not contribute to the cumulative impacts of other past, present, or reasonably foreseeable actions.

Conclusion

The continuing impacts of visitors interrupting or distracting traditional American Indian practitioners would be minor, adverse, and long term, the same as the no-action alternative. If American Indians shared knowledge about indigenous plants with park staff, certain plants and plant areas could be managed as ethnographic resources, resulting in minor, beneficial, long-term impacts.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

As described for the no-action alternative, the eligibility of Hospital Rock to be listed on the National Register of Historic Places as a traditional cultural property is undetermined. However, after applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that there would be no adverse effect on the resource.

Impacts of Alternative A

Under alternative A there would be negligible long-term impacts on access to ethnographic resources as a result of removing the Potwisha campground. Providing a demolition staging area could result in some minor, adverse, short-term impacts by temporarily obstructing access to ethnographic resources.

Other impacts on ethnographic resources would be the same as those described for the no-action alternative.

- Visitors would continue to have access to Hospital Rock, and American Indian visitors in particular would continue to be able to go to the Hospital Rock and Potwisha areas for traditional purposes. Continuing current uses would have no impact.
- Impacts from inadvertent visitor encounters with American Indian practitioners at Hospital Rock or Potwisha, or those gathering plants throughout the parks, would be minor, adverse, and short term.
- Continued consultations with neighboring American Indian tribes could result in better resource management of certain plants and plant areas as ethnographic resources in the parks, with minor, beneficial, long-term impacts.

Cumulative Impacts

Ongoing consultations with associated tribes and with neighboring national park and national forest system units could enhance mutual respect and the sharing of ethnographic knowledge, resulting in minor, beneficial, long-term impacts.

Expanded visitor facilities in Giant Sequoia National Monument, regional population growth, and continued development in Tulare County could impact natural resources and intrude on gathering areas or places of traditional cultural importance for American Indians, as could increased tourism and outdoor recreation. Impacts could be minor to moderate and adverse over the long term.

Alternative A would contribute negligible to minor, adverse, long-term impacts to the cumulative impacts of other past, present, and reasonably foreseeable actions. However, the adverse impact contributed by alternative A would be a small component of any overall cumulative impact.

Conclusion

Removing the Potwisha campground would result in negligible, long-term impacts on access to ethnographic resources. Providing a demolition staging area could result in some minor, adverse, short-term impacts by temporarily obstructing access to ethnographic resources. The continuing impacts of visitors interrupting or distracting traditional American Indian practitioners would be minor, adverse, and long term, the same as the no-action alternative. If American Indians shared knowledge about indigenous plants with park staff, certain plants and plant areas could be managed as ethnographic resources, resulting in minor, beneficial, long-term impacts.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

As described for the no-action alternative, the eligibility of Hospital Rock to be listed on the National Register of Historic Places as a traditional cultural property is undetermined. However, after applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that there would be no adverse effect on the resource.

Impacts of Alternative C

Impacts on ethnographic resources under the alternative C would be the same as those described for the no-action alternative.

- Visitors would continue to have access to Hospital Rock. American Indian visitors in particular would continue to be able to access the Hospital Rock and Potwisha

areas freely for traditional purposes. Continuing present uses would have no impact.

- Impacts from inadvertent visitor encounters with American Indian practitioners at Hospital Rock or Potwisha, or those gathering plants throughout the parks, would be minor, adverse, and short term.
- Continued consultations with neighboring American Indian tribes could result in better resource management of certain plants and plant areas as ethnographic resources in the parks, with minor, beneficial, long-term impacts.

Cumulative Impacts

Ongoing consultations with associated tribes and with neighboring national park and national forest system units could enhance mutual respect and the sharing of ethnographic knowledge, resulting in minor, beneficial, and long-term impacts.

Expanded visitor facilities in Giant Sequoia National Monument, regional population growth, and continued development in Tulare County could impact natural resources and intrude on gathering areas or places of traditional cultural importance for American Indians, as could increased tourism and outdoor recreation. Impacts could be minor to moderate and adverse over the long term.

This alternative would not contribute to the cumulative impacts of other past, present, or reasonably foreseeable actions.

Conclusion

The continuing impacts of visitors interrupting or distracting traditional American Indian practitioners would be minor, adverse, and long term, the same as the no-action alternative. If American Indians shared knowledge about indigenous plants with park staff, certain plants and plant areas could be managed as ethnographic resources, resulting in minor, beneficial, long-term impacts.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

As described for the no-action alternative, the eligibility of Hospital Rock to be listed on the National Register of Historic Places as a traditional cultural property is undetermined. However, after applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that there would be no adverse effect on the resource.

Impacts of Alternative D

Under alternative D there would be minor, adverse, long-term impacts on access to ethnographic resources as a result of locating a visitor center in a previously disturbed area across the road from the Potwisha campground. There could also be minor, adverse, short-term impacts on access to ethnographic resources during construction of a new visitor center.

Other impacts on ethnographic resources would be the same as those described for the no-action alternative.

- Visitors would continue to have access to Hospital Rock, and American Indian visitors in particular would continue to be able to go to the Hospital Rock and Potwisha areas for traditional purposes. Continuing current uses would have no impact.
- Impacts from inadvertent visitor encounters with American Indian practitioners at Hospital Rock or Potwisha, or those gathering plants throughout the parks, would be minor, adverse, and short term.
- Continued consultations with neighboring American Indian tribes could result in better resource management of certain plants and plant areas as ethnographic resources in the parks, with minor, beneficial, long-term impacts.

Cumulative Impacts

Ongoing consultations with associated tribes, and with neighboring national park and national forest system units could all enhance mutual respect and the sharing of ethnographic knowledge, with minor, beneficial, long-term impacts.

Expanded facilities in Giant Sequoia National Monument, regional population growth, and continued development in Tulare County could impact natural resources and intrude on places of traditional cultural importance for American Indians, as could increased tourism and outdoor recreation. Impacts could be minor to moderate, adverse, and long term.

Alternative D would contribute minor, adverse, long-term impacts to the cumulative impacts of other past, present, and reasonably foreseeable actions. However the adverse impacts contributed by alternative D would be a small component of any overall cumulative impact.

Conclusion

Under alternative D there would be negligible, adverse, long-term impacts on access to ethnographic resources as a result of locating a visitor center in a previously disturbed area across the road from the Potwisha campground. The visitor center could cause minor, adverse, short-term impacts on access to ethnographic resources. The continuing impacts of visitors interrupting or distracting traditional American Indian practitioners would be minor, adverse, and long term, the same as the no-action alternative. If American Indians shared knowledge about indigenous plants with park staff, certain plants and plant areas could be managed as ethnographic resources, resulting in minor, beneficial, long-term impacts.

There would be no impairment of park resources or values.

Summary: National Historic Preservation Act, Section 106

As described for the no-action alternative, the eligibility of Hospital Rock to be listed on the

National Register of Historic Places as a traditional cultural property is undetermined. However, after applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR 800.5), the National Park Service concludes that there would be no adverse effect on the resource.

MUSEUM COLLECTIONS AND ARCHIVES

Impacts of the No-Action Alternative

Analysis

The parks' museum collections and archives would continue to be housed at the Ash Mountain facility under adequate museum standards for fire detection and suppression, security, temperature and humidity control, curation, storage, and research. However, there is no further space for additional curation and storage or for expanded research. At some point all or part of the museum collections and archives would have to be moved to an expanded facility. Most likely the space needed to accommodate future curation and storage of museum collections would be found at the headquarters building, with some functions related to park administration moved out of the building so that space dedicated to collections and archives could be expanded. If this should happen, the act of moving the artifacts, specimens, and archives could result in negligible to minor, adverse, short-term impacts to the parks' collection. The long-term beneficial impacts of additional curatorial and storage space that met museum standards would be moderate.

Cumulative Impacts

The Eastern California Museum, in Independence, California, on the eastern side of the Sierra Nevada, recently completed a new addition for more exhibit, curation, and storage space, and improved security and safety. This has resulted in moderate, beneficial, and long-term impacts to regional museum collections and archives.

If present conditions for storing, curating, and displaying park museum collections and archives continued, this alternative would not contribute to the cumulative impacts of other actions. If, however, the collection was moved to expanded facilities inside the park, the result would be a moderate, beneficial, long-term impact contributed to any overall cumulative impact.

Conclusion

Museum collections and archives would continue to be safe and secure under this alternative. Within the life of this general management plan, however, part of the museum collections and archives would likely have to be moved to expanded facilities in the parks. Moving artifacts, specimens, and documents would have minor, adverse, short-term impacts. The impact of having additional curatorial and storage space that met museum standards would be moderate, beneficial, and long term.

There would be no impairment of the parks' resources or values.

Impacts of the Preferred Alternative

Analysis

The parks' museum collections and archives would be housed in expanded and improved facilities in one location that would meet state-of-the-art museum standards for fire detection and suppression, security, temperature and humidity control, curation, storage, and research. Most likely the space needed to accommodate future curation and storage of museum collections would be found at the headquarters building, with some functions related to park administration moved out of the building so that space dedicated to collections and archives could be expanded. Impacts to museum collections and archives would be moderate, beneficial, and long term.

The act of moving the artifacts, specimens, and archives could result in negligible to minor, adverse, short-term impacts.

Impact Thresholds for Museum Collections and Archives

Museum collections (prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens) are generally ineligible for listing on the National Register of Historic Places. As such, no section 106 determinations of effect are provided.

Negligible — The impact would be at the lowest levels of detection or barely measurable, with no perceptible consequences, either adverse or beneficial, to museum collections.

Minor — Adverse impact: The integrity of a few items in the museum collection would be affected, but the usefulness of the collection for future research and interpretation would not be degraded.

Beneficial impact: The current condition of the collection or its constituent components would be stabilized to minimize degradation.

Moderate — Adverse impact: The integrity of many items in the museum collection would be affected, and the usefulness of the collection for future research and interpretation would be diminished.

Beneficial impact: The condition of the collection would be improved or its constituent parts would be protected from the threat of degradation.

Major — Adverse impact: The integrity of most items in the museum collection would be affected, and the usefulness of the collection for future research and interpretation would be destroyed.

Beneficial impact: The condition of the collection as a whole or its constituent components would be secured from the threat of further degradation.

Criteria for Determining Impairment

An impact would be more likely to constitute an impairment to the extent that it

- affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- is key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- is identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Cumulative Impacts

Regional museum collections and archives have benefited by a recent addition to the Eastern California Museum, in Independence, California. The addition provides more exhibit, curation, and storage space, as well as more security and safety. This is a moderate, long-term impact.

Storing the parks’ collections and archives in expanded and improved facilities under state-of-the-art museum standards, as described above, would add a long-term, moderate, beneficial impact to any overall cumulative impacts.

Conclusion

Housing the parks’ museum collections and archives in expanded and improved quarters

meeting state-of-the-art museum standards would be a moderate, beneficial, long-term impact.

There would be no impairment of the parks’ resources or values.

Impacts of Alternative A

The parks’ museum collections and archives would continue to be housed at Ash Mountain under adequate museum standards for fire detection and suppression, security, temperature and humidity control, curation, storage, and research, as described for the no-action alternative. However, because present space is limited, at some point all or part of the material would have to be moved to expanded facilities in the parks. Most likely the space needed to accommodate future

curation and storage of museum collections would be found at the headquarters building, with some functions related to park administration moved out of the building so that space dedicated to collections and archives could be expanded. If this should happen, moving the collection could result in negligible to minor, adverse, short-term impacts. The long-term beneficial impacts of having additional curatorial and storage space that met museum standards would be moderate.

Cumulative Impacts

As described for the preferred alternative, regional museum collections and archives have benefited by a recent addition to the Eastern California Museum, in Independence, California. The addition provides more exhibit, curation, and storage space, as well as more security and safety. This is a moderate, long-term impact.

Storing the parks' collections and archives in expanded and improved facilities under state-of-the-art museum standards, as described above, would add a long-term, moderate, beneficial impact to any overall cumulative impacts.

Conclusion

Museum collections and archives would continue to be safe and secure. Within the life of this general management plan, however, part of the museum collections and archives would likely have to be moved to expanded facilities in the parks. Moving artifacts, specimens, and documents would have minor, adverse, short-term impacts. The impact of having additional curatorial and storage space that met museum standards would be moderate, beneficial, and long term.

There would be no impairment of the parks' resources or values.

Impacts of Alternative C

Analysis

Impacts under alternative C would be similar to those described for the preferred alternative.

- The parks' museum collections and archives would be housed in expanded and improved facilities in the parks that would meet state-of-the-art museum standards, most likely by transferring some functions in the headquarters building related to park administration and expanding space dedicated to collections and archives, with a moderate, beneficial, long-term impact.
- Moving artifacts, specimens, and archives to a new facility could result in negligible to minor, adverse, short-term impacts.

Cumulative Impacts

As described for the no-action alternative, regional museum collections and archives have benefited by a recent addition to the Eastern California Museum, which provides more exhibit, curation, and storage space, as well as more security and safety. This is a moderate, long-term impact.

Storing the parks' collections and archives in expanded and improved facilities under state-of-the-art museum standards, as described above, would add a long-term, moderate, beneficial, cumulative impact to any overall cumulative impact.

Conclusion

Moving the parks' museum collections and archives to facilities meeting state-of-the-art museum standards would be a moderate, beneficial, long-term impact.

There would be no impairment of the parks' resources or values.

Impacts of Alternative D

Analysis

Impacts under alternative D would be similar to those described for the preferred alternative.

- The parks' museum collections and archives would be housed in expanded and improved facilities in the parks that would meet state-of-the-art museum standards, most likely by transferring some functions in the headquarters building related to park administration and expanding space dedicated to collections and archives, with a moderate, beneficial, long-term impact.
- Moving the artifacts, specimens, and archives to a new or expanded facility could result in negligible to minor, adverse, short-term impacts.

Cumulative Impacts

As described for the no-action alternative, regional museum collections and archives have

benefited by a recent addition to the Eastern California Museum, in Independence, California, which provides more exhibit, curation, and storage space, as well as more security and safety. This is a moderate, long-term impact.

Storing the parks' collections and archives in expanded and improved facilities under state-of-the-art museum standards, as described above, would add a long-term, moderate, beneficial impact to any overall cumulative impacts.

Conclusion

Moving the parks' museum collections and archives to expanded and improved quarters meeting state-of-the-art museum standards would be a moderate, beneficial, long-term impact.

There would be no impairment of the parks' resources or values.

Transportation

METHODOLOGY FOR ANALYZING IMPACTS

Transportation patterns and impacts of the alternatives are discussed for the following major activity areas:

- Cedar Grove and the floor of the Kings Canyon
- Grant Grove / Big Stump
- Lodgepole / Wuksachi / Wolverton
- Ash Mountain
- Mineral King
- Other areas

Giant Forest (including Crystal Cave, Crescent Meadow, and Moro Rock) is omitted because management actions have already been prescribed for the area and do not vary among the alternatives currently being considered (see the *Giant Forest Interim Management Plan*, NPS 1996a). The Sequoia/Kings Canyon backcountry is not addressed because there are no roads, and no trailhead parking capacity issues have been documented.

The 1998 “Visitor Use Study” contains the results of transportation, parking, and visitor survey studies done in 1998 (BRW, Inc., and Lee Engineering 1999). The study also contains a brief examination of projected conditions for 2010, based on a series of declining (but still positive) annual growth rates. These forecasts have been used for this analysis where appropriate.

For each activity area, the transportation vision, issues, and actions are discussed with respect to their effect on carrying capacity related to roadways, parking, and transit. To quantify the carrying capacity, several key assumptions were made about the temporal distribution of visitors, parking behavior, and other minor parameters (such as average automobile occupancy). The assumptions are based on traffic and parking

data in the “Visitor Use Study” (BRW, Inc., and Lee Engineering 1999).

Temporal Distribution of Visitation

For transportation, carrying capacity is expressed in the number of visitors per day that can be accommodated at each entrance station, because the number of visitors in the park at one time is what defines congestion. Expressing carrying capacity in terms of the number of visitors monthly or annually is not meaningful in terms of transportation measures, because most roads and parking areas in the parks are substantially under capacity (and will probably continue to be) except during the summer.

Hourly traffic count data were recorded at the Ash Mountain entrance station in the summer of 1997. These counts generally indicate the relationship between the peak-hour traffic volume and the peak daily volume for the month at the entrance station. They were compared with monthly visitation estimates for the park as a whole.

Roadway Capacity

It is assumed that the perception of congestion and a sense of “crowdedness” on park roadways would likely contribute to a negative experience for many visitors. The impact of transportation service quality on visitor experience has not been studied formally, but roadway operations, delays, and frequent undesired stops would likely lead to a negative perception of how visitors experience the parks. To the extent that poor roadway operation could result from (or contribute to) inefficient use at many roadside pullouts, congestion could also lead to safety problems at pullouts where lanes (or parts of lanes) were blocked, sight lines were obscured, and pedestrian activity was high.

Roadway capacity (expressed in vehicles per hour) is defined as a limit to reflect the impact of roadway congestion on visitor experience. Since one park goal is to maximize the quality of visi-

tor experiences, this limit should reflect a traffic level above which that goal is not reasonably attainable. For this exercise, that limit is defined as the LOS D/E boundary, such that LOS D is acceptable, but LOS E is not (see page **Error! Bookmark not defined.** for LOS definitions). Because the value of that capacity varies significantly from one roadway segment to another, it is not quantified here.

The hourly vehicle limit can be translated to a daily capacity by assuming that the daily distribution of demand (percentage of daily traffic during the peak hour) remains constant across alternatives and for future visitation scenarios. This assumption is reasonable because the distribution of traffic throughout the day is governed by factors other than roadway capacity, such as the time visitors start their activities and how far they must travel to reach a desired destination. The daily distribution of traffic can vary significantly from one road segment to the next, and it was documented for many key segments in the “Visitor Use Study.” The following seven roadway segments were selected to represent the five major activity areas for this roadway carrying capacity analysis (listed with each segment’s corresponding activity area):

1. Kings Canyon Highway west of Cedar Grove — Cedar Grove and the floor of the Kings Canyon
2. Kings Canyon Highway north of Generals Highway — Grant Grove / Big Stump
3. Kings Canyon Highway west of Generals Highway — Grant Grove / Big Stump
4. Generals Highway north of Lodgepole — Wuksachi / Lodgepole / Wolverton
5. Generals Highway south of Lodgepole — Wuksachi / Lodgepole / Wolverton
6. Generals Highway north of Ash Mountain — Ash Mountain
7. Mineral King Road — Mineral King

These segments were selected based on their applicability to the major activity areas examined for this analysis and for the availability of traffic data. In addition, segments 3, 6, and 7 (as

numbered above) would represent the traffic at the three primary entrance stations to the parks.

Parking Capacity

The impact analysis is based on information in the “Visitor Use Study” on peak occupancy, average duration, and average turnover for 8 lots in the parks. The study gathered data on 11 lots, but 3 lots in the Giant Forest area (Sherman Tree, Crescent Meadow, and Moro Rock) will not retain their current use and configuration, regardless of the alternative chosen.

The assumption is that delays and visitor frustration in being unable to find a parking place would compromise positive visitor experiences. Full parking lots can also contribute to resource damage if visitors park outside delineated parking areas, and to additional roadway operational problems if they park in (and block) traveled ways.

Effect of Transit on Carrying Capacity

Transit service within the parks has the potential to increase carrying capacity with respect to both parking and roadway operations. The primary benefit would be the reduction of parking congestion at park features. Since roadway congestion is worst at or near the entrance stations, transit service could most effectively improve roadway carrying capacity if visitors in automobiles were intercepted outside the parks. While most roads connecting features inside the park are not congested even at peak times, transit completely internal to the parks would still generate some improvement to roadway operations at more popular features.

Transit would increase parking capacity by using surplus or future parking capacity at areas with less crowded attractions (or none at all) as “park-and-ride” locations for visitors. If visitors had to park only once and visit several attractions, a given level of visitation would generate less vehicle-miles traveled (VMT) in the park and would require substantially fewer parking spaces in the area served by transit.

The effect of the Giant Forest shuttle service has been accounted for in the background carrying capacity estimates because that service is included in all five alternatives. For service to areas other than Giant Forest or expansion of that service, the effects on carrying capacity are considered through general assumptions about service frequency and other parameters.

Estimating Visitation Growth

Between 1979 and 2000 annual visitation fluctuated considerably, from a high of 2.23 million in 1987 to a low of 1.35 million in 1996. In 2001 the parks had about 1.34 million visits, very near the 20-year low. (As noted in “The Affected Environment,” the method of counting visitors to Kings Canyon changed between 1991 and 1993, and visitation estimates prior to 1994 have not been adjusted to reflect this change.)

The “Visitor Use Study” conducted in 1998 assumed positive visitation growth with a declining rate to estimate 2010 traffic conditions. It also assumed that traffic would grow at the same rate as visitation, as shown in Table 40.

TABLE 40: TRAFFIC GROWTH ASSUMPTIONS FROM THE 1998 VISITOR USE STUDY

Year	Percentage Increase	Year	Percentage Increase
1998	2.5	2005	1.4
1999	2.3	2006	1.3
2000	2.1	2007	1.2
2001	2.0	2008	1.1
2002	1.8	2009	1.0
2003	1.7	2010	0.9
2004	1.5		

SOURCE: BRW, Inc., and Lee Engineering 1999.

These growth rates translate to a net visitation growth of just under 23% from 1997 to 2010. Since these estimates were made, the actual annual visitation for the parks has changed as follows: a 6.0% drop from 1997 to 1998, a 2.2% gain from 1998 to 1999, a 4.5% drop from 1999 to 2000, and a 3.2% gain from 2000 to 2001. The net visitation change over these five years is a 5.5% drop. These figures indicate that visitation can fluctuate broadly from year to year. Therefore, the overall growth assumption (just

under 23%) will be carried forward to this analysis for the no-action alternative. For alternatives A, C, and D, relative visitation growth assumptions have been formulated based on a rough judgment of the effects of management actions on visitation on an area-by-area basis. For the purposes of this analysis, from 1997 to 2010 alternative A is estimated to result in 10% less visitation, the preferred alternative and alternative C are estimated to increase visitation by 30%, and alternative D is estimated to increase visitation by 48%.

CARRYING CAPACITY ESTIMATES

Roadways

The peak-hour capacity for each segment was examined and converted to a daily roadway traffic limit. For each alternative impacts were analyzed on capacity and projected demand with respect to roadway operations. The roadway carrying capacity for the seven road segments that are analyzed is presented in Table 41. The daily capacity estimates shown in the table assume that the relationship of peak-hour traffic (or “peak-hour proportion”) to total daily traffic remains constant as traffic grows.

Since roadway segments close to the three primary entrance stations are included in the segments analyzed, these volumes and capacities can generally approximate the overall daily capacity for the parks. The existing (1997) total daily traffic volume for the three road segments near entrance stations was 6,420. If half of these vehicles are assumed to be inbound, then the daily park visitation was about 3,210 vehicles. With the same basic assumptions, the daily park visitation capacity (strictly from the roadway standpoint) would be about 6,860 vehicles per day entering the park. Given that this capacity estimate is more than double the actual visitation observed on an August day in 1997 (when some facilities were over capacity), it is quite probable that some factor other than roadway capacity would limit visitation. Examples of such factors could include entrance station capacity, parking congestion, visitor center capacity, and overall resource conditions.

TABLE 41: ROADWAY CARRYING CAPACITY FOR SELECTED SEGMENTS

Segment	Existing Volume		Peak-Hour Proportion	Capacity	
	Peak Hour	Daily		Peak Hour*	Daily
Kings Canyon Highway west of Cedar Grove	160	1,040	0.15	669	4,350
Kings Canyon Highway north of Generals Highway	433	3,270	0.13	669	5,050
Kings Canyon Highway west of Generals Highway	468	3,720	0.13	665	5,290
Generals Highway north of Lodgepole	245	1,990	0.12	608	4,940
Generals Highway south of Lodgepole	349	2,340	0.15	537	3,600
Generals Highway north of Ash Mountain	277	2,470	0.11	733	6,540
Mineral King Road	52	230	0.23	425	1,880

NOTE: All volumes and capacities are expressed in numbers of vehicles.
 * Peak hour capacity represents LOS D with HCM 2-lane rural road method.

Data from the 1970s show as many as 20,000–25,000 visitors entering the two entrances on a single day on summer holiday weekends. Using three persons per vehicle, this would suggest 6,000–8,000 vehicles entering the parks on a single day. The Big Stump entrance station experiences considerable congestion at existing visitation levels. If it is assumed that existing traffic at the Kings Canyon Highway road segment just inside the park resulted from congestion at the Big Stump entrance station, then the traffic volume observed there would equal the approximate capacity of the entrance station. Therefore, the roadway capacity in that segment could not be achieved without removing the bottleneck at the entrance station. If the roadway carrying capacity was adjusted for this phenomenon (and no existing congestion was assumed at the Ash Mountain or the Mineral King en-

trance station), the daily park carrying capacity with respect to roadway operations would be reduced by the difference between the volume and the capacity of the Kings Canyon Highway west of Generals Highway. This reduction (780 vehicles per day) would lower the estimated daily roadway park carrying capacity to approximately 6,080 vehicles per day.

Parking Areas

The following eight lots were counted during the summer 1997 data collection period and would remain open in their current configuration in the no-action alternative:

- Grant Grove visitor center
- Grant Tree
- Wolverton

TABLE 42: SUMMARY OF PEAK-SEASON DAILY VEHICLE VOLUME ESTIMATES

Area	Representative Road Segment	Road Segment Length (miles)	Existing (1997)	No-Action: Alternative	Preferred Alternative	Alternative A	Alternative C	Alternative D
Cedar Grove	Kings Canyon Highway west of Cedar Grove	8.8	1,040	1,280	1,350	940	1,350	1,540
Grant Grove / Big Stump	Kings Canyon Highway west of Generals Highway	4.7	3,720	4,580	4,840	3,350	4,840	5,510
Wuksachi/Lodgepole/Wolverton	Generals Highway south of Lodgepole	2.2	2,340	2,880	3,040	2,110	3,040	3,460
Ash Mountain/Foothills	Generals Highway north of Ash Mountain	6.5	2,470	3,040	3,210	2,220	3,210	3,660
Mineral King	Mineral King Road	15.5	230	280	300	210	300	340

SOURCE: URS Corporation.
 NOTE: Future estimates are for the year 2010.

- Lodgepole general store
- Lodgepole visitor center
- Hospital Rock
- Ash Mountain west lot and east lot

Combined, these lots have approximately 554 spaces during non-snow conditions. Of these, 321 were filled at peak occupancy during the 1997 survey. This total was estimated by adding the peak occupancy at each lot, and assuming all lots were at peak occupancy simultaneously. Peak occupancy at the Grant Grove visitor center was three cars more than the number of spaces available.

Of the 233 unoccupied spaces, 197 were at Wolverton. (The Wolverton parking area was not included in the reserve carrying capacity estimate because it provides replacement parking, not additional capacity.) The new Sherman Tree parking area (497 spaces) and the Wolverton parking area (300 spaces) replaced 18 parking lots that had been spread throughout Giant Forest. During spring and fall the Crescent Meadow and Moro Rock lots can be used for visitor parking when there is no transit service.

Excluding Wolverton, the seven remaining parking areas have 304 spaces, 268 of which were occupied at the peak. These estimates, if considered representative of the overall parking situation in the parks, indicate that the parks' carrying capacity is approximately 13% more vehicles than entered the parks each day during the study period. In the discussion on roadway carrying capacity, 3,210 daily entering vehicles were estimated. Under the assumptions used thus far, the daily capacity of the parks with respect to parking would be approximately 3,640 vehicles.

Given that the Sherman Tree lot replaces a 74-space lot, the increase in daily parking carrying capacity can be estimated. The existing lot has an average summer parking duration of 0.5 hour, and each space is used 12.5 times per day. The

new lot would be used as a primary transit staging lot, and visitors would use the Giant Forest shuttle system to visit multiple destinations. This type of use would increase the parking duration and reduce the average turnover. If each space was used three times per day, the increase in spaces (176) would translate to an additional parking capacity of approximately 530 vehicles per day. Total carrying capacity with respect to parking would be approximately 4,170 vehicles per day. This estimate is 1,910 vehicles per day less than the estimate of the parks' carrying capacity with respect to roadway operations.

Transit

Like many parks, Sequoia has operated a voluntary bus shuttle system to serve busy attraction areas. Transit service in the park has strong potential to increase the number of visitors who can enjoy and experience park features without the attendant impacts of new or expanded roadway and parking facilities. For example, a vehicle visiting three features in a day that are served by transit would require three parking spaces at these different locations; however, only one parking space would be needed with transit service. This consideration is offset by the fact that with transit service, a vehicle would be parked longer while visitors use the transit service to go to features. It is possible that one factor could substantially outweigh the other, and therefore it is conceivable (depending on parking duration) that transit service could result in higher parking space requirements overall. If this was the case, the transit system would still benefit transportation operations by controlling where visitors park, and by potentially improving roadway operations by using buses rather than individual cars to transfer visitors between activity areas.

The transit system at Giant Forest / Lodgepole ceased operation at the end of the 2000 visitor season owing to financial problems. A new transit system is being planned that may include San Joaquin Valley connections.

IMPACT DEFINITIONS AND INTENSITIES

The transportation analysis looks at the impact of the management alternatives on the parks' carrying capacity with respect to transportation. More specifically, proposed actions are evaluated for their potential to change visitation and the capacity to handle that change. Just as several aspects of park use could govern the level of visitation the park can handle (natural resources, visitor facilities, or visitor transportation), transportation in the park could limit visitor carrying capacity either through roadway or parking capacity constraints. Either way, transportation capacity can affect the quality of visitor experiences.

Impact intensities are analyzed within an area-specific context, while the contribution of the impacts of the proposed actions to cumulative impacts are evaluated in a regional context (i.e., the Sierra Nevada western slope).

The degree to which the ability of an aspect of the parks' transportation capacity is adequate to handle visitation demand is defined by the thresholds in the accompanying text box.

The analysis team used the following terms to evaluate the duration of transportation impacts:

- *Peak-Season Only* — The impact on carrying capacity would only be detectable during peak months. Transportation actions that would improve overall capacity could be seen as having an impact to carrying capacity only during peak seasons, since capacity (and therefore impacts to capacity) is not an issue when visitation levels are low.
- *Year-round* — The impact on carrying capacity would affect visitor experiences for much of the year, especially if negative impacts during peak months had the effect of spreading visitation more evenly throughout the day.

Impact Thresholds for Transportation Impacts

Negligible — The impact on carrying capacity in the area would be at the lower levels of detection or would not be measurable.

Minor — The impact on carrying capacity would be measurable and could affect the quality of visitor experiences in the area during some peak visitation hours.

Moderate — The impact would be clearly measurable and could have an appreciable effect on visitor experiences in the area during most visitation periods.

Major — The impact would be severely adverse or exceptionally beneficial. Impacts would have a substantial, highly noticeable, or widespread influence, affecting the quality of visitor experiences during most visitation times.

CUMULATIVE IMPACTS

The impacts of transportation actions inside the parks in each alternative would be affected by transportation projects and policies of others in the area. These projects and policies are represented on the “supply” side by transportation capacity improvements outside the parks that could increase visitation by lowering the travel time between the parks and the two primary gateway communities. On the “demand” side are actions by others outside the parks that could place additional travel demands on the primary access routes.

Cumulative transportation impacts are described for the transportation systems inside the parks and the nearby sections of California 180 from Fresno and California 198 from Visalia.

The following projects could reduce travel times and affect access capacity to the parks:

- The reconstruction of Generals Highway has been underway since the 1980s and will continue for several more years. Although the reconstruction does not represent a direct capacity improvement (such as additional travel lanes), some features such as

regrading, repaving, and managing roadside pullouts could have small but potentially measurable benefits to vehicle travel on the highway.

- California 180 from Fresno is to be expanded to a six-lane expressway in Fresno and a four-lane expressway as far east as Centerville and Minkler.
- California 65 from Bakersfield is to be widened to a four-lane expressway between Bakersfield and California 198, perhaps extending as far north as Madera County.
- A *Final Environmental Impact Report / Environmental Impact Statement* for high-speed rail transit service connecting central California with both the San Francisco Bay area and the Los Angeles area was released in August 2005.

On the “demand” side the following plans could place additional travel demands on the primary access routes:

- The *Management Plan* for Giant Sequoia National Monument calls for the rehabilitation of portions of California 180, which would improve access to the Cedar Grove area, as well as to various popular destinations on national monument land. The plan also proposes expanded camping opportunities.
- The Hume Lake Christian Camp, which is within the boundaries of Giant Sequoia National Monument, could be expanded. Visitors and staff use California 180 through Grant Grove village.

These are the only two foreseeable “demand” side actions that could present cumulative impacts to transportation in the parks. For both of these actions, the Big Stump entrance station and Grant Grove village are the only areas that would experience cumulative transportation impacts.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Analysis

On a parkwide basis the no-action alternative would result in traffic congestion because of changing user groups and increased day use. Currently scheduled transportation improvements would proceed as planned, but no new efforts would be undertaken to address current congestion issues in some activity areas, or to address potential increased congestion resulting from an increase in visitation. Visitation is projected to increase by 23% by 2010.

The current major transportation initiatives in the parks are rebuilding Generals Highway and implementing a transit shuttle system in Giant Forest. The Generals Highway project will upgrade the safety and durability of the roadway and provide minor capacity improvements (mostly related to scenic roadside pullouts). The Giant Forest shuttle system will help alleviate parking and roadway congestion in specific areas such as Crescent Meadow and Moro Rock.

Cedar Grove and the Floor of the Kings Canyon

Cedar Grove would continue to be a relatively quiet destination for backcountry access and a “turnaround point” for visitors to the scenic canyon areas. No transit service to this area would be proposed.

The no-action alternative would not affect vehicle demand or roadway carrying capacity in the Cedar Grove / Kings Canyon floor area.

Parking capacity and utilization were not measured for the 1998 “Visitor Use Study,” but there is no evidence that the area could not support more visitors in terms of parking supply. Maintaining current uses would have no impact on the carrying capacity of the Cedar Grove / canyon floor area.

The no-action alternative would have a negligible, peak-season impact on the transportation carrying capacity in the Cedar Grove area.

Grant Grove / Big Stump

As documented in “The Affected Environment,” congestion and delays for visitors passing through the Big Stump entrance station and Grant Grove village are increasing.

Under current conditions the Big Stump entrance station could determine carrying capacity for the parks because it is the busiest entrance. As long as this station continued to serve Hume Lake traffic, visitation growth would result in severe delays for even longer periods than under current conditions. Also, because most Hume Lake traffic goes through Grant Grove, and because Grant Grove is a popular destination, traffic congestion in Grant Grove village would worsen under current conditions.

Two key roadway segments for which daily capacities have been estimated are in the Grant Grove / Big Stump area. Although the entrance stations’ capacity would likely control traffic into the parks, the effects of projected increased visitation for this area on roadway carrying capacity have been examined. As shown in Table 43, traffic forecasts in the 1998 “Visitor Use Study” would not exceed the roadway carrying capacity on either segment in 2010. However, because no improvements would be made to the Big Stump entrance station, it is highly unlikely that the 2010 daily volumes would be realized, especially because recent experience suggests that the entrance station cannot adequately serve existing peak volumes.

Parking capacity would be significantly exceeded (as it often is now) at the Big Stump picnic area (28 spaces), the Grant Grove visitor center (75 spaces), and Grant Tree (53 spaces). The fact that these parking areas are at or near capacity under current conditions implies that

their carrying capacity has been reached. However, annual visitation data are not broken down by activity area, so it would be difficult to accurately quantify the effect on overall park carrying capacity. Nonetheless, it is reasonable to assume that retaining current conditions in the Grant Grove / Big Stump area would subsequently limit visitation because Big Stump is the primary gateway to Kings Canyon, Grant Grove, and several non-park areas.

Under the no-action alternative the viability of local transit service would be assessed, but there is no specific provision to implement such service if it was feasible. If transit service was provided, parking capacity could be increased somewhat because parking areas could support more visitors.

The no-action alternative would have a moderate, adverse impact on transportation carrying capacity in the Grant Grove / Big Stump area during peak seasons, with severe parking shortages at Grant Tree and Grant Grove village, and extensive summer congestion for inbound traffic at the Big Stump entrance station.

Wuksachi / Lodgepole / Wolverton

Wuksachi village was under construction during the 1998 “Visitor Use Study,” so transportation data are limited. Under the no-action alternative Wuksachi village would remain a primary lodging, food service, and park operations area. Lodgepole would remain a popular campground, the primary day-use commercial center, and the primary employee housing area.

Two of the key roadway segments for which daily capacity has been estimated are in the Wuksachi / Lodgepole / Wolverton area. Although the entrance station capacity would

TABLE 43: ROADWAY CARRYING CAPACITY FOR GRANT GROVE ROAD SEGMENTS — NO-ACTION ALTERNATIVE

Segment	Road Capacity	Daily Volumes	
		Existing	2010 Projected
Kings Canyon Highway north of Generals Highway	5,050	3,270	4,020
Kings Canyon Highway west of Generals Highway	5,290	3,720	4,560

NOTE: All volumes and capacities are expressed in vehicles per day.

likely meter traffic into the parks, these two segments have been examined with respect to how projected visitation for this area would affect roadway carrying capacity. As shown in Table 44, the 2010 projected traffic level would not exceed the roadway carrying capacity on either of these two road segments.

Wuksachi would remain a lodging area rather than an attraction, and all parking to support future buildout has already occurred. Parking at Lodgepole would become a limiting factor for visitation, as peak lot occupancies for the visitor center and the general store (91 spaces combined) have been at or near capacity in recent years. The Wolverton parking area has approximately 300 parking spaces; the 1998 “Visitor Use Study” recorded that no more than 30% of those were occupied in any season. A new parking area would improve parking capacity for the Sherman Tree, and therefore the carrying capacity with respect to parking at the Wolverton area in general. However, this new parking area was included in the background parking carrying capacity estimate because it is common to all alternatives.

All three areas would be served by the Giant Forest shuttle system, which would allow lodging patrons to park their cars at one location and use the shuttle system (including Crescent Meadow and Moro Rock).

The no-action alternative would have a negligible, year-round impact on carrying capacity in the Wuksachi / Lodgepole / Wolverton area, as potential parking constraints should be compensated for by the Giant Forest transit system.

Ash Mountain

The two parking areas at Ash Mountain (the visitor center and the picnic area) are currently

at or near capacity during peak times. The no-action alternative would not provide any new parking or transit service, so the carrying capacity would, in theory, be limited to current visitation levels.

The no-action alternative would have a negligible, year-round impact on transportation carrying capacity in the Ash Mountain area.

Mineral King

The no-action alternative would maintain the road alignment and width, RVs would be prohibited, and vehicle lengths would be limited on the road.

The carrying capacity of the Mineral King Road is unlikely to limit visitation because the road is long, narrow, winding, and rugged, and the perception of its difficulty probably deters most day-use visitors. Actions under this alternative would not have an impact on carrying capacity, but could keep demand down for certain types of visits.

The carrying capacity of parking areas at Mineral King is difficult to predict in light of the area’s inholdings and permit cabins. The primary park-related attraction in this area is the large selection of backcountry trailheads. The parking capacity at trailhead lots has not been measured, but park staff report parking demand has exceeded supply on some holiday weekends (July 4th and Labor Day), and during some special events cars have been parked illegally in the Mineral King Valley trailhead area. It appears that Mineral King could support additional visitation throughout the use season without substantial facility upgrades, but it is unlikely that demand would increase without new and/or upgraded facilities.

TABLE 44: ROADWAY CARRYING CAPACITY FOR WUKSACHI / LODGEPOLE / WOLVERTON ROAD SEGMENTS — NO-ACTION ALTERNATIVE

Segment	Road Capacity	Daily Volumes	
		Existing	2010 Projected
Generals Highway north of Lodgepole	4,940	1,990	2,440
Generals Highway south of Lodgepole	3,600	2,340	2,890

NOTE: All volumes and capacities are expressed in vehicles per day.

No transit service would be provided to Mineral King under the no-action alternative.

The no-action alternative would have a negligible, year-round impact on transportation carrying capacity in the Mineral King area.

Other Areas

Proposed transportation-related actions at several minor activity areas could contribute to changes in visitor demand or capacity. These areas include North Fork, South Fork, and Dillonwood. Roadway traffic and parking data have not been collected for these areas, and no transit service is proposed.

Maintaining the trailhead and small parking area at North Fork, and retaining the old Colony Mill Road as a trail connecting the North Fork area with the Crystal Cave road, would be unlikely to limit or encourage visitation, and therefore should not affect carrying capacity.

The South Fork's small campground and trailhead would be maintained. It is unlikely that visitation would be limited or encouraged, so no effect on carrying capacity is anticipated.

A plan for Dillonwood has not yet been developed.

The no-action alternative would have a negligible, year-round impact on transportation carrying capacity in the other activity areas examined.

Cumulative Impacts

If proposed actions for Giant Sequoia National Monument resulted in significant additional traffic, then cumulative impacts in the Grant Grove / Big Stump area under the no-action alternative would be major and adverse during peak seasons. Specifically, traffic growth beyond that forecast in the no-action scenario without additional roadway capacity and/or access reconfiguration could significantly worsen peak-season congestion at the Big Stump entrance and

result in severe parking shortages and intersection congestion problems in Grant Grove village.

Programmed roadway improvements on California 180 and 198 in the Central Valley could reduce travel times for park visitors, especially if those routes were not congested. However, both routes would continue to be two-lane mountainous roads near the parks, with features such as sharp curves and limited shoulders that limit functional capacity. As such, the cumulative impact of these "supply" side actions on transportation under the no-action alternative would be negligible and adverse.

Conclusion

Under the no-action alternative traffic is projected to increase by 23% by 2010. There would be a negligible, adverse, peak-season impact on transportation carrying capacity in the Cedar Grove area. There would be negligible, year-round impacts at Wuksachi / Lodgepole / Wolverton (potential parking constraints should be compensated for by the Giant Forest transit system), Ash Mountain, and Mineral King. Impacts in the other activity areas examined (North Fork, Colony Mill Road, South Fork, and Dillonwood) would also be negligible. The no-action alternative would have a moderate adverse impact on transportation carrying capacity in the Grant Grove / Big Stump area during peak seasons, with severe parking capacity shortages at Grant Tree and Grant Grove village, and extensive summer congestion for inbound traffic at the Big Stump entrance station.

On a cumulative basis, potential increases in peak-season daily travel through the Big Stump entrance and Grant Grove village as a result of foreseeable actions in Giant Sequoia National Monument could result in a major, adverse impact to roadway operations in those areas during the peak season.

IMPACTS OF THE PREFERRED ALTERNATIVE

Analysis

The primary goals of the preferred alternative are to preserve resources and to encourage diverse new user groups while preserving traditional uses in the parks. The preferred alternative would also seek to preserve some of the traditional park character and rustic architecture while containing negative resource impacts. Transit services would be provided in the Wuk-sachi / Lodgepole / Giant Forest area and possibly to locations and intermodal connections outside the parks. Some roads and parking areas would be redesigned to help reduce congestion and to accommodate limited visitation growth. Visitation is projected to increase by 30% by 2010.

Cedar Grove and the Floor of the Kings Canyon

The vision for this area is to strengthen the identity of Kings Canyon while maintaining a slower pace and lower visitation than at Grant Grove or Giant Forest. Cedar Grove village would be made more efficient, and the variety of overnight accommodations would be increased.

The National Park Service would encourage Caltrans to open the Kings Canyon Highway earlier in the spring and to keep it open longer in the fall, thus extending the visitor use season in Cedar Grove and the canyon. Since this action would not affect travel on a daily basis, it would not affect the daily carrying capacity of the roadway or visitor demand.

As described for the no-action alternative, there is no evidence that the area could not support additional visitation in terms of parking supply. Proposed actions would have no impact on the carrying capacity of the Cedar Grove / canyon floor area. No transit service is proposed to this area.

The preferred alternative would have a negligible, peak-season impact on transportation carrying capacity in the Cedar Grove area.

Grant Grove / Big Stump

Grant Grove village would continue as a popular destination, but no major transportation enhancements would be made. Facility and visitation growth would be capped to control utility demand. Some parking and roadway circulation elements would be redesigned to reduce congestion.

The Big Stump entrance station would be either relocated to a more appropriate location or redesigned to accommodate increased traffic flow. Either of these actions would increase the actual roadway carrying capacity because the bottleneck at the entrance station would be removed. The capacity analysis for this road segment under the preferred alternative would be the same as for the no-action alternative (see Table 43, page 233). That analysis indicates that the capacity of the roadway at this key location would accommodate about 48% more traffic than allowed into the parks in the summer of 1997, while a 30% traffic increase is projected under the preferred alternative.

Hume Lake traffic would be redirected through Quail Flat, which would reduce the level of traffic through Grant Grove. Existing traffic data appear to indicate that about one third of the daily traffic volume north of the Wye is going to Hume Lake. Also, volumes on Generals Highway are about 15% lower east of the Redwood Mountain / Quail Flat intersection than they are just east of the Wye. If all traffic to Hume Lake used the Quail Flat route, approximately 1,000 vehicle trips per day going to Hume Lake would be removed from the traffic stream on park roads in the Grant Grove village area.

Redirecting Hume Lake traffic through Quail Flat and other transportation actions for the Grant Grove / Big Stump area would increase the carrying capacity of the area with respect to roadway operations.

Parking in Grant Grove village would be redesigned, and parking at Grant Tree would remain at existing levels. While the extent of changes in parking at the Grant Grove visitor center have not been quantified, to estimate impacts it was

assumed that parking capacity would be increased by one third (25 spaces). The resulting net gain in parkwide carrying capacity would be about 163 vehicles per day (or approximately 2.8%). While this amount might not seem major on a parkwide basis, it would relieve an existing congestion problem and allow for some of the forecast growth to be accommodated.

As described for the no-action alternative, the viability of local transit would be assessed. This action would not affect carrying capacity.

Overall, the preferred alternative would have a minor, beneficial impact on transportation carrying capacity in the Grant Grove / Big Stump area in peak seasons with the relocation of the entrance station and some additional circulation and parking improvements.

Wuksachi / Lodgepole / Wolverton

Wuksachi village would remain as a primary lodging and food service facility, with residential and park operations areas, in accordance with the concession contract. Lodgepole would undergo minor redesign to separate day and overnight uses and to improve traffic flow and circulation. Wolverton would be the main day-use staging area for backcountry access and expanded winter uses.

No roadway actions would affect carrying capacity. Reconfiguring some access ways within Lodgepole village to facilitate traffic flow would be unlikely to have a noticeable effect on overall roadway operations quality.

There would be minor changes to parking circulation in Lodgepole, with minor upgrades in capacity possible. The impact of this action on overall parking capacity is not quantified, but is expected to be negligible.

Transit service for this area would be the same as described for the no-action alternative, with only a shuttle stop for the Giant Forest shuttle system.

Overall, the preferred alternative would have a negligible, year-round impact on transportation

carrying capacity in the Wuksachi / Lodgepole / Wolverton area.

Ash Mountain

Ash Mountain area would continue as the parks' primary administrative and operations center, with increased visitor use opportunities.

No roadway actions are proposed for the Ash Mountain area. Parking areas at the visitor center would be redesigned to improve circulation and reduce congestion. The feasibility of transit service to various park areas and surrounding communities for the public, park staff, and concession employees would be investigated but not definitely implemented. Since transit service would not be proposed, the impacts were not quantified.

The preferred alternative would have a negligible, year-round impact on the transportation carrying capacity in the Ash Mountain area since minor improvements to visitor center parking areas would not substantially affect capacity. While the feasibility of transit service would be studied, the impacts have not been quantified and would probably be relatively limited.

Mineral King

The Mineral King Road would continue to provide access to the cabins, resort, and the Sequoia backcountry, and the road would be maintained in its current configuration.

As described for the no-action alternative, maintaining the present alignment and width of the road would likely help limit future visitor use. It appears that parking areas in Mineral King could accommodate more use throughout the visitor season, although probably not on holiday weekends, when shortages have been observed. No transit service is proposed for the Mineral King area.

The preferred alternative would have a negligible, peak-season impact on the transportation carrying capacity in the Mineral King area.

Other Areas

No proposed actions would affect transportation carrying capacity in the North Fork area, Colony Mill Road, or South Fork. Future public road access to Dillonwood would be determined in long-term planning.

The preferred alternative would have a minor, beneficial, year-round impact on transportation carrying capacity in other activity areas.

Cumulative Impacts

From a transportation standpoint, most of the impacts under the cumulative analysis would be in the Grant Grove village area. More open management of Giant Sequoia National Monument and expansion of the Hume Lake Christian Camp could introduce additional traffic demand beyond the 30% increase forecast for the preferred alternative.

Although redirecting traffic to Hume Lake through Quail Flat would substantially reduce the potential impact to transportation conditions in the Grant Grove area, increases in monument traffic would offset this benefit. In addition, improving or relocating the Big Stump entrance station would not have the same beneficial impact documented above if the cumulative scenario was realized.

As described for the no-action alternative, programmed roadway improvements on California 180 and 198 in the Central Valley could reduce travel times for park visitors, especially if those routes were not congested. However, both routes would continue to be two-lane mountainous roads near the parks, with features such as sharp curves and limited shoulders that limit functional capacity. As such, the cumulative impact of these “supply” side actions on transportation under the preferred alternative would be negligible and adverse.

In combination with the proposed actions in the preferred alternative, the cumulative scenario would result in a negligible overall impact.

Conclusion

Under the preferred alternative traffic is projected to increase by 30% by 2010. The preferred alternative would have a negligible, peak-season impact on transportation carrying capacity in the Cedar Grove area and a minor, beneficial impact in the Grant Grove / Big Stump area in peak seasons as a result of relocating the entrance station and making circulation and parking improvements. The preferred alternative would have negligible, year-round impacts on carrying capacity in the Wuksachi / Lodgepole / Wolverton area, Ash Mountain, and Mineral King. In other activity areas (North Fork, Colony Mill Road, South Fork, and Dillonwood) impacts would be minor and beneficial.

On a cumulative basis the potential minor peak-season benefit of improvements to the Big Stump entrance station and the redirection of Hume Lake traffic through Quail Flat would be offset by increased traffic activity if traffic to Giant Sequoia National Monument increased and the private Hume Lake Christian Camp was expanded.

IMPACTS OF ALTERNATIVE A

Analysis

Alternative A would scale back visitor-oriented services and provide visitor experiences directly connected to natural resources. It would minimize transportation improvements (and even remove some parking) for the purpose of improving the natural environment. The Generals Highway improvements and Giant Forest transit system would be implemented as described for the no-action alternative. Visitation is projected to decrease by 10% by 2010.

Cedar Grove and the Floor of the Kings Canyon

No transportation actions under alternative A for this area would affect its carrying capacity or its ability to meet or limit visitation demand. An entrance station would be provided at Cedar Grove. Alternative A would have a negligible

impact on transportation carrying capacity in the Cedar Grove area year-round.

Grant Grove / Big Stump

Entrance stations would be provided at Cedar Grove for Kings Canyon National Park and at Lost Grove for Sequoia National Park. Hume Lake traffic would be redirected through Quail Flat, which would reduce the level of traffic through Grant Grove. Existing traffic data appear to indicate that about one third of the daily traffic volume north of the Wye is going to Hume Lake. Also, traffic volumes on Generals Highway are about 15% lower east of the Redwood Mountain / Quail Flat intersection than they are just east of the Wye. These two assumptions indicate that daily entrance station traffic would be approximately 2,180 at Cedar Grove and 1,810 at Lost Grove. These levels would be much more manageable than the current level at Big Stump. Removing the Big Stump entrance station would eliminate a considerable bottleneck and allow the roadway capacity on the Kings Canyon Highway to be used more effectively.

Lower visitation is prescribed for the area, but redirecting Hume Lake traffic through Quail Flat and removing the Big Stump entrance station in favor of Cedar Grove and Lost Grove stations would basically allow free access to the attractions and amenities in the Grant Grove area. One result of having no entrance station or fees in the Grant Grove area could be an increase in day use for picnicking and other recreational activities. This situation, when combined with reduced parking at the Grant Tree, for example, could lead to severe local congestion at certain features. Otherwise, the transportation actions for the Grant Grove / Big Stump area would increase the carrying capacity of the area with respect to roadway operations.

The Grant Tree parking area would be reduced to improve resource conditions (although the reduction is not yet quantified). Parking at Grant Tree and the visitor center/store would become a limiting factor in visitation, and congestion could increase in the area because traffic flow

would no longer be restricted by the Big Stump entrance station. No transit service is proposed for the Grant Grove / Big Stump area under alternative A.

Overall, alternative A would have a moderate, beneficial impact on transportation carrying capacity in the Grant Grove / Big Stump area during peak seasons by improving entrance station capacity and reducing overall use in the area.

Wuksachi / Lodgepole / Wolverton

Alternative A would be the same as the no-action alternative for Wuksachi, but use levels at Lodgepole and Wolverton would be reduced by removing some facilities and activities.

No roadway actions proposed for this area would affect the roadway carrying capacity. Parking areas at Lodgepole would be reduced in size and redesigned to improve resource conditions, but the reduction has not been quantified. To estimate the level of impact, a 20% reduction in parking capacity (18 spaces) would reduce total park carrying capacity by about 90 vehicles per day, or about 1.6%. Transit service for this area would be the same as the no-action alternative.

Alternative A would have a negligible impact on carrying capacity in the Wuksachi / Lodgepole / Wolverton area in peak seasons.

Ash Mountain

Impacts under alternative A would be similar to those under the no-action alternative. No specific transportation actions are proposed, but visitation would be limited.

No proposed roadway or parking actions would affect the carrying capacity in the Ash Mountain area. Lower-than-existing visitation would reduce the likelihood of parking congestion at the visitor center / picnic area lots. No transit service is proposed for the Ash Mountain / Foothills area under alternative A.

Alternative A would have a minor, beneficial, year-round impact on transportation carrying capacity in the Ash Mountain area by reducing overall use.

Mineral King

Roadway actions for Mineral King would be similar to those described under the no-action alternative except that roadways and development above West Mineral King would be removed. Since the roadway carrying capacity for Mineral King is represented by the capacity of the access road near the entrance station, this action is not assumed to have any impact on the roadway carrying capacity of the parks. It could result in slightly lower visitation to the area, further reducing the likelihood that roadway capacity would be met or exceeded in the foreseeable future.

Some trailhead parking would be removed to limit resource impacts, but reductions have not been quantified. Parking shortages have occurred in the Mineral King area at trailheads on holiday weekends, so a reduction in parking would affect the area's carrying capacity at peak use. Given the relatively small size and low level of use these trailhead parking areas receive, impacts to the overall parking carrying capacity of the parks are expected to be negligible. No transit service is proposed for the Mineral King area in alternative A.

Overall, alternative A would have a minor, beneficial, year-round impact on transportation carrying capacity in the Mineral King area by reducing overall use.

Other Areas

As described for the no-action alternative, maintaining the trailhead and small parking area at North Fork, and retaining the old Colony Mill Road as a trail, would not affect overall carrying capacity.

The South Fork campground would be reduced in scale to a trailhead with some campsites. Even though use could drop somewhat, no transpor-

tation actions in this area would affect carrying capacity.

Alternative A would open the Dillonwood sequoia grove to low use levels, but no vehicular access would be allowed. Roads would be converted to trails, and all facilities would be removed. A small parking area and trailhead would be provided outside the gate in cooperation with other land managers. These actions would have no impact to the transportation carrying capacity in Dillonwood.

Overall, alternative A would have a minor, beneficial, year-round impact on transportation carrying capacity in other activity areas area by reducing overall use.

Cumulative Impacts

Projects considered under the cumulative scenario would be in opposition to the goals of alternative A from a transportation standpoint because traffic through the Grant Grove area would increase, not decrease. Removing the Big Stump entrance station in favor of park entrances at Cedar Grove and Lost Grove could worsen the cumulative impact of increased traffic through the Grant Grove area because prospective users of non-park attractions in and near Giant Sequoia National Monument would no longer have a park entrance as a deterrent to their access. In combination with the proposed actions in the alternative A, the cumulative scenario would result in a moderate, adverse, peak-season impact in the Grant Grove / Big Stump area.

As described for the no-action alternative, programmed roadway improvements on California 180 and 198 in the Central Valley could reduce travel times for park visitors, especially if those routes were not congested. However, both routes would continue to be two-lane mountainous roads near the parks, with features such as sharp curves and limited shoulders that limit functional capacity. As such, the cumulative impact of these "supply" side actions on transportation under alternative A would be negligible.

In combination with the proposed actions in alternative A, the cumulative scenario would result in a negligible overall impact.

Conclusion

Under alternative A traffic is projected to decrease by 10% by 2010. Alternative A would have a negligible, year-round impact on transportation carrying capacity in the Cedar Grove area. Overall, alternative A would have a moderate beneficial impact on transportation carrying capacity in the Grant Grove / Big Stump area during peak seasons by improving the entrance station capacity and reducing overall use in the area. In the Wuksachi / Lodgepole / Wolverton area impacts on transportation carrying capacity in peak seasons would be negligible. Reducing overall use would result in minor, beneficial, year-round impacts on transportation carrying capacity in the Ash Mountain area, the Mineral King area, and other areas (North Fork / Colony Mill Road, South Fork, and Dillonwood) by reducing overall use.

On a cumulative basis, a projected 10% drop in peak-season daily travel in the parks by 2010 would be more than offset by increases in non-park traffic in the Grant Grove / Big Stump area. If the cumulative scenario was realized, the result for this area would be a minor, adverse impact on peak-season transportation operations.

IMPACTS OF ALTERNATIVE C

Analysis

Under alternative C developed areas would be redesigned to facilitate transportation and reduce congestion, while retaining the feel of yesterday. The Generals Highway improvements and Giant Forest shuttle system would be implemented as described for the no-action alternative. Visitation is projected to increase by 30% by 2010, the same as the preferred alternative.

Cedar Grove and the Floor of the Kings Canyon

The vision of alternative C for this area is to strengthen the identity of the canyon features while maintaining the area's slower pace and lower visitation compared to Grant Grove or Giant Forest. Cedar Grove village would be slightly expanded, and the variety of overnight accommodations would be increased.

As described for the preferred alternative, the visitor season would be potentially lengthened in the spring and fall by encouraging Caltrans to open the Kings Canyon Highway earlier in the spring and keep it open longer in the fall, thus providing more visitation opportunities. Since this action would not affect travel on a daily basis, it would not affect the daily roadway carrying capacity or visitor demand. As described for the no-action alternative, maintaining current parking areas would have no impact on the carrying capacity of the Cedar Grove / canyon floor area. No transit service would be proposed to this area under this alternative.

Alternative C would have a negligible, year-round impact on transportation carrying capacity in the Cedar Grove area.

Grant Grove / Big Stump

Alternative C would include several actions to expand and improve Grant Grove village, including redesigned facilities and increased use. Redesigning the Big Stump entrance station to facilitate traffic flow would translate directly to improved capacity for the entrance station. Although spatial limitations at the current entrance station site could preclude major improvements in capacity, it is likely that the bottleneck condition could be removed and that roadway capacity on Kings Canyon Highway west of the Wye could be more fully utilized. The capacity analysis for this road segment under alternative C would be the same as for the no-action alternative (see Table 43).

Under alternative C designating Quail Flat Road as California 180 would help direct some traffic around Grant Grove village rather than through

it; however, other strategies would likely be needed to redirect a substantial amount of traffic. The Quail Flat route to Hume Lake and Kings Canyon National Park is slightly longer and more circuitous than the route through Grant Grove. Therefore, increased travel time could be another deterrent to visitors in choosing whether or not to use the Quail Flat route.

The beneficial impact of improving parking capacity in Grant Grove village is unknown since the change has not been quantified. To estimate the level of impact, if parking at the Grant Tree remained at the existing level and parking at the Grant Grove visitor center was increased by one third (25 spaces), the net gain in parking carrying capacity would be about 163 vehicles per day (or approximately 2.8%). While this amount would not be substantial parkwide, it would relieve an existing congestion problem and allow for some of the forecast growth to be accommodated.

A voluntary, local transit system would be implemented, with parking and maintenance functions near the Wye. The system would serve the village and its attractions, as well as shuttle service between local overnight lodging locations such as Hume Lake, USFS campgrounds, and Montecito-Sequoia. This system would have the effect of increasing carrying capacity with respect to parking because the staging area would include additional parking supply for visitors using transit. The effects of this service on carrying capacity would depend on how many visitors used the transit service, which in turn would depend on the comfort, frequency, and cost of this service. If the staging area had 100 parking spaces, it might be reasonable to assume that 100 vehicles per day could be removed from other parking areas along the route served by the transit system. In this event, the transit service would in effect increase the parking carrying capacity by 100 vehicles per day, or approximately 1.7%.

Alternative C would have a moderate beneficial impact on transportation carrying capacity in the Grant Grove / Big Stump area in peak seasons by improving the capacity of the entrance station

and Grant Grove parking areas and implementing a local transit service.

Wuksachi / Lodgepole / Wolverton

Alternative C would be the same as the no-action alternative for Wuksachi. Lodgepole would be redesigned and expanded, with an emphasis on overnight use. Wolverton would retain its current character, but some back-country and winter operations would be expanded.

No roadway actions under alternative C would affect carrying capacity in this area. Reconfiguring some access ways within Lodgepole village to facilitate traffic flow would probably not affect overall roadway operations. No changes are proposed to the parking capacity in this area. Transit service for this area would be by means of the Giant Forest shuttle system, the same as described for the no-action alternative.

Alternative C would have a negligible, year-round impact on transportation carrying capacity in the Wuksachi / Lodgepole / Wolverton area.

Ash Mountain

The Ash Mountain area would continue as the parks' primary administrative and operations center, with increased visitor use opportunities.

No roadway actions are proposed for the Ash Mountain area under alternative C. Parking would be expanded to meet increased demand by converting the present picnic site to a parking area. The amount of this increase has not been quantified, but if the parking capacity increased by approximately half (14 spaces) and the turnover rate remained the same as now, the net overall parking carrying capacity would increase by 49 vehicles per day (or about 0.8%).

An employee shuttle service would be provided to reduce staff parking demand in the administrative areas. Details of this service are not prescribed at this time, and the service would not affect visitor carrying capacity.

Alternative C would have a minor beneficial impact on transportation carrying capacity in the Ash Mountain area during peak seasons.

Mineral King

Under alternative C Mineral King Road would continue to provide access to the cabins, the resort, and the Sequoia backcountry, and it would be preserved in its current configuration, as described for the no-action alternative.

The carrying capacity of parking areas at Mineral King would not change, as described for the no-action alternative, and while demand has exceeded supply on some holiday weekends and during special events, additional visitation could be accommodated throughout the use season without substantial facility upgrades. No transit service is proposed for the Mineral King area under alternative C.

Alternative C would have a negligible, year-round impact on transportation carrying capacity in the Mineral King area.

Other Areas

The trailhead at North Fork would be improved in alternative C, and the National Park Service would partner with the appropriate agencies to improve the road access. Even though traffic and capacity on this road have not been quantified, improvements in surface, width, and possibly alignment would all improve capacity. The level of use would probably stay relatively low, so the effect on overall park carrying capacity would likely be negligible.

As described for the no-action alternative, maintaining the small campground and trailhead at South Fork would have no effect on carrying capacity.

Road access would be upgraded to Dillonwood in alternative C so that the public could use the trails and primitive camping facilities there.

Alternative C would have a minor beneficial impact on transportation carrying capacity in other activity areas in peak seasons.

Cumulative Impacts

From a transportation standpoint, most of the impacts under the cumulative analysis would be in the Grant Grove village area. More open management of Giant Sequoia National Monument and expansion of the Hume Lake Christian Camp could introduce additional traffic demand beyond the 30% increase forecast for park visitation, similar to the preferred alternative.

Although redirecting traffic to Hume Lake through Quail Flat (by transferring the California 180 route designation) would substantially benefit transportation conditions in the Grant Grove area, traffic increases to the monument and other non-park features in the area would offset that benefit. In addition, improving or relocating the Big Stump entrance station would not have the same beneficial impact documented above if the cumulative scenario was realized.

As described for the no-action alternative, programmed roadway improvements on California 180 and 198 in the Central Valley could reduce travel times for park visitors, especially if those routes were not congested. However, both routes would continue to be two-lane mountainous roads near the parks, with features such as sharp curves and limited shoulders that limit functional capacity. As such, the cumulative impact of these “supply” side actions on transportation under alternative C would be negligible and adverse.

In combination with the proposed actions in alternative C, the cumulative scenario would result in a negligible impact overall.

Conclusion

Under alternative C traffic is projected to increase by 30% by 2010, the same as the preferred alternative. Alternative C would have a negligible, year-round impact on transportation carrying capacity in the Cedar Grove area, the Wuksachi / Lodgepole / Wolverton area, and the Mineral King area because daily traffic capacity would not be changed. There would be a moderate, beneficial impact in the Grant Grove / Big Stump area in peak seasons as a result of im-

proving the capacity of the entrance station and the Grant Grove parking areas and implementing a local transit service. Alternative C would have a minor, beneficial impact on transportation carrying capacity in the Ash Mountain area during peak seasons as a result of increasing parking and establishing an employee shuttle. Improving road access to North Fork and Dillonwood would result in minor, beneficial impacts.

The cumulative scenario could produce additional traffic demand beyond forecast increases in park visitation, which would offset the moderate benefit provided by actions in alternative C. If the cumulative scenario was realized, the result for this area would be a negligible impact on transportation operations.

IMPACTS OF ALTERNATIVE D

Analysis

Alternative D would encourage diverse new user groups and potentially allow new uses in the parks. Transit services would be provided to all major activity areas and possibly to locations and intermodal connections outside the parks. Some roads and parking areas would be redesigned to help reduce congestion and accommodate visitation growth. Visitation is projected to increase by 48% by 2010.

Cedar Grove and the Floor of the Kings Canyon

The visitor season would be potentially lengthened in the spring and fall by encouraging Caltrans to open the Kings Canyon Highway earlier in the spring and to keep it open longer in the fall, the same as the preferred action and alternative C. Maintaining current parking areas would have no impact on the carrying capacity of the Cedar Grove / canyon floor area. No transit service would be proposed to this area under the alternative D.

Alternative D would have a negligible impact on transportation carrying capacity in the Cedar Grove area in peak seasons.

Grant Grove / Big Stump

Under alternative D the Big Stump entrance station would be relocated outside the park. The design of the new station would eliminate the present bottleneck situation and increase traffic flow. The capacity analysis for this road segment would be basically the same as for the no-action alternative (see Table 43), which indicates that the roadway capacity at this key location would accommodate about 48% more traffic than what was accommodated in summer 1997.

Hume Lake traffic would be diverted around the Grant Grove area via a new bypass on Giant Sequoia National Monument land. This action would substantially reduce traffic volumes through the entrance station and Grant Grove village, freeing up additional roadway capacity for park visitors. Although the overall roadway carrying capacity would be the same as estimated previously in this report, approximately 1,000 vehicle trips per day to Hume Lake would be removed from park roads in the Grant Grove / Big Stump area.

The portion of Kings Canyon Highway (California 180) between the north end of Grant Grove village and the park boundary (a distance of about 1 mile) would be closed so that vehicles could not use the Hume Lake bypass to get around the Big Stump entrance station. This action would have a mixed effect on traffic that could be difficult to estimate. Visitors driving from Grant Grove village to Kings Canyon would need to go back south to the Wye, then take either the Hume Lake bypass road or go through Quail Flat and the Hume Lake area itself to get back to the Kings Canyon Highway north of Grant Grove village, and traffic south of Grant Grove would be increased. Trips from Sequoia National Park on Generals Highway would need to divert at Quail Flat, and trips through Grant Grove would be decreased. Caltrans could object to closing this road segment if it created a more circuitous route for canyon visitors and state maintenance vehicles.

As described for the no-action alternative, maintaining current parking areas would have no impact on the carrying capacity of the Grant

Grove / Big Stump area, with the exception that tour buses would be accommodated.

Alternative D would implement a more extensive voluntary day use transit system than under alternative C, with service to destinations such as Big Stump, Grant Tree, Panoramic Point, and national forest sites. The staging area would be near the expanded visitor center. Transit service would also be provided between Grant Grove and Giant Forest, so that visitors could see most of the major destinations by transit. This action could significantly increase the carrying capacity with respect to parking if shuttle service was frequent, reliable, comfortable, and relatively inexpensive to visitors. Although roadway capacity could be increased as well, it is still likely that parking capacity in the area would continue to govern the overall transportation carrying capacity. Like the potential transit staging area proposed in alternative C, if the staging area had 100 parking spaces, it might be reasonable to assume that 100 vehicles per day could be removed from parking areas served by the transit system. In this event, the transit service would in effect increase the parking carrying capacity by 100 vehicles per day, or approximately 1.7%.

Alternative D would have a major, beneficial impact on transportation carrying capacity in the Grant Grove / Big Stump area in peak seasons as a result of a bypass road, additional parking capacity, transit parking near the Wye, and transit service to activity areas.

Wuksachi / Lodgepole / Wolverton

Wuksachi would be expanded beyond existing plans, with additional diverse day and overnight uses, picnic areas, trails, and lodging. Lodgepole would be redesigned and expanded, with an emphasis on overnight use. Wolverton would retain its current character, but some backcountry and winter operations would be expanded.

No roadway actions under alternative D would affect carrying capacity. Reconfiguring some access ways within Lodgepole village to facilitate traffic flow would probably not affect overall roadway operations.

At Lodgepole day-use parking would be expanded and relocated. The primary parking action in this area under alternative D would be the construction of a 1,700-car parking structure, which would allow for a high number of vehicles to park and use the Giant Forest shuttle system. If the garage served an average of 1.5 vehicles per space per day, the parks' carrying capacity for parking would increase by 2,550 vehicles per day, or about 44%, which would surpass the overall roadway carrying capacity.

Transit service for this area would be by means of the Giant Forest shuttle system, the same as described for the no-action alternative.

Alternative D would have a moderate, beneficial impact on transportation carrying capacity in the Wuksachi / Lodgepole / Wolverton area in peak seasons due entirely to the substantial increase in parking capacity for the transit system.

Ash Mountain

The Ash Mountain area would continue as the parks' primary administrative and operations center, with increased visitor use opportunities. No roadway actions are proposed for the Ash Mountain area under alternative D. Parking would be constructed to accommodate a new visitor center facility in the Potwisha area or outside the park. Since the existing visitor center lot is over capacity at peak times, parking for a new visitor center should at least relieve parking problems at Ash Mountain.

The feasibility of providing transit service to various park areas and surrounding communities for the public, park staff, and concession employees would be evaluated. The impact of this service on carrying capacity would depend on the service area, frequency, cost, and comfort of the system. Since transit system use would be voluntary, no effort has been made in this analysis to quantify the impacts.

Alternative D would have a minor, beneficial, year-round impact on transportation carrying capacity in the Ash Mountain area since the new visitor center would increase parking capacity.

Transit service use, although not quantified, would probably be relatively limited.

Mineral King

Under alternative D maintaining the current condition of the Mineral King Road would not change the roadway carrying capacity. Parking demand could exceed supply on some holiday weekends and during special events, but additional visitation could be accommodated throughout the use season without substantial facility upgrades. No transit service is proposed for the Mineral King area in alternative D.

Alternative D would have a negligible, year-round impact on transportation carrying capacity in the Mineral King area.

Other Areas

No proposed actions would affect transportation carrying capacity in the North Fork / Colony Mill Road and South Fork areas. Road access would be upgraded to Dillonwood in alternative D so that the public could use the trails and primitive camping facilities there.

Alternative D would have a minor, beneficial impact on transportation carrying capacity in other activity areas in peak seasons.

Cumulative Impacts

From a transportation standpoint, most of the impacts under the cumulative analysis would be in the Grant Grove village area. More open management of Giant Sequoia National Monument and expansion of the Hume Lake Christian Camp would introduce additional traffic demand beyond the 48% increase forecast for park visitation under alternative D.

Although redirecting traffic to Hume Lake through Quail Flat (by transferring the California 180 route designation) would substantially benefit transportation conditions in the Grant Grove area, increases in traffic to the monument and other non-park attractions in the area would offset that benefit. In addition, improving or

relocating the Big Stump entrance station would not have the same beneficial impact documented above if the cumulative scenario was realized. However, these two actions and the closure of the road link between Grant Grove village and California 180 to the north would probably provide sufficient roadway capacity (and separation between park and non-park road users) to handle even the travel demands under the cumulative scenario.

As described for the no-action alternative, programmed roadway improvements on California 180 and 198 in the Central Valley could reduce travel times for park visitors, especially if those routes were not congested. However, both routes would continue to be two-lane mountainous roads near the parks, with features such as sharp curves and limited shoulders that limit functional capacity. As such, the cumulative impact of these “supply” side actions on transportation under alternative D would be negligible and adverse.

In combination with the proposed actions in alternative D, the cumulative scenario would result in a moderate, beneficial, peak-season impact to transportation service quality in the Grant Grove / Big Stump area.

It is also worth noting that a Grant Grove bypass might not meet the criteria for Giant Sequoia National Monument since no roads are to be allowed other than those in existence at the time of designation. A transportation plan is to be done.

Conclusion

Under alternative D traffic is projected to increase by 48% by 2010. Alternative D would have a major, beneficial impact on transportation carrying capacity in the Grant Grove / Big Stump area in peak seasons as a result of a bypass road (if allowed), additional parking capacity, transit parking near the Wye, and transit service to activity areas. In the Wuksachi / Lodgepole / Wolverton area alternative D would have a moderate beneficial impact on transportation carrying capacity in peak seasons as a result of

the substantial increase in parking capacity for the transit system. Alternative D would have a negligible impact on transportation carrying capacity in the Cedar Grove area in peak seasons, as well as at North Fork, South Fork, and Dillonwood. Impacts in the Ash Mountain area would be minor, beneficial, and year-round since the new visitor center would increase park-

ing capacity; transit service use would probably be relatively limited. The impact in the Mineral King area would be negligible and year-round.

The cumulative impact of potential independent but related actions would be moderate and beneficial during the peak season in the Grant Grove / Big Stump area.

Visitor Experience

METHODOLOGY FOR ANALYZING IMPACTS

The impact analysis evaluates how the visitor experience might vary between alternatives as a result of applying proposed actions and different management zones in the alternatives. The analysis is qualitative rather than quantitative because of the conceptual nature of the alternatives. Consequently, professional judgment was used to reach reasonable conclusions as to the intensity, type, and duration of the potential impact.

The following five broad areas of visitor experience have been analyzed:

1. *Park Character* — How the parks' character would vary as a result of differing management prescriptions and the effect on visitors' experiences under each alternative.
2. *Visitation* — The degree to which each alternative would generally respond to changing visitor demographics and use patterns.
3. *Educational Opportunities* — How each alternative would provide educational facilities, programs, and outreach. Educational facilities such as museums, nature centers, and visitor centers or contact stations provide orientation to the parks and their recreational opportunities, as well as offering educational information. Educational programs include methods of education — from personal services provided by NPS staff (ranger programs / activities and other guided activities) to self-guided activities, and from trail wayside exhibits to park newspapers and publications. Information programs deal with contacting visitors before they reach the parks through methods such as websites, and outreach programs that focus on regional teacher education, local / regional visits and programs by park staff, and school programs in the parks.

4. *Recreational Opportunities* — This section analyzes four aspects of recreational opportunities for each alternative:

- Opportunities to experience a full range of park resources as listed in the parks' purpose and significance statements, for example, sequoia groves, caves, elevation change from the foothills to alpine environments, cultural resources, wild and scenic rivers, and wilderness.
- Opportunities for basic recreational experiences (hiking, camping, front- and backcountry use, skiing, snow play, cave tours, and water play). Opportunities to experience recreation communities within the parks or to visit historic hydroelectric facilities or nonprofit camps are addressed in the "Private Land and Special Use Permits on Park Land" chapter.
- Opportunities for nontraditional or new recreational experiences (new activity assessment, bicycling, watercraft, snowmobile, and air tours).
- Opportunities for stock use.

5. *Visitor Services* — This section analyzes the differences in overnight lodging and camping opportunities and other facilities that the alternatives provide. Other visitor service facilities include restaurants, food service, supply stores, gift shops, and gas stations. Restrooms are discussed in the "Park Management, Operations, and Facilities" chapter.

Intensity. Impact intensities for visitor experience are shown in the accompanying text box. Impacts could be temporary or short term (for example, delays and inconvenience caused by the reconstruction of the Generals Highway, or the conversion of Giant Forest to day use) or long term.

Beneficial impacts would provide greater availability or access to park resources, programs, and activities, while adverse impacts would reduce access or availability of these three aspects of the visitor experience.

IMPACTS COMMON TO ALL ALTERNATIVES

In accordance with the conditions imposed by Congress in Public Law 108-447, the secretary of the interior may allow the continued operation of small-scale, historic hydroelectric facilities on the Marble and Middle Forks of the Kaweah River, and four dams in Mineral King that feed the East Fork of the Kaweah River.

The Mineral King dams are classified as a significant hazard should they fail (NPS 1992b), particularly to the East Mineral King cabins and the Cold Spring campground. Park managers will work with the hydroelectric operator through a regulated permitting process to ensure that the facilities are maintained and operated in a manner that does not impair park resources. In accordance with Public Law 108-447, a reauthorization permit requires that an independent safety assessment be conducted and that any identified deficiencies be corrected. The secretary of the interior may also impose any other reasonable terms and conditions necessary for the management and care of Sequoia National Park and the purposes for which it was established.

With updated mitigation plans and mitigation funding, long-term impacts to public health and safety are expected to be negligible and adverse, while impacts related to continued recreational activities along the access routes would be moderate and beneficial. At the same time, the visual intrusion of structures used for hydroelectric power generation would result in moderate, adverse, long-term impacts on scenic values.

Impact Thresholds for Visitor Experiences

Negligible — The impact would not be detectable or would be barely detectable, would not occur in primary resource areas, or would affect few visitors.

Minor — The impact would be slight but detectable, would not occur in primary resource areas, or would affect few visitors.

Moderate — The impact would be readily apparent, would occur in primary resource areas, or would affect many visitors. The impact would be clearly detectable by visitors and could have an appreciable effect on visitor experiences.

Major — The impact would be severely adverse or exceptionally beneficial, would occur in primary resource areas, or would affect the majority of visitors.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Analysis

Park Character

Sequoia and Kings Canyon National Parks would retain their basic rustic character — offering most visitors opportunities to see the many natural and cultural resources for which the parks are significant. The limited amount of development and frontcountry reinforce the parks' natural and rustic character for visitors, maintaining the desired visitor experience. Over 97% of the parks would be managed in accordance with the prescriptions for backcountry zones, offering visitors many opportunities for primitive and unconfined recreation.

Development areas would total approximately 1,745 acres, or less than 0.2% of the total park area (see Table 45). Of that, over 65% would be for park operations. About 11% of development would be residential, over 15% campgrounds, and 7.5% villages. Frontcountry areas reached by roads would constitute just under 2.3% of the parks; of that around 1.8% would be low-use frontcountry.

TABLE 45: SUMMARY OF MANAGEMENT ZONES BY ALTERNATIVE

Zone	No-Action Alternative	Preferred Alternative	Alternative A	Alternative C	Alternative D
	Acres / Percentage	Acres / Percentage	Acres / Percentage	Acres / Percentage	Acres / Percentage
Development (including campgrounds, villages, operations and residential areas)	1,745 / 0.20%	1,887 / 0.22%	1,310 / 0.15%	1,986 / 0.23%	2,133 / 0.25%
Frontcountry (high-use scenic driving, low- and high-use frontcountry)	20,004 / 2.31%	17,986 / 2.08%	18,553 / 2.14%	19,477 / 2.25%	31,084 / 3.59%
Backcountry / Wilderness (including designated and potential wilderness, major and secondary trail corridors, and cross-country areas)	843,511 / 97.49%	845,387* / 97.70%	845,398 / 97.70%	843,798 / 97.52%	832,043 / 96.16%

NOTE: Total area in the parks = ±865,260 acres. Acres were quantified using GIS mapping.

* 40 acres of the Hockett Plateau would be excluded from wilderness to allow for a high Sierra camp

Private vehicles would remain the primary means for visitors to experience the parks, and parking shortages in some areas would contribute to visitor dissatisfaction. All types of resources could continue to be accessed by visitors, with occasional crowding in some high-use, frontcountry areas. Caves, alpine areas, and many trails would remain largely inaccessible to people with disabilities; however, wayside exhibits would provide an alternative way to vicariously experience what the parks offer. The redesign of some facilities to increase capacity would help mitigate the impacts of increased visitation.

The no-action alternative would preserve the low-key, backcountry, and rustic character of the parks, resulting in a minor to moderate, beneficial, long-term impact on visitors' abilities to experience park character because of limited development, guidelines to preserve character, and a vast backcountry.

Visitor Use

Traditional use patterns (longer stays by smaller groups) would continue to change as the regional population grows and new user groups discover the parks. Increased day use, short stays, and weekend use would become common, resulting in more summer weekend congestion and incon-

venience to visitors. There appears to be a trend that as the nation's population ages, a smaller percentage of visitors stay in the backcountry for longer than a day.

No visitor use limits would be established. Most use would occur in the high-use scenic driving, high-use frontcountry, and development zones. Increased visitor use and shorter visits would continue to result in minor to moderate, adverse, long-term impacts resulting from seasonal crowding in these zones.

Crowding could occur on summer and holiday weekends, and some visitors might not be able to see major park resources if parking was not available. Delays at entry gates would continue to make experiences less pleasant, and regional use would eventually self regulate. Year-round frontcountry use and lodging would attract more visitors. Grant Grove would continue to experience congestion, with delays at the north entry gate of a half hour or more. Late summer use at the campgrounds in the foothills and along the Middle Fork of the Kaweah River would likely remain high, and parking near the Ash Mountain visitor center would remain inadequate during summer.

The no-action alternative would generally result in minor to moderate, adverse, long-term im-

pacts on visitor use, primarily because of continued congestion.

Visitor Information

As more people use the Internet to plan trips, inadequate staffing could result in minor, adverse impacts, primarily on out-of-state visitors seeking additional pre-trip information. With insufficient staff, many new populations visiting the parks could miss information needed to make their visits safer, more educational, and less impacting to park resources. This situation could worsen somewhat over time.

Educational Opportunities

Educational Facilities. Educational facilities are primarily in the high-use frontcountry and development zones, with a few small contact stations in the low-use frontcountry, so that most visitors have opportunities to access educational facilities. Visitor centers at Ash Mountain (Foot-hills) and Grant Grove would be updated as needed to improve education about park interpretive themes, but they would not be able to accommodate demand. Visitor contact stations would continue to provide limited space for education at Cedar Grove and Mineral King. The visitor center at Lodgepole and the Walter Fry Nature Center would have reduced levels of educational staffing in order to support Giant Forest facilities, with resulting inconvenience and unmet demand for many visitors. New educational facilities at the Giant Forest museum and the Beetle Rock education center would fill an important interpretive gap about giant sequoia ecology and provide additional group learning opportunities. Gradual improvements to educational facilities, combined with new facilities in Giant Forest, would have moderate to major, beneficial, long-term impacts on educational opportunities, but inadequate staffing at some facilities would increasingly result in minor, adverse, long-term impacts on visitor experiences.

Educational Programs. *Education, Interpretation, and Orientation* — The majority of educational and orientation programs would take place

in the high-use frontcountry and development zones. Programs would continue to focus on visitor safety, basic visitor information, and orientation. The highly valued ranger naturalist programs would still be provided, but they might be inadequate to meet the level requested by visitors at peak times. Some visitor programs and tours would continue to be provided by volunteers or the Sequoia Natural History Association. New trail centers, wayside exhibits, and an education center at Beetle Rock would be added in the high-use frontcountry zone, encouraging more visitors to hike the trail system. Exhibits would be updated in Grant Grove. Despite improvements to educational programs and greater use of volunteers, the impact on visitors would continue to be moderate, adverse, and long term primarily because of the inadequate ranger naturalist program.

Outreach Education — A limited outreach educational program would continue to meet some regional needs. Inadequate staffing to provide outreach education would increasingly affect regional populations with user groups who have not traditionally used national parks. Local outreach education has also informed the public about several critical park issues, such as the importance of fire in the ecosystem. Inadequate outreach education would result in minor, adverse, long-term impacts.

Recreational Opportunities

Opportunities to Experience Park Resources. Under the no-action alternative most visitors would be able to choose how to experience the diverse range of resources for which the parks are significant, and road access would be provided to many of them. Features in the high-use frontcountry would remain overcrowded, and parking would be difficult to find during the summer; a transit system would be put in place only at Giant Forest, resulting in both more access and less convenience for visitors as they learn to use the system. The likelihood of encountering others would remain similar to today. Some opportunities to experience solitude would remain even in frontcountry areas. A limited amount of development (2.3% of the parks), as

well as park policy and development guidelines, would mean that natural dark would predominate and light sources could even be reduced, allowing visitors to better enjoy the night skies. Wilderness opportunities would remain, and visitors could experience wilderness values such as solitude and freedom from human impacts. Over the long term there would still be minor to moderate, seasonal, adverse impacts on the ability of visitors to experience park resources because of continued congestion.

Opportunities for Basic Recreational Experiences. *Trails and Hiking* — Without resources to actively maintain many frontcountry trails in both low- and high-use areas, visitor experiences would likely be less than satisfactory. Some visitors get lost on the trail system due to lack of signs, redundant trails, or the presence of visitor-created trails not on trail maps; this situation would likely worsen with increasing visitation.

Long-distance trails, as well as shorter trails in the frontcountry, would continue to be provided. The majority of the parks would remain backcountry, and while there is an extensive trail system, most of the backcountry would be without trails.

Trail conditions affect most visitors wanting to hike, resulting in moderate, adverse, long-term impacts because park staff cannot adequately maintain the extensive frontcountry trail system.

Camping — The 14 frontcountry campgrounds would be gradually rebuilt to improve visitor experiences. RV dump stations would be retained unless they did not comply with state regulations. Most frontcountry campgrounds would be multi-purpose and would contain RV sites. In backcountry areas, camping would continue by permit, and some areas would provide designated campsites.

- At Cedar Grove each campground would be limited to 250 sites, and the free RV dump station would remain, resulting in negligible to minor, beneficial, long-term impacts as a result gradual improvements to campgrounds.

- At Lodgepole the campgrounds would be redesigned, and an RV dump station would be retained, with minor to moderate, beneficial, long-term impacts as a result of improvements to the parks' most popular campgrounds.
- In the foothills, the Potwisha and Buckeye Flat campgrounds would be retained, resulting in minor, beneficial impacts on foothills campers as the campgrounds were improved over time.
- The Cold Spring and Atwell Mill campgrounds would remain at Mineral King, resulting in negligible to minor, beneficial, long-term impacts as the campgrounds were gradually improved. Atwell Mill would remain the only campground within a sequoia grove, offering visitor opportunities, but continuing some risk to users due to the potential of sequoia trees or limbs falling without notice. Retaining the Mineral King dams will continue the potential adverse impact on human life and downstream development at the Cold Spring campground, as discussed on page 249.
- In the backcountry the Bearpaw Meadow high Sierra camp and designated campsites would continue to provide some camping or overnight support facilities, such as toilets and bear-proof storage boxes. Those backcountry users desiring greater freedom and no support facilities for their overnight backpacking or stock experience would also have many opportunities. The impact of retaining the popular Bearpaw Meadow camp would be negligible to minor, beneficial, and long term because diverse lodging opportunities would be provided for a small number of backcountry visitors seeking that experience.

Over the long term camping opportunities would be improved, resulting in negligible to minor, beneficial impacts on visitors wanting to camp.

Water Play — Summer water play in rivers at Cedar Grove, Lodgepole, and the foothills would continue when water conditions are safe and would likely become increasingly popular, par-

ticularly with regional day use visitors. Impacts such as littering, riverbank erosion, unwanted visitor-created trails, and vegetation loss would occur in heavily used areas, resulting in localized visitor-generated resource degradation, with minor, adverse, long-term impacts. Despite degradation, the impact on visitor enjoyment would be negligible and beneficial since waterplay opportunities would remain readily available.

Cave Tours — Offering low-cost, guided tours at Crystal Cave would allow many visitors to experience this resource. Several types of tours are provided. With increased park visitation, visitors might have more difficulty obtaining tickets in advance. An unknown number of visitors who might not be able to get advance tickets would be denied this experience. Wayside exhibits would provide an alternative way for disabled visitors or those unable to procure tickets to vicariously experience park caves. Allowing access to other caves by permit would allow cave enthusiasts many opportunities for park cave exploration. The impact on those seeking to visit caves would be negligible, beneficial, and long term since various opportunities would continue.

Fishing — Fishing would continue to be highly regulated. No facilities to support fishing would be provided. The parks would continue to restore native populations and to eliminate non-native species. Despite increasing visitation, the impact on fishing would continue to be negligible, beneficial, and long term.

Winter Use — Winter use of the parks would continue to attract more people. Snowplay areas would remain popular with families and would likely become increasingly crowded on winter weekends with more regional day users, resulting in some minor, adverse, long-term impacts. Cross-country skiing and snowshoeing opportunities would remain in the Giant Forest and Grant Grove areas. Crowding and a lack of rental equipment during holiday weekends would result in some minor, adverse, short-term impacts. The impact of the no-action alternative on winter recreational opportunities would generally be minor, beneficial, and long term since many opportunities would continue to be provided,

and concessioner equipment rentals would likely increase to meet demand.

Opportunities for Nontraditional Recreational Experiences. New activities, such as kayaking, would be assessed in accordance with NPS and park policies and resource concerns to determine their appropriateness. This would result in minor, adverse, short-term impacts on those who would like to freely recreate in the parks.

Bicycle Use — Bicycle use would continue to be allowed on park roads in development, high-use scenic driving, and high- and low-use front-country zones, but not on trails or in the back-country. Bicycling would be a limited recreational activity and would not provide an alternate means of transportation within the parks. Bike lanes would not be striped, and family bike use would be primarily limited to campgrounds since bicyclists would need to share narrow roads with motorists, a situation likely to make many visitors feel unsafe. Bicycling with vehicular traffic would likely be experienced primarily by road cyclists. The impact on those seeking bicycling opportunities would be minor, adverse, and long term since most bicycling would continue to be on roads also used by motor vehicles.

Snowmobiles / Snow Machines — The use of snowmobiles and snow machines would only be allowed on roads by private inholders and permit holders to access their cabins (in Wilsonia and Mineral King), in accordance with regulations at 36 CFR 2.18 and 7.8. Recreational snowmobiling is not allowed in the parks because it adversely impacts the park values of solitude and natural quiet, but it is allowed on USFS land. Because most of the parks are wilderness, motorized equipment is prohibited, so snowmobiles are confined to frontcountry roads, where their use may pose safety concerns for other winter users. Because snowmobile use is limited to a few areas, and because opportunities are provided on adjacent public lands, the impact of this general prohibition would be minor, beneficial, and long term for the majority of park winter users.

Watercraft — Nonmotorized watercraft use would continue to be allowed except on the South Fork of the Kings River in the Cedar Grove area. On rivers where use is allowed, it would not be regulated. The resulting impact would be negligible to minor, beneficial, and long term for those seeking this type of experience.

Air Tours — Potential impacts would be analyzed in an air tour management plan prepared jointly by the National Park Service and the Federal Aviation Administration. No air tour companies currently operate in the parks, resulting in the preservation of natural quiet and sounds for the enjoyment of visitors.

Opportunities for Stock Use. The 100-year tradition of using horses and other stock would continue under the no-action alternative, in accordance with current regulations, which would be refined based on use surveys and resource monitoring. Commercially provided horse / pack trips, as well as the corrals at Cedar Grove, Grant Grove, and Mineral King, would continue but at reduced levels because use trends have decreased. A new location to replace the commercial Wolverton pack station would be identified. Any new commercial location would need to be convenient for visitors, the National Park Service, and operators, as well as safe. Also, desired resource conditions would need to be achieved, and any needed facilities would have to be sustainable. About 12 additional commercial operators would continue to provide pack services. A “Preliminary Draft Franchise Fee / Feasibility Analysis of Current Saddle Horse Ride and Pack Stations” (NPS 2004) indicates new or existing commercial pack station / stock ride operations might become increasingly infeasible without government-provided infrastructure, such as roads, utilities, and buildings. This is primarily due to rising insurance costs and projected costs for additional resource protection requirements, such as weed-free feed, waste removal, and equipment costs for waste removal.

Stock use provides traditional opportunities to enjoy the parks and could hypothetically provide

access for visitors with disabilities. Based on the number of permits currently issued and discussions with backcountry rangers, there is little use of stock by visitors with disabilities.

Undesired stock impacts on hikers (odor, feces, urine, dust, and eroded trails) would continue at the same level, a minor, adverse, long-term impact on some backcountry hikers. This impact would be mitigated through regulation and education of stock users.

Continuing stock use would provide diverse visitor opportunities to many regional stock groups and general park visitors, and increased regulation would somewhat mitigate stock impacts. The result would be minor, beneficial, long-term impacts on those wanting to use stock, but at the same time generating minor to moderate, adverse impacts on hikers in locations where trails are shared.

Visitor Facilities and Services

Visitors would continue to have access to all present facilities, with overnight lodging, as well as camping, opportunities provided in the development, low-use frontcountry, and backcountry zones. All existing overnight facilities would remain in the parks.

- At Cedar Grove seasonal use would continue; the small lodge would remain, as would food service and the store. Visitors would retain the same types of services as today, with negligible to minor, beneficial, long-term impacts as a result of gradual improvements.
- At Grant Grove lodging would be expanded by adding nine cabins and renovating 19 cabins and some central baths. The existing mix of cabins and lodges would remain. Visitors would have access to the same types of services as today, with minor to moderate, beneficial, long-term impacts as a result gradual improvements to lodging.
- At Lodgepole the gas station would be studied for retention, adaptive use, or removal. Other facilities (store, post office, showers, laundry, food service) would be

retained. There could be an increasing demand for food service since none is provided in the Giant Forest area. Lodgepole visitors would retain the same types of services as today, with minor to moderate, beneficial impacts as a result of improvements over the long term.

- At Wuksachi 312 additional lodge rooms would be constructed to replace lodging removed from Giant Forest. An amphitheater would be built, and food service and other services expanded. Wuksachi visitors would have increased lodging, food service, and other services compared to today, with moderate, beneficial, long-term impacts for visitors seeking lodging in the parks.
- At Wolverton the concession building for winter use, the picnic area, and the Boy Scout camp would remain. The shuttle system would provide Giant Forest visitors an improved experience, since congestion would be reduced. However, the corral has been removed, reducing recreational opportunities. Services at Wolverton would be improved compared to today, resulting in major, beneficial, long-term impacts since most visitors spend time in the Giant Forest and parking would be more convenient. At the same time, because the corral has been removed and a new location has not been identified, the impact on the relatively small number of visitors seeking a riding experience in the Giant Forest would be minor, adverse, and short term since the service would be provided at another location.

Overall, maintaining and gradually improving present facilities and services, along with the planned expansion of concession facilities and new facilities at Giant Forest, would result in minor to moderate, beneficial, long-term impacts on visitor experiences.

Cumulative Impacts

Lodging, food service, and additional types of recreational opportunities are provided in surrounding communities, such as Three Rivers. Most motels provide swimming pools, and there

is also a golf course and a spa. Seasonal river rafting are offered. It is likely that a similar type and number of services would be provided in the future.

Giant Sequoia National Monument, designated in April 2000 from portions of national forest land to further protect giant sequoia groves, is expected to have a negligible impact on existing types of visitor uses. Visitor services, such as lodging, camping, gas, and food, are provided in several locations in Giant Sequoia National Monument, meeting the needs of both monument and park visitors. However, national monument status is likely to attract more visitors, which could add to existing congestion in the parks. Visitors to the national parks overlap with visitors to Giant Sequoia National Monument, since they can only get to the northern unit by way of the Big Stump entrance station, and visitors drive along the Generals Highway through the monument between Sequoia and Kings Canyon National Parks. Monument status could further emphasize resource values and recreational opportunities, broadening some interpretive stories that could be jointly told. There is some visitor confusion about how management regulations differ between the U.S. Forest Service and the National Park Service and the types of recreational opportunities that can be offered (for example, hunting and snowmobiling are allowed in nonwilderness forest areas). This confusion could be mitigated with education.

Terminus Dam on Lake Kaweah has recently been raised to increase storage, resulting in some loss or relocation of recreation facilities, such as boat ramps and picnic areas. While these kinds of facilities are not provided in the parks, they primarily serve local and regional users, so this action would have a negligible, adverse, long-term impact on recreational opportunities for park visitors.

Past actions in the parks (from the 1950s to 1999) that have affected visitor experiences include the following:

- The removal of Giant Forest facilities (roads, parking lots, lodging, dining facilities, the general store, informal food

service, the photo studio, park and concession housing, the Hazelwood picnic area, the corral, and several campgrounds). Eventually development at Wuksachi village will replace the same amount of visitor lodging that was removed. A future project is the relocation of an underground electric power line running through the center of the sequoia grove to follow the Crescent Meadow road. All these actions are intended to preserve and improve the condition of the Giant Forest sequoia grove.

- The rebuilding of Generals Highway to preserve its scenic historical character and slower mountain driving opportunities.
- The replacement of utility systems to meet state standards. In some locations comfort stations are being replaced with vault toilets.
- The updating of exhibits at the Grant Grove and Ash Mountain visitor centers.

The no-action alternative, in conjunction with past, present, and reasonably foreseeable actions in the region, would result in visitor opportunities remaining much as they are today. Impacts on visitors to the parks and to Giant Sequoia National Monument would be moderate, beneficial, and long term.

Conclusion

Continuing current management practices and policies would maintain visitors' present experiences, with some change as facilities were replaced. Crowding would persist in some areas, trails would continue to deteriorate, and educational opportunities would remain inadequate. Transit would be limited to Giant Forest, and bicycling would continue to be mixed with traffic on park roads. At the same time, gradual improvements of existing facilities would continue to occur in all areas of the parks, as would the planned expansion of concession facilities and new facilities at Giant Forest. Despite minor to moderate, beneficial, long-term impacts on visitors from gradually improving facilities and continued opportunities, traffic congestion in the

most popular areas would generally result in moderate, adverse, long-term impacts.

The no-action alternative, in conjunction with past, present, and reasonably foreseeable actions in the region, would continue visitor opportunities much as they are today. This would result in moderate, beneficial, long-term impacts on visitors to the parks and to Giant Sequoia National Monument.

IMPACTS OF THE PREFERRED ALTERNATIVE

Analysis

Park Character

The parks would retain their basic rustic character, offering most visitors opportunities to see the many natural and cultural resources for which the parks are significant. The limited amount of development and frontcountry zones would reinforce the parks' natural and rustic character for visitors, helping maintain the desired visitor experience. Over 97% of the parks would continue to be managed in accordance with the prescriptions for backcountry zones, offering visitors many opportunities for primitive and unconfined recreation.

Development areas would constitute less than 1% (0.22%) of the total park area and include approximately 1,887 acres. Of that, over 65% would be for park operations (primarily wastewater treatment), over 15% for campgrounds, about 11% for residential uses, and 7.5% villages. Frontcountry areas reached by roads would amount to about 2.1% of the park, 1.6% of which would be low-use frontcountry.

Compared to the no-action alternative, the preferred alternative would also preserve the low-key, rustic character of the parks because of limited development, guidelines to preserve the rustic character, and the vast backcountry. However, improved circulation and education about the parks would result in moderate, beneficial, long-term impacts because congestion would be reduced and visitors would have more opportunities to learn about park resources.

Visitor Use

Traditional use patterns would continue to be altered as the regional population grows and new user groups discover the parks. Frontcountry visitation would not need to be restricted at the entrance gates in order to ensure high-quality experiences. Day use, short stays, and weekend use would likely become more common, and visitation during the spring and fall shoulder seasons would be encouraged. Private vehicles would remain the primary means to enter the parks, but transit would offer a pleasant way to get around. The Big Stump entrance station would be redesigned or relocated to facilitate traffic flow, reducing wait times and making visitor experiences more pleasant. Year-round frontcountry use and lodging would attract more visitors. The number of parking spaces would be increased by redesigning existing lots.

The majority of visitation would occur in the high-use scenic driving, high-use frontcountry, and development zones. Visitors would continue to have access to diverse natural and cultural resources for which the parks are significant, and improved circulation patterns and transit systems would result in less frequent seasonal crowding in popular areas. Traditional activities such as hiking, camping, lodging, backcountry use, and scenic driving would remain. Park developed areas would be nearly the same size as they are today, and they would be rebuilt as needed. Over the long term, however, more facilities could be provided outside the parks in collaboration with other entities.

While backcountry use would remain low, expanded educational programs would help more visitors gain the skills necessary to visit the backcountry. Additional recreational opportunities in the foothills would be provided along the Middle and North Forks of the Kaweah River and at Ash Mountain. Caves, alpine areas, and many trails would remain largely inaccessible to people with disabilities; however, wayside exhibits would provide an alternative way to vicariously experience what the parks offer.

Accommodating more diverse visitation and day use, combined with transit and circulation improvements, would result in moderate, beneficial, long-term impacts on the ability of visitors, including new user groups, to visit and enjoy the parks.

Visitor Information

People would have additional opportunities to learn about the parks before their visits by means of the Internet. This would allow them to plan their visits to make the best use of their time, resulting in a minor, beneficial, long-term impact.

Educational Opportunities

Educational Facilities. Facilities would be located primarily in the high-use frontcountry and development zones. Orientation and exhibits could be installed at transit stops. Additional educational opportunities outside the parks could be pursued with the U.S. Army Corps of Engineers, the U.S. Forest Service, and others.

- A new, small-scale visitor center at Cedar Grove would meet visitor needs, resulting in minor, beneficial impacts to visitors as a result of improved educational facilities.
- The Foothills and Grant Grove visitor centers would be expanded and updated. Increased opportunities to learn about the history of the parks and the region would be provided at Grant Grove, either by redesigning the visitor center or by adaptively reusing sites or structures (such as the gas station). This would result in moderate to major, beneficial, long-term impacts on educational opportunities in these highly visited areas.
- The visitor center at Lodgepole would emphasize backcountry and wilderness themes, resulting in moderate, beneficial, long-term impacts since more visitors would be informed about backcountry / wilderness values and recreational opportunities. The Walter Fry Nature Center would be eliminated; however, a diverse and more flexible array of educational

opportunities in the Giant Forest / Lodgepole area would be provided to mitigate that minor, adverse impact. The result of actions at Lodgepole on visitor education would generally be moderate, beneficial, and long term.

- New educational facilities at the Giant Forest museum and the Beetle Rock education center would be completed, filling an important gap in interpretation about giant sequoia ecology and providing additional group learning opportunities for most park visitors. The result of these actions on visitor education would be major, beneficial, and long term.
- The Mineral King visitor contact station would be improved, resulting in minor, beneficial, long-term impacts on educational opportunities in this area.
- At Dillonwood there has been no visitor use, but further planning would determine the levels and types of use.

Improvements to educational facilities would generally result in moderate to major, beneficial, long-term impacts for park visitors since improvements would occur in developed areas throughout the parks.

Educational Programs. *Education, Interpretation, and Orientation* — Educational programs would focus on learning about park resources, instilling park stewardship values, leave-no-trace ethics, and backcountry skills, in addition to basic visitor orientation and safety information. Park orientation would be expanded, with more information about recreational opportunities and skills needed for safe enjoyment. Additional educational staff would result in a greater variety and amount of programs, so more visitors would have access to programs and activities. Park exhibits would be updated, and the park newspaper and publications would continue. New trail centers, wayside exhibits, orientation, and trail information would be provided. The preferred alternative would have moderate, beneficial, long-term impacts on the ability of park visitors, as well as local and regional populations, to participate in popular educational programs

because additional, diverse programs would be provided.

Educational Outreach — Outreach programs for diverse publics would be expanded, and participation in regional classrooms would be encouraged by increasing park staff involved in outreach. A classroom-focused website would provide additional educational opportunities, and numerous volunteer and partnership efforts would be developed. The result would be a minor to moderate, beneficial, long-term impact on park educational opportunities.

Recreational Opportunities

Opportunities to Experience Park Resources. Under the preferred alternative visitors would have a choice of opportunities to experience the diverse resources for which the parks are known, and road access would be provided to many of them. Features in the high-use frontcountry zone would continue to be crowded occasionally during peak times. Redesigning the circulation system in Grant Grove and continuing the transit system in the Giant Forest area would improve opportunities for visitors to experience park resources. The likelihood of encountering others would remain similar to today. Some opportunities to experience solitude would remain, even in frontcountry areas.

Limited development in the parks, as well policies and development guidelines, should help preserve opportunities for visitors to enjoy the night skies without inference from artificial light sources, and opportunities could be gradually improved. Many backcountry and wilderness opportunities would remain, and visitors could experience wilderness values such as solitude and freedom from human impacts.

Compared to the no-action alternative, opportunities to experience diverse park resources would be similar to those today; however, improved circulation would result in negligible to minor, beneficial impacts on visitor access to park resources.

Opportunities for Traditional Recreational Experiences. *Trails and Hiking* — There would be numerous recreational trail opportunities in all park environments. Frontcountry trails currently receive the most use, and they would continue to be most popular, with gradually increasing visitation. Trail conditions in both low- and high-use areas would be improved, and the system would be somewhat expanded, visitor-created trails and redundant trails would be removed, and additional trail information would be provided. Improving hiking trails and building a footbridge near Hospital Rock would result in moderate, beneficial, long-term impacts in terms of hiking opportunities in the foothills.

The majority of the parks would remain backcountry, with an extensive trail system, and long-distance trails would continue to be provided. The backcountry trail system would remain similar to today, with no trails in most of the backcountry.

The preferred alternative would have moderate to major, beneficial, long-term impacts on hiking and trail use for most visitors because of an improved trail system, better conditions, and additional directional signs.

Camping — A variety of camping options would continue to be provided. Twelve frontcountry campgrounds would be gradually rebuilt to improve visitor experiences, to accommodate diverse user groups, and to separate differing user types. Campgrounds would generally be configured for about 250 sites. A few small primitive campgrounds could be provided to offer more diverse camping choices. RV dump stations could be eliminated to protect park resources if they did not meet state standards.

- Campgrounds at Cedar Grove would be redesigned to improve camping experiences, with more separation between sites and discrete areas for different types of uses, resulting in minor, beneficial, long-term impacts.
- The Crystal Springs campground in Grant Grove would be converted to a day use function, resulting in moderate, adverse,

long-term impacts. However, park staff would work with Giant Sequoia National Monument staff to increase camping opportunities in the vicinity of Grant Grove, so opportunities might remain similar to those today.

- Campgrounds at Lodgepole, Dorst, and South Fork would be upgraded as needed, resulting in negligible, beneficial, long-term impacts.
- In the foothills the Potwisha and Buckeye Flat campgrounds would be retained, and a new primitive campground would be added in the North Fork area, resulting in minor, beneficial, long-term impacts on those seeking a more primitive camping experience in the vicinity of Three Rivers.
- The Cold Spring campground at Mineral King would be expanded to replace campsites removed from Atwell Mill, and primitive sites would be added. Improved camping at Mineral King would generally result in minor, beneficial, long-term impacts, even though there would be minor, adverse, long-term impacts on those visitors wanting to camp in a sequoia grove. Removing overnight camping from Atwell Mill would be consistent with actions in other sequoia groves to eliminate overnight use and thus provide a safer visitor experience because users would be at less risk from being injured by falling trees or limbs. Retaining the Mineral King dams will continue the potential adverse impact on human life and downstream development at the Cold Spring campground, as discussed on page 249.
- In the backcountry the Bearpaw Meadow tent-hotel (high Sierra camp) and designated campsites provide some camping or overnight support facilities such as toilets and bear-proof storage boxes. The possibility of providing an additional high Sierra camp would be explored. The impact of retaining the camp would be negligible to minor, beneficial, and long term in terms of providing diverse opportunities for the

small number of backcountry visitors seeking this type of experience.

- In backcountry areas camping by permit would continue, and some areas would provide designated campsites, including stock campgrounds. Educational programs and enforcement efforts by park rangers would be enhanced to make sure hikers and backpackers understand how to protect their food supplies from black bears. The resulting impact on backcountry camping would be negligible, beneficial, and long term as a result of more education about avoiding bear/human conflicts.

The preferred alternative would generally provide minor to moderate, beneficial, long-term impacts in terms of camping opportunities.

Water Play — Seasonal summer water play in rivers at Cedar Grove, Lodgepole, and the foothills would continue and could become increasingly popular with more regional visitors. River access points, parking areas, trails, and trailheads would be defined in popular areas to reduce bank and vegetation damage, as well as use impacts such as littering. This would result in minor, beneficial, long-term impacts as a result of improved river access for a small number of visitors.

Cave Tours — Low-cost, guided cave tours of various types would continue to be offered by the Sequoia Natural History Association at Crystal Cave. With increased park visitation, visitors might have to plan farther in advance to obtain tickets. An unknown number of visitors who might not be able to get tickets would be denied this experience. Due to the 0.5-mile steep access trail, the cave would not be accessible to those visitors in wheelchairs or those unable to negotiate the terrain. Access by means such as educational waysides and photographs of the cave could help illustrate cave resources to visitors who could not access the cave. Restrooms would remain at the parking lot; they would only be provided at the cave if it became technologically and economically feasible to meet state wastewater standards with sustainable facilities. The preferred alternative would result in negli-

gible, beneficial, long-term impacts on guided cave tours since the tour would remain similar to what is offered.

To better protect park resources, access to other caves would be restricted to cave specialists with permits. The preferred alternative would have a negligible, beneficial, long-term impact on opportunities for the general public to experience cave resources, and a minor, adverse, long-term impact on opportunities for the small number of recreational cavers and spelunkers to experience park caves.

Fishing — Fishing would continue to be highly regulated. No fishing support facilities would be provided to the limited number of anglers in the parks. The National Park Service would continue to restore native populations and eliminate nonnative species. Impacts would be negligible, beneficial, and long term for the few anglers in the parks.

Winter Use — Expanded winter use would be encouraged so visitors could enjoy park resources year-round. Snowplay areas would be provided at Grant Grove and Wolverton, with equipment rentals, limited food service, and restrooms being made available. Crowding would still be common at snowplay sites during weekends and holidays. Cross-country skiing and snowshoeing would continue to offer opportunities to have a quieter experience within superb front and backcountry park settings. Winter camping would be provided in several campgrounds, in addition to backcountry opportunities. The preferred alternative would result in minor, beneficial, long-term impacts for visitors to participate in winter activities as a result of slightly expanded opportunities and services.

Opportunities for Nontraditional Recreational Experiences. *New Activities* — New activities would be assessed against policy and resource concerns to determine potential impacts. Low-impact activities that did not impair park resources and were related to park settings would be allowed. The parks would encourage basic activities. Measures to separate some activities that would infringe on the experiences of other

visitors would enhance overall park enjoyment for as many visitors as possible. The preferred alternative would have minor, beneficial, long-term impacts for visitors to experience new activities deemed appropriate.

Bicycle Use — Under the preferred alternative bicycle use would continue to be allowed on park roads in the development, high-use scenic driving, and high- and low-use frontcountry zones, but not on trails or in the backcountry. Bicycling would provide another method of transportation at Cedar Grove, where bike lanes on existing roads and / or separate bike routes would be provided. In other areas, bike lanes would not be striped, and family bike use would be primarily limited to campgrounds since bicyclists would need to share narrow roads with motorists, a situation likely to make many visitors feel unsafe. Thus, bicycling on Generals Highway or Kings Canyon Highway with vehicular traffic would probably be primarily by road cyclists. The Shepherd Saddle Road near Ash Mountain would offer a circular bicycling route connecting with the North Fork area. Taken as a whole, the preferred alternative would have minor, beneficial, long-term impacts for bicycling in the parks as a result of striped lanes along with cycling opportunities on Shepherd Saddle Road.

Snowmobiles / Snow Machines — As described for the no-action alternative, the use of snowmobiles and snow machines would only be allowed on roads by private inholders and permit holders for access to their cabins (in Wilsonia and Mineral King). Recreational snowmobiling is not allowed in the parks because it adversely impacts the park values of solitude and natural quiet, but it is allowed on USFS land. Because most of the parks are designated wilderness, motorized equipment is prohibited, so snowmobiles are confined to frontcountry roads where their use may pose safety concerns for other winter users. Because snowmobile use is limited to a few areas, and because opportunities are provided on adjacent public lands, not allowing recreational snowmobile use in the parks would have minor, beneficial, and long-term

impacts on the majority of park users during the winter.

Nonmotorized Watercraft — Nonmotorized watercraft would continue to be allowed except on the South Fork of the Kings River. Watercraft use (primarily kayak) would be monitored on the Middle Fork of the Kaweah River, and no commercial use would be allowed. Developed river access points at popular waterplay areas, which would reduce bank erosion, vegetative impacts, and littering, could also provide access for nonmotorized watercraft users since the recreational waterplay and watercraft seasons do not overlap. As such, the preferred alternative would have minor, beneficial, long-term impacts on those few visitors seeking opportunities to use nonmotorized watercraft on park rivers.

Air Tours — Potential air tours in the future would be regulated in accordance with the provisions of the National Parks Air Tour Management Act of 2000. The act directs the Federal Aviation Administration, in cooperation with the National Park Service, to develop an air tour management plan whenever a person applies for authority to conduct a commercial air tour operation over a unit of the national park system if such a plan does not already exist for that park unit. The purpose of the plan would be to provide acceptable and effective measures to mitigate or prevent adverse impacts of commercial air tour operations on natural and cultural resources and visitor experiences. No air tour companies currently operate in the parks, although two companies have applied for operating authority.

Opportunities for Stock Use. Under the preferred alternative horses and other stock use would continue at present levels, with reasonable regulations and enhanced monitoring. (Present use levels are much lower than historical levels.) Areas would be open or closed to stock use depending on resource conditions and the capability of the resource to withstand use. This sustainable approach has substantially reduced stock-related impacts. It is expected that as leave-no-trace / sustainable stock practices and use of supplemental feed increased, resource

conditions would continue to improve. This would result in minor, beneficial, long-term impacts for stock users.

Stock use provides traditional opportunities to enjoy the parks and could provide access for visitors with disabilities. Currently there is a small amount of stock use by visitors with disabilities, so the impact would be negligible.

Concession stables / corrals providing day and overnight trips would continue at Cedar Grove, Grant Grove, and Mineral King. About 20 additional commercial operators would continue to provide pack services. A new, sustainable location to replace the Wolverton corral would be explored in the Dorst, Wuksachi, Lodgepole, and Wolverton areas. A “Preliminary Draft Franchise Fee / Feasibility Analysis of Current Saddle Horse Ride and Pack Stations” (NPS 2004) indicates new or existing commercial pack station / stock ride operations might become increasingly infeasible without government-provided infrastructure, such as roads, utilities, and buildings. This is primarily due to rising insurance costs and projected costs for additional resource protection requirements, such as weed-free feed, waste removal, and equipment costs for waste removal.

Impacts of horse use (feces, eroded trails, dust) would continue to cause minor, adverse, long-term impacts to some backcountry hikers, but increased regulation and stock-free areas, which would be determined in the forthcoming wilderness stewardship and stock use plan, would mitigate this impact.

Despite adverse impacts on hikers, providing stock opportunities would result in minor, beneficial, long-term impacts because a traditional use would continue. Monitoring, regulation, and education would gradually improve trail and backcountry conditions.

Visitor Facilities and Services

Overnight lodging as well as camping opportunities would be provided in the following zones — development, low-use frontcountry,

and backcountry. All existing overnight facilities would remain in the four lodging areas, along with 12 campgrounds and the high Sierra tent-hotel. (Camping facilities are discussed on page 259).

- At Cedar Grove seasonal use would continue (food service, the store, and the free RV dump station), along with modestly expanded and more types of lodging. Impacts would be the same as the no-action alternative; however, facilities would be gradually improved, resulting in minor, beneficial, long-term impacts on visitor experiences.
- At Grant Grove lodging would be expanded with 9 additional cabins; 19 cabins would be renovated and some central baths would be provided. The existing mix of cabins and lodges at Grant Grove would remain, but improved facilities would result in negligible to minor, beneficial, long-term impacts to visitors wanting to stay at Grant Grove.
- At Lodgepole the gas station would be analyzed for retention, adaptive use, or removal. Other facilities (store, post office, showers, laundry, food service) would be retained to provide for both day use and camper needs. Demand for food service could increase since none is provided in the Giant Forest area, and concessioners would likely adapt to the demand. A redesigned circulation system could help visitors find food and other services more easily. There would be moderate, beneficial, long-term impacts because of improvements to services.
- At Wuksachi 312 additional lodge rooms would be constructed to replace lodging removed from Giant Forest. An amphitheater would be built, and food service and other services would be expanded. Similar to the no-action alternative, this alternative would result in moderate, beneficial, long-term impacts because of additional lodging opportunities within the parks.
- At Wolverton the concession building for winter use and the picnic area would remain. The Boy Scout camp would be converted to a camp for volunteers. Services at

Wolverton would be improved compared to today, resulting in major, beneficial, long-term impacts since most visitors spend time in the Giant Forest and parking would be more convenient. The removal of the corral (with no new location yet identified) would adversely affect a relatively small number of visitors seeking a riding experience in the Giant Forest, resulting in a minor, adverse, short-term impact until the service was replaced at another location.

Generally providing a variety of improved facilities and services would enhance visitor experiences and better meet the changing needs of visitors, resulting in minor to moderate, beneficial impacts on visitor experiences over the long term.

Cumulative Impacts

Past, present, and reasonably foreseeable actions in the region would be the same as those described for the no-action alternative. Lodging, food service, and additional types of recreational opportunities are provided in surrounding communities, such as Three Rivers. Most motels provide swimming pools, and there is also a golf course, spa, and seasonal river rafting. It is likely that a similar type and number of services will be provided in the future.

Giant Sequoia National Monument is expected to have a negligible impact on existing types of visitor uses. Visitor services (such as lodging, camping, gas, and food) are provided in several locations in the monument, meeting the needs of both monument and park visitors. However, national monument status is likely to attract more visitors, which could add to existing congestion in the parks. Visitors to the national parks overlap with those to the national monument since they can only get to the northern unit by way of the Big Stump entrance station and visitors drive along the Generals Highway through the monument between Sequoia and Kings Canyon National Parks. Monument status could further emphasize resource values and recreational opportunities, broadening some interpretive stories that could be jointly told. Some visitor confusion about how management

regulations differ between the Forest Service and the Park Service and the types of recreational opportunities that can be offered (for example, hunting and snowmobiling are allowed in non-wilderness forest areas) could be mitigated with education.

Terminus Dam on Lake Kaweah has recently been raised to increase storage, resulting in some loss or relocation of recreation facilities, such as boat ramps and picnic areas. While these kinds of facilities are not provided in the parks, they primarily serve local and regional users, this action would have a negligible, adverse, long-term impact on recreational opportunities for park visitors.

As described for the no-action alternative, past actions in the parks that have affected visitor experiences include the following:

- removing Giant Forest facilities, with replacement lodging at Wuksachi village, and in the future relocating an underground electric power line running through the center of the sequoia grove to follow the Crescent Meadow road; these actions are intended to preserve and improve the condition of the Giant Forest sequoia grove
- rebuilding the Generals Highway to preserve its scenic historical character and slower mountain driving opportunities
- replacing utility systems to meet state standards, with comfort stations in some locations being replaced by vault toilets.
- updating exhibits at the Grant Grove and Ash Mountain visitor centers

The preferred alternative, in conjunction with past, present, and reasonably foreseeable actions in the region, would be expanded somewhat, resulting generally in moderate, beneficial, long-term impacts on park visitors due to improved facilities and opportunities in the parks and the attraction of Giant Sequoia National Monument.

Conclusion

The preferred alternative would enhance visitor recreational and educational opportunities to

enjoy and understand the parks while retaining their basic character and accommodating some growth in visitation. Limited facility expansion and redesign would offer visitors more choice and convenience, while improving access to park resources. Taken together, the actions in the preferred alternative would have moderate to major, beneficial, long-term impacts on experiences for all visitors. The following actions would specifically contribute to the beneficial impacts:

- improved diverse and comprehensive visitor orientation and educational programs, upgraded educational facilities, more ranger naturalist programs, focus on park values and learning outdoor skills, and expanded outreach
- redesigned and more efficient visitor circulation systems, including transit
- improved trail systems
- more choices in lodging
- facility improvements — a new, small-scale visitor center and bike routes at Cedar Grove; an improved visitor center, historic museum and redesigned circulation at Grant Grove; new facilities at Giant Forest; an improved Ash Mountain visitor center, with added bicycling, hiking, and camping opportunities in the foothills
- enhanced ability to meet the needs of diverse visitor groups and increased accessibility to park resources by visitors with disabilities

The preferred alternative, in conjunction with past, present, and reasonably foreseeable actions in the region, would generally result in moderate, beneficial, long-term impacts on park visitors because of improved facilities and expanded opportunities in the parks and the attraction of Giant Sequoia National Monument.

IMPACTS OF ALTERNATIVE A

Analysis

Park Character

The parks would retain their basic rustic character, but a limited number of visitors would have opportunities to see the many natural and cultural resources for which the parks are significant. The majority of the parks would be managed in accordance with three backcountry prescriptions. Development areas would amount to 0.15% of the total park area and include approximately 1,310 acres, a reduction of around 435 acres from the no-action alternative. Of that development, park operations would occupy around 60%, residential 10%, campgrounds over 20%, and villages about 8%. Frontcountry areas reached by roads would amount to 2.1% of the parks, and around 1.7% of that would be low-use frontcountry. About 97.7% of the parks would be managed as backcountry, slightly more than now.

Compared to the no-action alternative, this alternative would preserve the low-key, rustic character of the parks by limiting development, with guidelines to preserve rustic character and the vast backcountry. However, reduced development would result in a minor to moderate adverse impact on opportunities to conveniently experience the parks' character over the long term.

Visitor Use

Traditional use patterns would continue to be altered as the regional population grows and as new user groups continue to discover the parks, which would increasingly contrast with the surrounding developed area. Day use, short stays, and weekend use would become more common. Private vehicles would remain the primary way to experience the parks. Crowding would be less common in many frontcountry areas except for Grant Grove, which would remain very congested because Hume Lake traffic would still be routed through the village. Use limits and resulting gate closures would deprive some people of opportunities to visit. Caves, alpine areas, and

many trails would remain largely inaccessible to people with disabilities, so wayside exhibits would provide an alternative way to see what the parks offer. Many types of visitor facilities would be moved out of the parks, and fewer services would be available to visitors. Year-round frontcountry use and lodging would continue to attract visitors.

Visitor use would be limited. The high-use scenic driving, development, and high-use frontcountry zones would see the most visitation. Crowding would be reduced on weekends, and those visitors who could enter and find parking would be able to see major park resources in a more relaxed, less crowded atmosphere. Relocated north entry gates would facilitate park entry but would exempt the Grant Grove area from use limits, so that area would remain congested since most traffic to Hume Lake and Cedar Grove passes through the village. Additional planning would be required to visit the parks. With reduced visitation, the quality of visitor experiences would improve.

While limits on the number of visitors allowed into the parks would have major, adverse, long-term impacts on all visitors to freely access the park, the subsequent improved visitor experiences would result in minor, beneficial, long-term impacts.

Visitor Information

Information programs would be expanded, using numerous volunteers and partners, and a website would be established. The result would be a minor, beneficial, long-term impact for those seeking information before they visit.

Educational Opportunities

Educational Facilities. Educational facilities would continue to be primarily provided in the development and high-use frontcountry zones, but the amount of facilities would be reduced.

- Limited and inadequate education would be provided at Cedar Grove in the contact station, and no visitor center would be provided. Compared to the no-action alterna-

tive, impacts would be negligible and adverse over the long term.

- The Walter Fry Nature Center would be removed, and the Lodgepole visitor center functions would be moved to the new Giant Forest museum. While new facilities and exhibits would be present, alpine interpretation would no longer be the focus. The Beetle Rock education center would provide new group educational opportunities. Fewer educational facilities and opportunities would result in minor to moderate, adverse impacts to visitor experiences over the long term.

Taken as a whole, this alternative would result in a minor to moderate, adverse, long-term impact on visitors' opportunities to use educational facilities in the parks.

Educational Programs. *Education, Interpretation, and Orientation* — Educational efforts would focus on visitor safety, orientation, and leave-no-trace programs, with a shift to written materials and exhibits. Guided educational activities would generally no longer be available. Reduced educational opportunities would have moderate to major, adverse, long-term impacts on most visitors.

Educational Outreach — Outreach programs would focus on resource protection. They would be enlarged, utilizing numerous volunteers and partners, and a Website would be established. The result would be a minor, beneficial, long-term impact on park educational programs.

Recreational Activities

Opportunities to Experience Park Resources. Under alternative A visitors would have fewer choices to experience the range of park resources, although most types of resources could still be accessed by all visitors gaining entrance to the parks. Fewer people could visit since daily visitation would be limited. Providing fewer facilities would result in less convenience and less choice, as well as more of a need for visitors to plan their visits in advance. Smaller park developed areas would be less crowded than in

other alternatives because lodging and services would be reduced. With less visitation, the quality of visitor experiences could improve for some visitors, but features would remain busy because less parking would be provided and the transit system would be more limited. There would be fewer frontcountry trails, so the likelihood of encountering others would remain similar to today. Frontcountry subalpine motorist access in Mineral King would be curtailed, but pedestrians could still visit the valley. Waterplay opportunities might be restricted to protect resources. Winter use would be allowed at current levels, but fewer rentals would be available.

Reduced party sizes would mean that backcountry visitors would have more opportunities to experience solitude and other wilderness values, as well as wilderness recreational opportunities.

Because of steep terrain, caves, alpine areas, and many trails would remain largely inaccessible to people with disabilities. However, wayside exhibits would provide an alternative way for these individuals to see what the parks offer.

Since opportunities to experience the range of park resources would remain, alternative A would have a minor, adverse, long-term impact on how visitors experience the range of park resources. However, fewer visitors would enhance the quality of the overall visitor experience, as well as park values of wilderness and solitude, resulting in minor, beneficial, long-term impacts.

Opportunities for Traditional Recreational Experiences. *Trails and Hiking* — As described for the preferred alternative, conditions of frontcountry trails in both low- and high-use areas would be improved, but the amount of frontcountry trails would be reduced. An extensive trail system would continue to be provided, including long-distance, backcountry trails. However, most of the backcountry would remain trailless.

Alternative A would have minor to moderate, beneficial, long-term impacts for hiking and trail use because trail conditions would be improved.

Camping — Camping would generally offer more variety, and campgrounds would be redesigned to increase spaces between sites. The size of campgrounds would be capped at 200 sites, and most campgrounds would be reduced in size. Types of camping would be designated, thus improving the overall camping experience.

- At Cedar Grove campgrounds would be reduced in size and designated for certain types of uses, resulting in minor to moderate, adverse, long-term impacts to those wanting to stay overnight at Cedar Grove.
- At Grant Grove campgrounds would be redesigned to reduce the number of sites and to provide more day use space, resulting in minor, adverse impacts on those who could not find camping in the area.
- At Lodgepole and Dorst the campgrounds would be reduced in size, improving camping conditions, but resulting in minor, adverse impacts on those who could not find campsites in the area.
- In the foothills, the Potwisha campground would be removed, and South Fork would be converted to a trailhead campground, resulting in moderate, adverse impacts on those who could not find camping in these areas.
- The Cold Spring campground at Mineral King would be expanded to accommodate sites from Atwell Mill, resulting in negligible, beneficial, long-term impacts since a similar number of campsites would be provided, but minor, adverse impacts on those seeking to camp in a sequoia grove. Removing overnight camping from Atwell Mill would be consistent with actions in other sequoia groves to eliminate overnight use and thus provide a safer visitor experience because users would be at less risk from being injured by falling trees or limbs. Retaining the Mineral King dams will continue the potential adverse impact on human life and downstream development at

the Cold Spring campground, as discussed on page 249.

- The high Sierra camp at Bearpaw Meadow would be removed, resulting in minor, adverse, long-term impacts on the small number of visitors wanting this type of backcountry experience.
- For backcountry campers educational programs and enforcement efforts by park rangers would be enhanced in order to protect black bears from hiker and backpacker food supplies.

This alternative would generally result in minor, beneficial, long-term impacts on most camping experiences, with a moderate, adverse, long-term impact due to the removal of the Potwisha campground in the foothills area.

Water Play — Seasonal summer water play in rivers at Cedar Grove, Lodgepole, and the foothills would continue, but limited access could concentrate more people in some areas, with minor, adverse, long-term impacts on visitors. Reducing the number of river access points, parking areas, trails, and trailheads would decrease bank and vegetation damage, as well as use impacts such as littering. As a result of improved conditions, despite more limited access, there would be minor, beneficial, long-term impacts on waterplay opportunities.

Cave Tours — Low-cost, guided cave tours of various types would continue to be offered by the Sequoia Natural History Association at Crystal Cave. With decreased park visitation, it might be easier to obtain tickets in advance. An unknown number of visitors who might not be able to get advance tickets would be denied this experience. Due to the 0.5-mile steep access trail, the cave would not be accessible to those visitors in wheelchairs or those unable to negotiate the terrain. Educational waysides and photographs of the cave could help illustrate cave resources to visitors who could not access the cave. Restrooms would remain at the parking lot. Alternative A would result in negligible, beneficial, long-term impacts on guided cave

tours since the tour would remain similar to what is offered now.

To better protect park resources, access to other caves would be restricted to cave specialists with permits. Alternative A would have negligible, beneficial, long-term impacts on opportunities for the general public to experience cave resources, and minor, adverse, long-term impacts on opportunities for the small number of recreational cavers and spelunkers to explore park caves.

Fishing — Sportfishing would be more restricted so as to allow the restoration of native populations and to eliminate nonnative species. The resulting impact would be minor, long term, and adverse for those anglers seeking nonnative species.

Winter Use — Winter use demand would continue to expand, and crowding and lack of rental equipment would continue to occur during holiday weekends. Not providing winter use facilities at Wolverton would have minor to moderate, adverse, long-term impacts since fewer facilities and less rental equipment would be available.

Opportunities for Nontraditional Recreational Experiences. *New Activities* — New activities would be prohibited, even those with potentially no impact. The result would be minor, adverse, long-term impacts for those visitors desiring to try new or extreme activities within the parks since there would be a comprehensive prohibition.

Bicycle Use — Under alternative A bicycle use would be allowed only on park roads, the same as the no-action alternative. Safety would not be improved by striping bike lanes. The result would be minor, adverse, long-term impacts to bicyclists due to safety concerns.

Snowmobiles / Snow Machines — The use of snowmobiles and other snow machines would be prohibited, resulting in minor, adverse impacts over the short and long terms for private inholders and cabin permit holders who use these ma-

chines to access their cabins during the winter. However, all park users would be equally subject to restrictions. Because snowmobile use is currently limited to a few areas, and because opportunities are provided on adjacent USFS lands, not allowing recreational snowmobiling in the parks would have minor, beneficial, long-term impacts on the majority of park visitors during the winter.

Nonmotorized Watercraft — Nonmotorized watercraft would be discouraged, resulting in negligible to minor, adverse, long-term impacts on recreational opportunities since the number of visitors enjoying this activity is low but has been growing in recent years.

Air Tours — Potential impacts would be analyzed in an air tour management plan prepared jointly by the National Park Service and the Federal Aviation Administration.

Opportunities for Stock Use. Prohibiting horses and other stock throughout the parks under alternative A would result in moderate, adverse, long-term impacts to the relatively small number of visitors seeking this use. Commercially provided horse and pack trips would also be eliminated, and the corrals at Cedar Grove, Grant Grove, and Mineral King would be closed. Permits and discussion with backcountry rangers show little or no current use of stock by visitors with disabilities, so the impact on them would be negligible.

Visitor Facilities and Services

Fewer facilities would be provided in the development and the low- and high-use frontcountry zones under alternative A. Some facilities would be moved outside the parks, resulting in less convenience and choice for visitors. For example, gasoline and RV dump stations would not be provided within the parks, and there would be less lodging and camping.

- At Cedar Grove seasonal use would continue, but public lodging would be removed, resulting in minor to moderate, adverse, long-term impacts to those wanting to stay overnight here.

- At Grant Grove there would be no change in the amount of cabins and other lodging provided, resulting in negligible, beneficial, long-term impacts to those wanting to stay overnight here.
- At Lodgepole the nature center and post office would be removed, with minor to moderate, adverse, long-term impacts due to fewer amenities.
- At Wolverton the picnic area would remain, but the winter concession building and the Boy Scout camp would be removed and the areas restored to more natural conditions. Services at Wolverton would be reduced compared to today, resulting in moderate, adverse, long-term impacts on winter use since support facilities would be removed. At the same time there would be major, beneficial, long-term impacts on visitation since most visitors spend time in the Giant Forest and parking would be more convenient.
- Like the other alternatives, new visitor service facilities would be provided in Giant Forest (the museum, the Beetle Rock education facility, and transit shuttle facilities), resulting in major, beneficial, long-term impacts on visitor experiences.

This alternative would generally result in minor to moderate, adverse, long-term impacts on visitor experiences as a result of fewer facilities.

Cumulative Impacts

Past, present, and reasonably foreseeable actions in the region would be the same as those described for the no-action alternative. Lodging, food service, and additional types of recreational opportunities are provided in surrounding communities, such as Three Rivers. It is likely that a similar type and number of services will be provided in the future.

Giant Sequoia National Monument is expected to have a negligible impact on existing types of visitor uses. Visitor services (such as lodging, camping, gas, and food) are provided in several locations in the monument, meeting the needs of

both monument and park visitors. More visitors to the monument could add to congestion in the parks because these visitors can only get to the northern unit by way of the Big Stump entrance station and visitors drive along the Generals Highway through the monument between Sequoia and Kings Canyon National Parks. Some visitor confusion about how management regulations differ between the Forest Service and the Park Service and the types of recreational opportunities that can be offered (for example, hunting and snowmobiling are allowed in USFS nonwilderness forest areas) could be mitigated with education.

Raising Terminus Dam to increase the level of Lake Kaweah has resulted in some loss or relocation of recreation facilities, such as boat ramps and picnic areas. While these kinds of facilities are not provided in the parks, they primarily serve local and regional users, so this action would have a negligible, adverse, long-term impact on recreational opportunities for park visitors.

Past actions in the parks that have affected visitor experiences include the following:

- removing Giant Forest facilities, with replacement lodging at Wuksachi, and in the future relocating an underground electric power line through the center of the sequoia grove to follow the Crescent Meadow road; all these actions are intended to preserve and improve the condition of the Giant Forest sequoia grove
- rebuilding the Generals Highway to preserve its scenic historical character and slower mountain driving opportunities
- replacing utility systems to meet state standards, and replacing comfort stations with vault toilets in some locations
- updating exhibits at the Grant Grove and Ash Mountain visitor centers

Alternative A, in conjunction with past, present, and reasonably foreseeable actions in the region, would likely result in less choice and more limited visitor opportunities than are currently

provided. This would result in a moderate, adverse, long-term impact on park visitors due to reduced facilities and opportunities in the parks, despite the attraction of Giant Sequoia National Monument.

Conclusion

Since the focus of alternative A is to reduce use and development, the general impact on visitor experiences would be moderate, long term, and adverse. New facilities at Giant Forest would improve education, park experiences, and accessibility for physically disabled visitors. But on the whole, the parks would be less convenient and offer less choice, more restrictions, a loss of traditional activities, and fewer facilities to a limited number of visitors.

Alternative A, in conjunction with past, present and reasonably foreseeable actions in the region, would likely result in less choice and more limited visitor opportunities than are currently provided. This would result in moderate, adverse, long-term impacts on park visitors because of fewer facilities and opportunities in the parks, despite the attraction of Giant Sequoia National Monument.

IMPACTS OF ALTERNATIVE C

Analysis

Park Character

Alternative C focuses on retaining the parks' basic rustic character and restoring traditional use patterns, which may not be realistic with changes in society. Development areas would increase slightly to around 1,986 acres (0.23% of the total park area), an increase of 241 acres compared to the no-action alternative. Within the development zone, park operations would occupy around 55% of the area, campgrounds 19%, residential areas 16%, and villages 10%. Frontcountry areas accessible by roads would amount to 2.25% of the park, with around 2% being low-use frontcountry. About 97.5% of the parks would be managed as backcountry and wilderness.

Compared to the no-action alternative, alternative C would also preserve the low-key, rustic character of the parks through limited development, guidelines to preserve the rustic character, and the vast backcountry. However, improved parking and circulation would result in a minor to moderate, beneficial impact over the long term because it would be more convenient for visitors to experience the parks.

Visitor Use

Traditional use patterns would be emphasized, and the parks would meet the needs of a growing regional population. However, new user groups might find that the parks do not offer opportunities that meet their family or cultural needs. Private vehicles would remain the primary means for experiencing the parks. Redesigning the entrance station at Grant Grove would reduce wait times and make visitor experiences more pleasant. Visitor use would not be limited, and visitors could access all types of park resources. Longer stays would be encouraged through an expanded in-parks education program, despite recreation trends toward shorter stays and more day use. The high-use scenic driving, development, and high-use frontcountry zones would see the largest increase in visitation.

Crowding and traffic congestion during the peak season would remain common in high-use frontcountry and development areas, and some visitors would not be able to see primary park resources because of inadequate parking facilities during peak periods. Redesigning developed areas and circulation patterns as needed would somewhat improve the quality of visitor experiences even with more visitors. Existing river use and winter use levels would continue, but areas could be modified to reduce or contain resource impacts.

Cultural resources would be highlighted, and slightly more visitors would have opportunities to see the many natural and cultural resources for which the parks are significant. Caves, alpine areas, and many trails would remain largely inaccessible to visitors with disabilities, so wayside exhibits would provide an alternative

way to experience what the parks offer. Small groups would be encouraged to visit the backcountry, but on a dispersed basis.

The overall result of alternative C would be moderate, beneficial, long-term impacts on visitor experiences.

Visitor Information

The emphasis on in-park ranger programs would possibly make it harder for visitors to get information to plan their trips to the parks, a moderate, adverse impact on regional park users and those planning to come to the parks.

Educational Opportunities

Educational Facilities. Additional visitor educational facilities would be developed, and others would be consolidated.

- A new, small-scale visitor center would be provided at Cedar Grove, with minor, beneficial, long-term impacts due to improved educational opportunities for the small number of visitors here.
- The visitor center at Grant Grove would be updated as needed, resulting in minor, beneficial, long-term impacts on visitor educational opportunities.
- The visitor center at Lodgepole and the Walter Fry Nature Center would be removed, with functions concentrated in the new Giant Forest facilities. Some educational and nature activities would be provided at the shuttle stop. Removing popular facilities would result in moderate, adverse, long-term impacts to Lodgepole visitors. This impact would be somewhat mitigated by more educational opportunities at shuttle stops and the new facilities at Giant Forest.
- New educational facilities at the Giant Forest museum and the Beetle Rock education center would fill an important interpretive gap about giant sequoia ecology and provide additional group-learning opportunities. Like all the alternatives, these actions would result in major, bene-

ficial, long-term impacts since the majority of park visitors stop at Giant Forest.

- A new or enlarged visitor center would be built at Ash Mountain, providing more opportunities to learn about the foothills environment. With these new opportunities near a main park entrance, the impact on visitor educational opportunities would be moderate to major, beneficial, and long term.
- A visitor contact station would continue to provide limited space for education at Mineral King, resulting in negligible, beneficial, long-term impacts on visitors in this area.

The overall impact on visitor educational opportunities of improved and new educational facilities would be moderate to major and beneficial over the long term.

Educational Programs. *Education, Interpretation, and Orientation* — Increasing orientation programs and providing more of the popular ranger naturalist programs would enhance the learning environment for visitors with regard to resource protection and cultural resources. Additional education about Native American uses of the park and the history of recreation communities would be provided. The result would be moderate, beneficial, long-term impacts on most visitors.

Educational Outreach — Focusing educational programs within the parks and eliminating park outreach programs in favor of an expanded ranger program would result in long-term, moderate, adverse impacts on regional park users.

Recreational Activities

Opportunities to Experience Park Resources. Under alternative C opportunities would continue to be provided so visitors could experience the range of resources for which the parks are significant, although the number of frontcountry trails leading to resources would be consolidated to eliminate redundant trails and to protect resources. There would be more opportunities to visit park caves, but because of steep terrain,

caves would still be inaccessible to some visitors; however, wayside exhibits would provide an alternative way to vicariously experience what the parks offer. Portions of facilities and park roads would be redesigned to accommodate more visitors. Developed areas in the parks would have more diverse types of lodging, including traditional cabins. Regulations would be used to maintain traditional activities, thus improving the quality of experiences for most visitors. Features and attractions in the high-use frontcountry zone would remain crowded at times, and a limited transit system would be used to improve circulation at these sites. Consolidating frontcountry trails in both low- and high-use areas would increase the likelihood of visitors encountering others on the trails. Access to heavily used waterplay areas would likely be redesigned to reduce impacts on natural resources, somewhat restricting visitor freedom. Winter use would expand, with more opportunities for snow play, as well as designated cross-country and snowshoe trails.

Areas managed as backcountry, including designated wilderness, would be similar to what is available today. Reduced party-size requirements and more regulation would adversely affect backcountry experiences for some visitors.

While opportunities to experience the range of park resources would remain, there would be a number of visitor impacts. Less choice and consolidated facilities would result in minor, adverse, long-term impacts on visitors' abilities to experience the range of park resources. There would also be negligible to minor, adverse, long-term impacts on opportunities to enjoy frontcountry solitude as a result of consolidating trails. Overall, there would be negligible to minor, beneficial, long-term impacts on the quality of visitor experiences.

Opportunities for Traditional Recreational Experiences. *Trails and Hiking* — Trails would be consolidated, resulting in improved conditions, but fewer choices for hiking. However, the overall impacts would be moderate, beneficial, and long term because of better trail conditions.

Camping — Camping would generally offer more variety.

- At Cedar Grove campgrounds would be redesigned to better fit family groups, and campgrounds would be designated for certain types of camping. The RV dump station would be retained. Impacts on campers at Cedar Grove would be minor, beneficial, and long term.
- At Grant Grove popular campgrounds would be redesigned to provide more space between sites, resulting in moderate beneficial, long-term impacts because of improved experiences.
- The Dorst campground would continue, with a negligible impact on camping opportunities.
- At Lodgepole the popular campgrounds would be reduced in size, resulting in improved camping experiences, but a moderate, adverse, long-term impact on the amount of camping in this area.
- The Potwisha and Buckeye Flat campgrounds would be upgraded, and the South Fork campground would be retained, resulting in negligible, long-term impacts on foothills campers.
- The Atwell Mill campground would be redesigned, and the Cold Spring campground would be retained at Mineral King, resulting in negligible, beneficial, long-term impacts on visitors who want several camping opportunities at Mineral King. Expanding overnight camping at Atwell Mill would be inconsistent with actions in other sequoia groves to eliminate overnight use and thus provide a safer visitor experience, with less risk of human injuries from falling trees and limbs. Retaining the Mineral King dams will continue the potential adverse impact on human life and downstream development at the Cold Spring campground, as discussed on page 249.
- Continuing the high Sierra camp at Bearpaw Meadow would retain more camping choices for visitors, resulting in negligible, beneficial, long-term impacts on visitors

seeking this type of backcountry experience.

This alternative would generally result in minor to moderate, beneficial, long-term impacts for visitors who are camping, despite fewer campsites.

Water Play — Seasonal summer water play in rivers at Cedar Grove, Lodgepole, and the foothills would continue. Similar to the preferred alternative, river access points, parking areas, trails, and trailheads would be defined in popular areas to reduce bank and vegetation damage, as well as littering. Improved and defined access would result in minor, beneficial, long-term impacts for a small number of visitors.

Cave Tours — Low-cost, guided tours at Crystal Cave, with advance ticket sales, would allow some visitors to experience this resource. As described for the no-action alternative, an unknown number of visitors might not be able to get permits, thus being denied this experience. Guided tours would be provided at other caves. Generally, making more cave opportunities available for visitors wanting such experiences would have minor, beneficial, long-term impacts.

Fishing — Sportfishing would continue to be highly regulated. No facilities to support fishing would be provided. The park would continue to restore native populations and to eliminate non-native species. The impact on fishing would be negligible, beneficial, and long term since fishing opportunities would continue.

Winter Use — Winter recreational opportunities would be expanded so visitors could better enjoy park resources year-round. Snowplay areas would be provided at Grant Grove and Wolverton, with equipment rentals, limited food service, and restrooms being made available, similar to the preferred alternative. Crowding would continue to be common at snowplay sites during weekends and holidays. Cross-country skiing and snowshoeing would continue to offer opportunities for quieter experiences within superb front- and backcountry park settings. Winter camping would be provided in several camp-

grounds, in addition to backcountry opportunities. Like the preferred alternative, alternative C would result in minor, beneficial impacts for winter use opportunities over the long term because of slightly expanded opportunities and services.

Opportunities for Nontraditional Recreational Experiences. *New Activities* — Traditional basic activities would be encouraged, as would activities related to the parks’ purposes. The result would be negligible, adverse impacts for those few visitors desiring to try new or extreme activities within the parks. For other visitors this policy would result in minor, beneficial impacts over the long term because the parks’ traditional character would be preserved.

Bicycle Use — Under alternative C bicycle use would be facilitated at Cedar Grove and Grant Grove by means of striping bike lanes, giving bicyclists a dedicated portion of the roadway to use. Opening Shepherd Saddle Road to bicycle use would result in additional recreational opportunities, and the absence of vehicles would create a safer experience for visitors. Overall, impacts would be minor, beneficial, and long term to the relatively small number of bicycle-riding visitors.

Snowmobiles / Snow Machines — Like the no-action and preferred alternatives, the use of snowmobiles and other snow machines would only be allowed on roads for private inholders and permit holders to access their cabins (in Wilsonia and Mineral King). Because most of the parks are wilderness and motorized equipment is prohibited, snowmobiles are confined to frontcountry roads, where their use may pose safety concerns for other winter users. Because snowmobile use is limited to a few areas, and because opportunities are provided on adjacent USFS lands, impacts on the majority of park users during the winter would be minor, beneficial, and long term.

Nonmotorized Watercraft — Nonmotorized watercraft would be allowed with regulation on park rivers, with minor, beneficial, long-term impacts on watercraft users.

Air Tours — Similar to the preferred alternative, potential impacts would be analyzed in an air tour management plan prepared jointly by the National Park Service and the Federal Aviation Administration.

Opportunities for Stock Use. Under alternative C the use of horses and other stock would continue as a traditional use in the parks, but with regulation and reduction in party sizes. The result would be minor, long-term, and beneficial for stock users since the use would continue to be allowed, but the impact would be adverse for backcountry stock users accustomed to traveling in large groups.

Continuing to provide commercial horse and pack trips, and keeping the corrals at Cedar Grove, Grant Grove, and Mineral King open, would result in minor, beneficial, long-term impacts for visitors enjoying this type of activity. A new, sustainable location to replace the Wolverton corral would be explored at Dorst, Wuksachi, Lodgepole, and Wolverton. Added stock support would be provided at Dillonwood and in the foothills. A “Preliminary Draft Franchise Fee / Feasibility Analysis of Current Saddle Horse Ride and Pack Stations” (NPS 2004) indicates that new or existing commercial pack station / stock ride operations might become increasingly infeasible without government-provided infrastructure, such as roads, utilities, and buildings. This is primarily due to rising insurance costs and projected costs for additional resource protection requirements, such as weed-free feed, waste removal, and equipment costs for waste removal.

Continuing stock use is expected to have a negligible, beneficial impact for visitors with physical disabilities because this would provide another means for them to access various resources in the parks.

Impacts of horse use (feces, eroded trails, dust) could be reduced by education, smaller party sizes, and regulation enforcement, but hikers would continue to be adversely affected to a minor degree.

Despite minor, adverse impacts on hikers, opportunities for continued traditional stock use with regulations and monitoring to improve visitor experiences for all would generally result in minor, beneficial impacts over the long term.

Visitor Facilities and Services

Overnight lodging and camping would be accommodated in the development, low-use front-country, and backcountry zones. Slightly more overnight facilities would be provided than under the no-action alternative, resulting in more convenience and choices for visitors. Developed areas would not include gas stations. As previously described, campgrounds would generally offer more variety.

- At Cedar Grove a longer use season and cabins would be added to offer more choices in public lodging, resulting in minor, beneficial, long-term impacts.
- At Grant Grove lodging would be expanded within the limits of current concession contracts and would include a traditional mix of cabins and lodges. Impacts of more lodging choices on visitors would be minor and beneficial over the long term.
- At Wuksachi a gas station would be provided, and lodging and visitor services would be expanded within the concession contract limits and an amphitheater provided, resulting in minor to moderate, beneficial, long-term impacts on visitors.
- At Lodgepole facilities meeting overnight needs (e.g., laundry / showers, groceries) would remain, resulting in minor, beneficial impacts over the long term.
- At Wolverton the concession building for winter use and the Boy Scout camp would be retained, and picnic facilities would be provided at shuttle stops and new parking areas. Pending the selection of a new corral site, the impact on the relatively small number of visitors seeking a Giant Forest riding experience would be minor, adverse, and short term. Services at Wolverton would be improved compared to today, resulting in major, beneficial, long-term impacts since

most visitors spend time in Giant Forest and parking would be more convenient.

For visitors this alternative would generally result in minor to moderate, beneficial, long-term impacts in terms of facilities, visitor convenience, and choices of lodging.

Cumulative Impacts

Past, present, and reasonably foreseeable actions in the region would be the same as those described for the no-action alternative. Lodging, food service, and additional types of recreational opportunities are provided in surrounding communities, such as Three Rivers. It is likely that a similar type and number of services will be provided in the future.

Giant Sequoia National Monument is expected to have a negligible impact on existing types of visitor uses. Visitor services (such as lodging, camping, gas, and food) are provided in several locations in the monument, meeting the needs of both monument and park visitors. However, national monument status is likely to attract additional visitors, which could add to congestion in the parks because visitors can only get to the northern unit by way of the Big Stump entrance station and they drive along Generals Highway through the monument between Sequoia and Kings Canyon National Parks. Some visitor confusion about how management regulations differ between the Forest Service and the Park Service and the types of recreational opportunities that can be offered (for example, hunting and snowmobiling are allowed in non-wilderness forest areas) could be mitigated with education.

Raising the level of Terminus Reservoir has resulted in some loss or relocation of recreation facilities, such as boat ramps and picnic areas. While these kinds of facilities are not provided in the parks, they primarily serve local and regional users, so this action would have negligible, adverse, long-term impacts on recreational opportunities for park visitors.

Past actions in the parks that have affected visitor experiences include the following:

- removing Giant Forest facilities, with replacement lodging at Wuksachi, and in the future relocating an underground electric power line running through the center of the sequoia grove to follow the Crescent Meadow road; these actions are intended to preserve and improve the condition of the Giant Forest sequoia grove
- rebuilding the Generals Highway to preserve its scenic historical character and slower mountain driving opportunities
- replacing utility systems to meet state standards, and in some locations replacing comfort stations with vault toilets
- updating exhibits at the Grant Grove and Ash Mountain visitor centers

Alternative C, in conjunction with past, present, and reasonably foreseeable actions in the region, would improve facilities and opportunities in the parks, in addition to the attractions of Giant Sequoia National Monument, resulting in moderate, beneficial, long-term impacts on visitor experiences.

Conclusion

Compared to the no-action alternative, alternative C would provide improved visitor opportunities, characterized by moderate, beneficial impacts over the long term. The differences from the preferred alternative include fewer day use facilities, in-park educational programs focused on ranger naturalist programs, and the elimination of an outreach program. The actions in alternative C that would generally contribute to moderate, beneficial, long-term impacts on visitor experiences include:

- new educational facilities at Giant Forest, Cedar Grove, and Ash Mountain
- expanded ranger naturalist programs
- a limited, voluntary shuttle system
- improved campgrounds, frontcountry trails, and bicycling opportunities
- more lodging

Alternative C, in conjunction with past, present, and reasonably foreseeable actions in the region, would improve visitor facilities and opportunities, generally resulting in moderate, beneficial, long-term impacts on visitors to the parks and to Giant Sequoia National Monument.

IMPACTS OF ALTERNATIVE D

Analysis

Park Character

The parks would retain their basic rustic character, offering most visitors opportunities to see the many natural and cultural resources for which the parks are significant. Development areas would total 2,133 acres (0.25% of the total park area), an increase of 388 acres over the no-action alternative. Within the development zone, park operations would occupy around 50% of the area, residential uses around 10%, campgrounds around 24%, and villages about 11%. Frontcountry areas reached by roads would amount to 3.8% of the parks, the majority of which (2.8%) would be in the low-use frontcountry zone. Compared to the other alternatives, there would be slightly less backcountry and slightly less area compatible with management as wilderness under this alternative. Higher levels of use might be more common on major backcountry trails.

Compared to the no-action alternative, alternative D would also preserve the low-key, rustic character of the parks because of limited development, guidelines to preserve rustic character, and the vast backcountry. However improved circulation and transit would result in moderate, beneficial impacts on visitor experiences.

Visitor Use

Traditional use patterns would continue to be altered as the regional population grows and new user groups continue to discover the parks. Visitation would not be limited, and facilities would likely be developed to accommodate additional visitation and more day use. Short stays and weekend use, in addition to day use, would likely become more common. Private vehicles

would remain the primary means of arriving at the parks, and relocated entrance stations would make the experience more pleasant. Most visitor use would be in the high-use scenic driving, development, and high-use frontcountry zones.

While more visitors could come, they would be dispersed by means of a transit system and the development of additional areas to visit. Developed areas in the parks would be larger than they are today. High-use areas would remain crowded at times, especially on summer weekends, but all visitors should be able to see primary park resources because of transit systems. Caves, alpine areas, and many trails would remain largely inaccessible to people with disabilities, so way-side exhibits would provide an alternative way to see what the parks offer. Educational programs would include backcountry skills, so that more people would experience the backcountry. Most facilities would remain in the parks.

More visitation, combined with more areas to visit, transit improvements, and additional facilities, would result in moderate, beneficial, long-term impacts on visitor experiences.

Visitor Information

People would have additional opportunities to learn about the parks before their visits on the Internet. This would allow them to plan their visits to make the best use of their time, resulting in minor, beneficial, long-term impacts.

Educational Opportunities

Educational Facilities. New educational facilities / visitor centers would be provided at Cedar Grove, Grant Grove, and Ash Mountain / Foothills or Potwisha. The visitor contact station at Mineral King would continue to provide limited space for education. The Lodgepole visitor center would be assessed to determine if several educational facilities could be supported in the Giant Forest area. A nature facility, which would meet the needs of day users as well as overnight guests, would be provided at Lodgepole. New educational facilities at the Giant Forest museum and the Beetle Rock education center would be

completed, filling an important interpretive gap about giant sequoia ecology and providing additional group learning opportunities. The result of new facilities would be major, beneficial, long-term impacts on visitors' abilities to learn about park resources.

Educational Programs. *Education, Interpretation, and Orientation* — Educational programs would be substantially expanded by means of more outreach, popular ranger naturalist programs, and additional programs that would focus on instilling park stewardship values, leave-no-trace ethics, and backcountry skills. Park orientation and wayfinding would be expanded. The overall impacts would be major, beneficial, and long term because many more visitors would have access to educational programs.

Outreach Programs — Visitor outreach programs would be expanded to reach diverse publics, including classrooms throughout the region. A classroom-focused website would provide additional education, and numerous volunteer and partnership efforts would be developed. The overall impact would be minor, beneficial, and long term because a broad segment of the population would have chances to learn about the parks, their ecology, and their history.

Recreational Activities

Opportunities to Experience Park Resources. Under alternative D there would be slightly more opportunities to experience the range of resources for which the parks are significant, with increased access to some resources, such as alpine areas, caves, and features along Generals Highway. The frontcountry trails system would be improved and expanded, offering more variety of trails and directional information. The likelihood of encountering others would remain similar to today. There would be more opportunities to experience wilderness values and recreational opportunities. Varied party sizes, dispersion of uses, and separation of stock and hikers would result in backcountry experiences still likely to provide solitude. Larger sizes of stock parties would be allowed.

Because of the terrain, caves, alpine areas, and many trails would remain largely inaccessible to people with physical disabilities. However, there would be more accessible trails and facilities than today, and they would provide more diverse experiences for disabled visitors.

With continued opportunities to experience the range of park resources, there would be moderate, beneficial, long-term impacts because of improved circulation and facilities.

Opportunities for Traditional Recreational Experiences. *Trails and Hiking* — There would be numerous recreational opportunities to use trails in all park environments, similar to the preferred alternative. Conditions of frontcountry trails in both low- and high-use areas would be improved, and additional trail information would be provided.

The majority of the parks would remain backcountry. While most of the backcountry would remain trailless, more major backcountry trails would be provided to accommodate higher levels of use. Educational programs and enforcement efforts by park rangers would be enhanced to ensure that hikers and backpackers protected their food supplies from black bears.

This alternative would have major, beneficial, long-term impacts for hiking and trail use since most park visitors would use portions of the improved trail system, and many more would be educated about trails and backcountry hiking

Camping — Camping opportunities would generally offer more variety, as well as greater separation of differing camping preferences.

- At Cedar Grove campground sizes would be limited and types of camping designated, thus improving the camping experience, resulting in minor, beneficial, long-term impacts.
- The Dorst campground would be redesigned to separate uses and provide more types of campsites. The RV dump station would be retained, and a camper store would be added. Impacts would be moderate and beneficial for campers over the long term because different needs of user groups would be met.

erate and beneficial for campers over the long term because different needs of user groups would be met.

- At Lodgepole the campgrounds would be reduced in size but conditions would be improved, resulting in minor, beneficial, long-term impacts for the smaller number of campers who could get a campsite.
- In the foothills the Potwisha campground would be removed, resulting in a moderate, adverse, long-term impact on camping in the foothills since this is the main foothills campground.
- Camping would be added along the North Fork, and the South Fork campground would be converted to a trailhead campground, resulting generally in minor, beneficial, long-term impacts on foothills camping.
- Both the Cold Spring and the Atwell Mill campgrounds would be expanded at Mineral King, resulting in minor, beneficial, long-term impacts because of more camping opportunities. Expanding overnight camping at Atwell Mill would be inconsistent with actions in other sequoia groves to eliminate overnight use and thus provide a safer visitor experience, with less risk of human injuries from falling trees and limbs. Retaining the Mineral King dams will continue the potential adverse impact on human life and downstream development at the Cold Spring campground, as discussed on page 249.
- The high Sierra camp at Bearpaw Meadow would continue to offer low-key, backcountry facilities for visitors, and a new high Sierra camp would be built, doubling opportunities for visitors seeking this type of backcountry experience. The result on visitor experiences would be minor to moderate, beneficial, long-term impacts to a small number of visitors.

This alternative would generally result in minor to moderate, beneficial, long-term impacts on camping due to improved facilities. Removing

the Potwisha campground would result in moderate, adverse impacts over the long term.

Water Play — Seasonal summer water play in rivers at Cedar Grove, Lodgepole, and the foothills would continue. Similar to the preferred alternative, river access points, parking areas, trails, and trailheads would be defined in popular areas to reduce bank and vegetation damage, as well as use impacts such as littering. This would result in minor, beneficial, long-term impacts, similar to the preferred alternative, because of improved and controlled visitor access for a small number of visitors.

Cave Tours — Low-cost, guided tours of Crystal Cave, with advance ticket sales, would continue to be offered by the Sequoia Natural History Association. As now, the cave would not be accessible to those visitors in wheelchairs or those unable to negotiate the terrain. For these visitors, access could be provided through educational waysides and photographs. Restrooms would remain at the parking lot; they would only be provided at the cave if it became technologically and economically feasible to meet state wastewater standards with sustainable facilities.

To better protect park resources, access to other caves would be restricted to cave specialists with permits. Alternative D would have negligible, beneficial, long-term impacts on opportunities for the general public to experience cave resources, and minor, adverse, long-term impacts on opportunities for recreational cavers and spelunkers to explore park caves.

Fishing — Sportfishing would continue and would be regulated in order to restore native populations and to eliminate nonnative species. The resulting impact would be negligible, beneficial, and long term for the few anglers fishing in the parks.

Winter Use — Winter use would be expanded so visitors could enjoy park resources year-round. Snowplay areas would be provided at Grant Grove and Wolverton, with equipment rentals, limited food service, and restrooms being made available. Crowding would be common at snow-

play sites during weekends and holidays. Cross-country skiing and snowshoeing would continue to offer opportunities to have a quieter experience within superb front- and backcountry park settings. Winter camping would be provided in several campgrounds, in addition to backcountry opportunities. Similar to the preferred alternative, alternative D would result in minor, beneficial, long-term impacts by improving winter use opportunities and services that serve a small number of winter users.

Opportunities for Nontraditional Recreational Experiences. *New Activities* — New activities would be assessed against policy and resource concerns to determine potential impacts. Low-impact activities that did not impair park resources and were related to park settings would be allowed. The parks would encourage basic activities. Measures to separate some activities that would infringe on the experiences of other visitors would enhance the overall enjoyment of park resources for as many visitors as possible. This alternative would have minor, beneficial, long-term impacts for visitors to experience new activities deemed appropriate.

Bicycle Use — Under alternative D bicycle use would improve with designated bike routes at Cedar Grove, redesigned roads that would accommodate bicycles at Grant Grove, and bicycling opportunities on the road to Crescent Meadow, Colony Mill Road, and Shepherd Saddle Road. Impacts on bicycle-riding visitors would be moderate, beneficial, and long term because of safer conditions and additional opportunities in many popular areas of the parks.

Snowmobiles / Snow Machines — Like the no-action and preferred alternatives, the use of snowmobiles and other snow machines would only be allowed on roads by private inholders and permit holders to access their cabins (in Wilsonia and Mineral King). Because most of the parks are wilderness and motorized equipment is prohibited, snowmobiles are confined to frontcountry roads, where their use may pose safety concerns for other winter users. Because snowmobile use is limited to a few areas, and because opportunities are provided on adjacent

USFS lands, impacts on the majority of park users during the winter would be minor, beneficial, and long term.

Nonmotorized Watercraft — Like the preferred alternative, nonmotorized watercraft would be allowed with regulation, and access points would be designated. The result would be minor, beneficial, long-term impacts on the small but increasing number of visitors using nonmotorized watercraft.

Air Tours — Similar to the preferred alternative, potential impacts would be analyzed in an air tour management plan prepared jointly by the National Park Service and the Federal Aviation Administration.

Opportunities for Stock Use. Under alternative D use by horses and other stock would continue but with less limitation on party sizes than under the other alternatives, resulting in minor, beneficial, long-term impacts to stock users. There would be more separation between stock users and hikers than today, resulting in minor, beneficial, long-term impacts to hikers, who would be less exposed to impacts from stock use.

Continuing commercial horse and pack trips; retaining the corrals at Cedar Grove, Grant Grove, and Mineral King; relocating the Wolverton corral (the Dorst, Wuksachi, Lodgepole, and Wolverton areas would be considered); and expanding and improving riding trails would result in minor, beneficial, long-term impacts to visitors seeking stock experiences. Some day use trails would be removed from the Giant Forest area, resulting in a minor, adverse, long-term impact on those riders seeking the experience of riding in the sequoia grove.

Continuing stock use would have negligible, beneficial, long-term impacts for visitors with physical disabilities because this would provide another means for them to access various resources in the parks.

Additional stock camps would be provided at Shepherd Saddle and on the Hockett Plateau. Stock support facilities would be provided at

Dillonwood. These additional facilities would result in a moderate, beneficial, long-term impact on the small number of visitors who are stock users.

A “Preliminary Draft Franchise Fee / Feasibility Analysis of Current Saddle Horse Ride and Pack Stations” (NPS 2004) indicates new or existing commercial pack station / stock ride operations might become increasingly infeasible without government-provided infrastructure, such as roads, utilities, and buildings. This is primarily due to rising insurance costs and projected costs for additional resource protection requirements, such as weed-free feed, waste removal, and equipment costs for waste removal.

Impacts of horse use (feces, eroded trails, dust) could be reduced by education and regulation enforcement, but hikers would continue to be adversely affected to a minor degree.

In general the impact of improved stock facilities and more accessible and expanded stock opportunities for visitors would be moderate, beneficial, and long term despite adverse impacts on backcountry hikers.

Visitor Facilities and Services

Slightly more overnight facilities would be provided. When economically feasible, some non-visitor facilities would be moved outside the parks where they would be more efficient to operate. As previously described, campgrounds would be designed to offer more variety, as well as separation of differing camping preferences.

- Operating Cedar Grove year-round or for an extended season would increase use and change the character of this developed area. A visitor center would be added, diverse types of public lodging would be expanded, and camping preferences designated. Opportunities for visitors at Cedar Grove would expand substantially, resulting in moderate to major, beneficial, long-term impacts. The change in character would be mitigated by design guidelines already in place.

- At Grant Grove a bypass road could be constructed to divert Hume Lake traffic around the park, thus reducing traffic congestion in the village. (A determination would have to be made whether the bypass would be compatible with the presidential proclamation creating Giant Sequoia National Monument.) A transit system and related facilities would be constructed, the visitor center would be relocated near the transit staging area, and a gas station would be provided. Lodging would be expanded, with more cabins and other lodging types available. The changes in visitor experiences from expanded facilities under alternative D would be major, beneficial, and long term. Changes in park character resulting from this alternative would be mitigated by design guidelines already in place.
- Providing a camper store at Dorst would make obtaining supplies more convenient for overnight campers. However, supplies can be purchased at nearby Stony Creek Lodge in Giant Sequoia National Monument, so the beneficial overall impact of a store at Dorst would be negligible to minor.
- At Wuksachi a mix of cabins and lodges, to the extent allowed by contract, as well as a gas station, would be provided, resulting in moderate, beneficial, long-term impacts to visitors seeking overnight accommodations close to Giant Forest.
- At Lodgepole the nature center and post office would be removed and the need for a visitor center assessed. Fewer facilities would mean less convenience for some visitors, with minor to moderate, adverse impacts over the long term.
- At Wolverton the concession building for winter use and the picnic area would remain. The Boy Scout camp would be converted to a camp for volunteers. In addition to a new visitor parking lot / shuttle system, a 1,700-car parking garage would be developed to allow expanded day use at Giant Forest. While more day visitors would be able to visit Giant Forest, greatly increased parking and improved vehicular circulation

would result in more crowding and degraded visitor pedestrian experiences. The removal of the corral has reduced recreational opportunities at Wolverton, adversely affecting a relatively small number of visitors wanting to ride in Giant Forest until a new location has been identified, a minor, adverse impact. Visitor services at Wolverton would be vastly expanded compared to today, but as a result of crowding, the general impact would be major and adverse over the long term since most visitors spend time in the Giant Forest. While parking would be more convenient, the low-key character of the area would be changed over the long term.

- New visitor service facilities in the Giant Forest (the museum, the Beetle Rock education facility, and transit shuttle facilities) would result in major, beneficial impacts for visitors over the long term, the same as the other alternatives.
- The Potwisha campground would be converted to day uses or a new visitor center. The resulting impacts to day use would be major, beneficial, and long term.

This alternative would generally result in moderate to major, beneficial, long-term impacts on visitor experiences due to improved day use and educational facilities, as well as better visitor facility conditions.

Cumulative Impacts

Past, present, and reasonably foreseeable actions in the region would be the same as those described for the no-action alternative. Lodging, food service, and additional types of recreational opportunities are provided in surrounding communities, such as Three Rivers. It is likely that a similar type and number of services will be provided in the future.

Giant Sequoia National Monument is expected to have a negligible impact on existing types of visitor uses. Visitor services (such as lodging, camping, gas, and food) are provided in several locations in the monument, meeting the needs of

both monument and park visitors. National monument status is likely to attract additional visitors, which could add to congestion in the parks because visitors can only get to the northern unit by way of the Big Stump entrance station and visitors drive along Generals Highway through the monument between Sequoia and Kings Canyon National Parks. Some visitor confusion about how management regulations differ between the Forest Service and the Park Service and the types of recreational opportunities that can be offered (for example, hunting and snowmobiling are allowed in nonwilderness forest areas) could be mitigated with education.

Raising the level of Terminus Reservoir on Lake Kaweah resulted in some loss or relocation of recreation facilities, such as boat ramps and picnic areas. While these kinds of facilities are not provided in the parks, they primarily serve local and regional users, so this action would have a negligible, adverse, long-term impact on recreational opportunities for park visitors.

Past actions in the parks that have affected visitor experiences include the following:

- removing Giant Forest facilities, with replacement lodging at Wuksachi, and in the future relocating an underground electric power line running through the center of the sequoia grove to follow the Crescent Meadow road; these actions are intended to preserve and improve the condition of the Giant Forest sequoia grove
- rebuilding the Generals Highway to preserve its scenic historical character and slower mountain driving opportunities
- replacing utility systems to meet state standards, and in some locations replacing comfort stations with vault toilets
- updating exhibits at the Grant Grove and Ash Mountain visitor centers

Alternative D, in conjunction with past, present, and reasonably foreseeable regional actions, would generally expand visitor experience opportunities, resulting in moderate to major,

beneficial impacts on park visitors because of improved park facilities and opportunities and the attraction of Giant Sequoia National Monument.

Conclusion

Alternative D would generally have moderate to major, beneficial, long-term impacts on visitor experiences. The expansion of facilities would offer choices and convenience, while improving access to park resources. There could be a minor adverse impact on basic activities as a result of accommodating new activities, but these activities would have to relate to park resources. The following actions would specifically contribute to the beneficial impact:

- a redesigned and more efficient circulation system
- a larger, improved trail system
- a maximized transit system
- more choices in lodging
- a new visitor center and bike routes at Cedar Grove
- a relocated visitor center and bypass at Grant Grove
- new facilities at Giant Forest
- a new foothills visitor center
- added bicycling, hiking, and camping opportunities
- improved and diversified educational programs (including more ranger naturalist programs, as well as a focus on park values and learning outdoor skills), and increased accessibility to park resources by visitors with disabilities .

Alternative D, in conjunction with past, present and reasonably foreseeable regional actions, would generally result in moderate to major, beneficial impacts on park visitors because of improved facilities and opportunities, plus the attraction of Giant Sequoia National Monument.

Private Land and Special Use Permits on Park Land

GUIDING REGULATIONS AND POLICY

The National Park Service was established to protect and preserve resources for this and future generations.

- *NPS Organic Act of 1916* — The Organic Act requires the National Park Service “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.”
- *National Parks and Recreation Act of November 10, 1978 (PL 95-625)* — This act transferred land in the Sequoia Game Refuge to Sequoia National Park and limited special use permits for cabins on what had been U.S. Forest Service land to the permittee of record in 1978.
- *Public Law 108-447* — This law amended Public Law 99-338 to authorize two additional renewals of the permit for hydroelectric facilities within the park, until September 8, 2026. The FERC license for the Kaweah complex facilities outside the park (Project 298-000-California) runs through December 31, 2021.

Public Law 108-447 also amended Public Law 95-625 relating to the Mineral King special use permits. The legislation struck the permit limit of 25 years and the provisions that permits could not be transferred, giving permittees the right to transfer permits to their heirs, successors, and assigns (PL 108-447, Division E, Title 1, Sec. 139. (b)).
- *Director’s Order #53: Special Use Permits* — A special park use is a short-term activity that takes place in a park area and:
 - provides a benefit to an individual, group or organization, rather than the public at large;

- requires written authorization and some degree of management control from the National Park Service in order to protect park resources and the public interest;
- is not prohibited by law or regulation; and
- is neither initiated, sponsored, nor conducted by the NPS.”

According to section 3.3 of *Director’s Order #53*, a special use permit may be a right or a privilege. A right is based on property ownership, legislative or treaty entitlement, or constitutional guarantee. Where none of these factors is present, the use is a privilege over which the superintendent may exercise varying degrees of discretion and control.

METHODOLOGY FOR ANALYZING IMPACTS

The impact analysis considers how the concept of public national parks, resource protection, and public recreational uses would be affected by

- privately owned land within park boundaries (inholdings)
 - Wilsonia
 - Oriole Lake
 - Silver City / Kaweah Han
 - portions of Mineral King Valley
- permitted special park uses (uses based on congressional legislation or park actions) — nonprofit campground permit (impacts related to special use permits for private cabins on public land in the Mineral King Valley are discussed under “Impacts Common to All Alternatives”)
- adjacent land / boundary adjustments

Beneficial impacts would increase public use and access, while adverse impacts would reduce public use and ownership. Some impacts could be beneficial to some users while adverse or neutral to others.

Impact Thresholds for Private Lands and Permitted Special Uses

Negligible — Impacts from private and permitted land uses would not be detectable to visitors, private landowners, or permittees, and they would have no discernible effect on public use and ownership.

Minor — Impacts from private and permitted land uses would be slightly detectable to visitors, private landowners, and permittees, but they are not expected to have an overall effect on public use and ownership.

Moderate — Impacts from private and permitted land uses would be clearly detectable to visitors, private landowners, and permittees, and they could have an appreciable effect on public use and ownership.

Major — Impacts from private and permitted land uses would have a substantial and noticeable effect on visitors, private landowners, and permittees, and they could permanently alter various aspects of public use and ownership.

for the management and care of Sequoia National Park and the purposes for which it was established.

Hydroelectric facilities, which are readily apparent to many visitors and visually intrude on the natural scene, would continue to provide recreational opportunities, such as hiking along the channels, as discussed on page 249.

As a whole, impacts of special use permits for hydroelectric utilities on public land would be moderate, adverse, and long term, primarily as a result of visual intrusions on the natural setting.

Mineral King Permit Cabins — Cabin Cove, West Mineral King, East Mineral King. Permits to use private cabins at Cabin Cove, West Mineral King, and East Mineral King could be issued for terms not to exceed five years and could be renewed unless the National Park Service determined that use of a cabin was incompatible with the administration of the park or that the land was needed for park purposes. Permits would be administered in accordance with the provisions of *NPS Management Policies 2001* and *Director's Order #53: Special Use Permits* (see appendix G).

As a result of Public Law 108-447, the National Park Service is reviewing management of the cabin permit program. Permits will be issued to present permit holders, their heirs, or assigns in accordance with Public Law 108-447. These permits will include requirements that cabins meet applicable health and safety codes with provisions relating to unacceptable adverse impacts to park resources, cabin appearance, utilities, self-sustaining funding to maintain the historic community appearance, interpretation, and other issues to ensure that park resources will be protected and that public use of public land will be preserved.

Cabins may be acquired by the National Park Service through donation or purchase, however partial (percentage) acquisition of a cabin would be difficult for the agency to manage. Cabins acquired in sound condition would be managed according to the "Secretary's Standards."

IMPACTS COMMON TO ALL ALTERNATIVES

As previously discussed, Public Law 108-447 authorized the continuation of the Kaweah no. 3 hydroelectric facilities and special use permit cabins in the Mineral King area. The following discussion therefore applies to all alternatives.

Utility Use — Hydroelectric Facilities. Continued hydroelectric power generation would allow the history and use of these facilities to be interpreted. Park managers would work with the operator through a regulated permitting process to ensure that the facilities are maintained and operated in a manner that does not impair park resources. In accordance with Public Law 108-447, a reauthorization permit requires that an independent safety assessment be conducted and that any identified deficiencies be corrected. The secretary of the interior may also impose any other reasonable terms and conditions necessary

A cultural resource preservation plan would be prepared for the Mineral King Road Cultural Landscape District in consultation with the state historic preservation officer and the Mineral King Preservation Society. The plan would identify a viable management / maintenance strategy, including an appropriate treatment method according to the "Secretary's Standards"; measures for resource protection (e.g., addressing cabins in wetland locations or within floodplains, or actions to make non-contributing cabins more compatible with the historical appearance of the landscape district; and a decision process for determining whether to repair, replace, or remove cabins in the event that they are damaged by natural disaster (such as a tree fall, flood, or avalanche). The cultural resource preservation plan and permit requirements would have moderate, long-term, beneficial impacts on the preservation and condition of privately owned facilities located on public land.

Over 60 permit holders and their families, heirs, or assigns could continue to have private cabins on 65 acres of public land. In terms of achieving national park purposes to provide for public enjoyment, as well as to preserve and conserve park resources, this action would have major, adverse, long-term impacts because 65 acres of publicly owned land would still be unavailable for public use.

As a whole, impacts due to the private use of public land would be major, adverse, and long term, despite the minor to moderate, beneficial impacts resulting from the preservation of the cabin community and requirements to meet permit conditions, because the general public would still not have access to public land.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Analysis

Private Land

Privately owned land would be managed consistent with the parks' land protection plans, which would be updated as needed. Privately owned

recreational cabin areas would be considered as residential types of development.

Wilsonia. Private property would be acquired from willing sellers, in accordance with the 1986 *Land Protection Plan* and as funds were available (NPS 1986c). Structures would then be removed and the sites returned to natural conditions. Up to 190 private properties within the park boundary in Wilsonia could be affected. This alternative would continue piecemeal acquisition of approximately one property every 12 years, resulting in a patchwork of public and private ownership. Since the action would involve willing sellers, impacts on private landowners, their families, or heirs would not be considered adverse.

In terms of achieving national park purposes to preserve and conserve resources and to provide for public enjoyment, the purchase of private property and the restoration of purchased sites to natural conditions would be consistent with the current *Land Protection Plan*. If funds were not available to purchase inholdings offered for sale, the park would not be able to fully implement its current *Land Protection Plan*, and private uses within park boundaries would continue indefinitely.

Generally, the impacts of the no-action alternative on public use and ownership and private landowners would be negligible, beneficial, and long term because land inside park boundaries would be eventually acquired; however, the land is not easily seen by most visitors. There would be a negligible impact on potential public recreation since Wilsonia has limited recreational potential, the area is not readily apparent to visitors since it is not on main park roads, and there are no plans under this alternative to encourage recreational use of the area.

Oriole Lake. Purchasing private lands from up to four willing sellers, consistent with the 1986 *Land Protection Plan* (NPS 1986c) and as funds became available, and restoring sites and the access road to natural conditions would improve resource conditions. With the removal of all facilities, this area would be designated as

wilderness since it is surrounded by wilderness. Since the action would involve willing sellers, the impact on private landowners would not be considered adverse.

Acquisition would have only minor, beneficial, long-term impacts on public access since the area is remote and little used. If funds were not available to purchase inholdings offered for sale, the park would not be able to fully implement its current *Land Protection Plan*, and private uses within park boundaries would continue indefinitely.

The impact of acquiring private property for public use and ownership at Oriole Lake would generally be minor and beneficial over the long term because the area is remote and only limited public access would be facilitated under this alternative.

Silver City. Silver City Resort and private cabins would continue, in accordance with the 1984 *Land Protection Plan*, and remaining lots and/or property could be sold without restriction (NPS 1984). The National Park Service has already acquired approximately 60 acres. There would be no impact on approximately 30 private landowners.

In terms of achieving park purposes to protect resources and to provide for public enjoyment, private land within the park would continue to be a visual impact due to development and would continue to detract from public use, resulting in minor, adverse impacts over the long term. Some visual impacts have been mitigated through existing scenic conservation easements.

The small resort at Silver City provides public lodging and visitor services (restaurant, store, and public showers), which help meet visitor needs in the area. Public access to these services would continue, resulting in minor, beneficial, long-term impacts.

Generally, the no-action alternative would result in minor, beneficial, long-term impacts on visitor services, but minor, adverse, long-term impacts on public ownership and visual resources.

Kaweah Han. Private ownership of Kaweah Han, which is some distance from the Mineral King Road, would continue. Private residential use at this area does not impact existing patterns of visitor use or park access.

The impact on public ownership under the no-action alternative would be negligible and adverse over the long term.

Mineral King. As funds were available, the largest Mineral King trailhead parking area would be acquired if offered for sale by the owner, and the trailhead would be retained. Since this action would involve a willing private landholder, impacts would not be considered adverse. In terms of achieving park purposes, public ownership would have a moderate, beneficial, long-term impact on public use and access because continued trailhead access would be ensured.

Acquisition could affect two cabins that are adjacent to the trailhead parking area and that are under long-term leases issued by the landowner. Because the cabin leases would no longer apply, and long-standing users would not have access to the cabins, this action could be perceived as a major, adverse, long-term impact to the lessees. The historic cabins would be removed, resulting in changes that detract from the character of the cultural landscape or benefit the natural scenery. However, public acquisition would improve public access because the cabins imply limited access and public use in this area. Acquiring the backcountry trailhead would have a moderate, beneficial, long-term impact on public use and recreation since many Mineral King visitors use the trailhead parking area.

Taken as a whole and despite major, adverse, long-term impacts on the cabin leaseholders, the no-action alternative would generally have moderate, beneficial, long-term impacts on public use and ownership because improvements could be made to public access and use once the area became public land.

Special Use Permits on Park Land

The non-profit Boy Scout camp would continue to be permitted, and regional Boy Scout programs could remain in that location, resulting in no impact on this organization or other non-profit users and park volunteers who use the facilities. At the same time, the area would remain unavailable for public use. The impact on public use would be minor, adverse, and long term.

Boundary Adjustments

Acquiring the Alley property along the North Fork of the Kaweah River would allow a trail-head to be established and would improve access to the foothills environment. Since this is low-use area, impacts on public ownership, use, and access would be minor, beneficial, and long term.

Cumulative Impacts

Around the time that General Grant National Park (now Kings Canyon National Park) was established in 1890 there was discussion about acquisition of the private land known as Wilsonia; however, acquisition did not occur. The private land was subsequently subdivided and sold for seasonal recreational use, making it more difficult to acquire all of the land. Over time the National Park Service has acquired private land from willing sellers.

Silver City was built in the late 1800s along the Mineral King Road, the first road into Sequoia National Park. A small recreation community remained after extractive uses like mining and logging stopped.

In conjunction with past, present, and reasonably foreseeable actions, the no-action alternative would have negligible, adverse, long-term impacts on public use and ownership of national park lands as a result of continuing a special use permit for a Boy Scout camp. At the same time, this alternative would have negligible impacts on private land and property rights within the parks.

Conclusion

The no-action alternative would generally result in moderate, beneficial, long-term impacts on public use and ownership of national park lands. This impact would result from acquiring ownership of limited amounts of private land within and outside the parks from willing sellers to increase resource protection in some areas and public access in others.

In conjunction with past, present, and reasonably foreseeable actions, the no-action alternative would have a negligible impact on public use and ownership.

IMPACTS OF THE PREFERRED ALTERNATIVE

Analysis

Private Land

Privately owned land would be managed consistent with the parks' land protection plans, which would be updated as needed. Privately owned recreation cabin areas would be considered as residential types of development.

Wilsonia. Under the preferred alternative individual properties in the Wilsonia recreational community would continue to be acquired on a willing-seller / willing-buyer basis. Gradually increasing public ownership within park boundaries would have negligible, beneficial, long-term impacts, similar to the no-action alternative.

In terms of achieving national park purposes to preserve and conserve resources and to provide for public enjoyment, the purchase of private property and the restoration of purchased sites to natural conditions would be consistent with the *Land Protection Plan* (NPS 1986c). The *Land Protection Plan* would be updated to acknowledge the national register status of the Wilsonia Historic District (see discussion under "Cultural Resources"). Nonhistoric NPS sites would be returned to natural conditions. If funds were not available to purchase inholdings offered for sale, the park would not be able to fully implement its

current *Land Protection Plan* or any future plan calling for acquisition on a willing-seller, willing-buyer basis, and private uses within park boundaries would continue indefinitely.

Similar to the no-action alternative, the impact of the preferred alternative on public use and ownership and private landowners would be negligible, beneficial, and long term. There would be negligible, beneficial impacts on potential public recreation since *Wilsonia* is neither visually intrusive nor located near visitor destinations or facilities, and there are no plans to encourage recreational use of the area.

Oriole Lake. Under the preferred alternative, the Oriole Lake properties would be purchased if there were willing sellers, the structures removed, and the road converted to a backcountry trail for access to a unique foothills environment. This area would become federally designated wilderness with the removal of facilities.

Similar to the no-action alternative, this action would have a minor, beneficial, long-term impact in terms of achieving park purposes. Because properties would be acquired on a willing-seller / willing-buyer basis, impacts on landowners would not be considered adverse. Providing trail access to this remote area would allow use mostly by local and regional visitors, and use is expected to be quite low. Because the area is remote, impacts on public recreational use would be minor and beneficial over the long term. If funds were not available to purchase properties offered for sale, private uses within park boundaries would continue indefinitely.

Generally the impact of the preferred alternative at Oriole Lake would be minor and beneficial over the long term because private property would be acquired for public ownership and use.

Silver City. Under the preferred alternative the Silver City Resort would continue to provide visitor services and lodging; private land would only be acquired on a willing-seller / willing-buyer basis. Consequently, there would be no impacts on private landowners.

Silver City Resort and private cabins would continue in accordance with the 1984 *Land Protection Plan* (NPS 1984), and remaining lots and/or property could be sold without restriction. The National Park Service has already acquired approximately 60 acres. There would be no impact on approximately 30 private landowners. Some visual impacts are mitigated through existing scenic conservation easements.

The Silver City Resort provides public lodging and visitor services (restaurant, store and public showers) that help meet visitor needs in the area. Public access to these services could increase slightly with higher visitation, which could be accommodated.

Generally, the preferred alternative would result in minor, beneficial, long-term impacts on visitor services, but minor adverse impacts on public ownership and visual resources.

Kaweah Han. Private residential use at Kaweah Han, which is some distance from the Mineral King Road, would continue. Private use does not impact existing or future patterns of visitor use or park access. To preserve the visual values of the land under this alternative, the National Park Service would seek to acquire a scenic easement from the owner and would update the 1984 *Land Protection Plan*. If the property was to be subdivided, the National Park Service would seek to acquire properties on a willing-seller / willing-buyer basis.

Generally, the preferred alternative would result in negligible, adverse, long-term impacts on public ownership and use because the property is not visible or accessible to most visitors.

Mineral King. As funds were available, the largest Mineral King trailhead parking area would be acquired if offered for sale by the owner, and the trailhead would be retained, the same as the no-action alternative. Since this action would involve a willing seller, the impact on the private landholder would not be considered adverse.

As described for the no-action alternative, two cabins are located on this property. Acquisition could adversely affect the lessees who hold long-term leases issued by the private landowner. Because the cabin leases would no longer apply, and long-standing users would not have access to the cabins, this action could be perceived as a major, adverse, long-term impact by the lessees. In terms of achieving park purposes, public ownership would have a moderate, beneficial, long-term impact on public use and recreation since many Mineral King visitors use the trailhead and the cabins' presence implies limited access and public use in this area. This alternative would ensure trailhead access over the long term.

Despite major, adverse, long-term impacts on the cabin leaseholders, the preferred alternative would have moderate, beneficial, long-term impacts on public use and ownership because improvements could be made to public access and use of public land; historic cabins would be preserved; and trailhead access would be ensured over the long term.

Special Use Permits on Park Land

Under the preferred alternative the Boy Scout camp would be converted to a camp for NPS volunteers, with Boy Scout use allowed when possible. This action would result in minor, beneficial, long-term impacts related to park management and would therefore benefit the public. Although the Boy Scouts would no longer control scheduling for the camp, some continued Boy Scout use could be accommodated. The preferred alternative would have a minor to moderate, adverse impact on the Boy Scouts because annual use would likely be less convenient and not guaranteed. Using the area for park purposes would have a negligible, adverse, long-term impact on public recreation since the site is not currently used for public recreation.

Despite the adverse impact on the Boy Scouts, the preferred alternative would generally have a minor, beneficial impact because of improved park operations, which would benefit the public.

Boundary Adjustments

As described under the no-action alternative, the park would acquire the Alley property on the North Fork of the Kaweah River to create a trailhead and a small campground and to improve access to the foothills environment. Because this area is not highly used, the impact on public use and ownership would be minor, beneficial, and long term.

Cumulative Impacts

As described for the no-action alternative, private land in Wilsonia predates the creation of the park in 1890. At that time the area was not acquired, and the private land was subsequently subdivided and sold for seasonal recreational use. Over time the National Park Service has acquired some private land in Wilsonia from willing sellers.

Silver City was built in the late 1800s along the Mineral King Road, the first road into Sequoia National Park. A small recreation community remained after extractive uses like mining and logging stopped.

In conjunction with past, present, and reasonably foreseeable actions, the preferred alternative would generally have a negligible, beneficial, long-term impact on public use and ownership. At the same time, this alternative would have a negligible impact on private land and property rights within the parks.

Conclusion

The preferred alternative would result in moderate, beneficial, long-term impacts because public use of public land would be increased by acquiring a small amount of private land in and around the parks to increase public access, while generally allowing private use of private land to continue.

In conjunction with past, present, and reasonably foreseeable actions, the preferred alternative would generally have a negligible impact on public use and ownership.

IMPACTS OF ALTERNATIVE A

Analysis

Private Land

Privately owned land would be managed consistent with land protection plans, which would be updated as needed. Privately owned recreational cabin areas would be considered as residential types of development. Inholdings would be purchased on a willing-seller / willing-buyer basis. If funds were not available to purchase properties offered for sale, private uses within park boundaries would continue indefinitely, and goals under this alternative would not be fully achieved.

Wilsonia. As funds were available, private property would be acquired from willing sellers, the structures would be removed, and the sites would be returned to natural conditions. Approximately 190 properties could be acquired. Since the action would involve willing sellers, there would be no impact on private landowners. Similar to the no-action alternative, this alternative would continue piecemeal acquisition, leaving a patchwork of public and private properties within the park boundary.

In terms of achieving national park purposes, purchases of private property would have a moderate, beneficial, long-term impact on public ownership and full public use of land within park boundaries since the area is not within public view or along major roads. Because the Wilsonia area would be gradually returned to natural conditions and the area would not provide recreational opportunities, alternative A would have a negligible, beneficial impact on public recreational use of the area.

Oriole Lake. As funds were available, up to four private parcels would be purchased from willing sellers, structures and the road would be removed, the area would be restored, and only trail access would be provided. When nonconforming uses were removed the area would be designated as wilderness. Since the action would involve willing sellers, the impact on private landowners would not be considered adverse.

Because this is a remote area and would be accessed by a backcountry trail, use would probably be quite low and would be mostly by local and regional residents. With the presence of a trailhead and trail, the impact on the public recreational use would be minor, beneficial, and long term.

Silver City. As funds were available, land would be purchased from willing sellers, structures would be removed, and the sites would be returned to natural conditions. This alternative would result in piecemeal acquisition, leaving a patchwork of public and private ownership affecting approximately 30 cabins / lots within the park boundary. Since the action would involve willing sellers, there would be no adverse impact on them, the Silver City Resort, or the Silver City recreation community.

In terms of achieving park purposes, purchases of private property would have a moderate, beneficial, long-term impact on public ownership of park land since the area is visible along the Mineral King Road. But public use and recreation would not be improved, and public lodging would no longer be provided in the Mineral King area, resulting in a moderate, adverse, long-term impact on public use.

Kaweah Han. As funds were available, land would be purchased from willing sellers, and all structures would be removed, resulting in a negligible, beneficial, long-term impact on public use since the area is expected to have little use, is not visible, and is not along the Mineral King Road.

Mineral King. As funds were available, land on which the largest Mineral King trailhead parking area occurs would be acquired if the owner wished to sell; trailhead parking would then be removed, and the trailhead would be relocated in order to better preserve the Mineral King Valley. Since the action would involve a willing seller, impacts on the private landholder would not be considered adverse.

As described for the no-action alternative, two cabins are located on this property. Acquisition

could adversely affect the lessees who hold long-term leases issued by the private landowner. Because the cabin leases would no longer apply, and long-standing users would not have access to the cabins, this action could be perceived as a major, adverse, long-term impact by the lessees. In terms of achieving park purposes to provide for public enjoyment, as well as to preserve and conserve resources, this action would have moderate, beneficial, long-term impacts since private land would be acquired for public ownership, and the cabins, which imply limited access and public use in this area, would be removed. However, returning the land to more natural conditions and relocating the trailhead and parking area would have a moderate, adverse, long-term impact on public use and recreation since relocated facilities would result in added hiking distance for most hikers on popular trails leading out of the valley.

Despite major adverse impacts on the cabin leaseholders, alternative A would generally have a moderate, beneficial, long-term impact on public ownership as a result of improved resource conditions. Removing the parking area and relocating the trailhead would have moderate, adverse impacts on public recreational use.

Special Use Permits on Park Land

Under alternative A the Boy Scout Camp permit would not be extended. The camp would be removed and the area returned to natural conditions, resulting in a moderate, adverse, long-term impact on regional Boy Scouts and others who use the facility. At the same time there would be a negligible, beneficial, long-term impact on public use and recreation since the area would be restored and public use would be allowed.

Boundary Adjustments

As described under the no-action alternative, acquiring the Alley property on the North Fork of the Kaweah River to create a trailhead and improve access to the foothills environment would result in minor, beneficial, long-term impacts on public ownership, as well as public

access and use, since the area would likely experience lower levels of use.

Cumulative Impacts

Cumulative impacts would be similar to those described for the no-action alternative. Private land at Wilsonia predates the creation of the park in 1890. At that time the area was not acquired, and the private land was subsequently subdivided and sold for seasonal recreational use. Over time the National Park Service has acquired some private land in Wilsonia from willing sellers.

Silver City was built in the late 1800s along the Mineral King Road. A small recreation community remained after extractive uses like mining and logging stopped.

In conjunction with past, present, and reasonably foreseeable actions, alternative A would have negligible impacts on public use and ownership.

Conclusion

Reducing use and development under alternative A would substantially increase public ownership of private land in the parks. Under alternative A all private uses and private land inside the parks would eventually be acquired and the areas returned to natural conditions, resulting in moderate, beneficial, long-term impacts on public ownership and use of the parks. At the same time reduced opportunities for recreational use in the parks would result in moderate, adverse, long-term impacts.

In conjunction with past, present, and reasonably foreseeable actions, alternative A would have negligible impacts on public use and ownership.

IMPACTS OF ALTERNATIVE C

Analysis

Private Land

Privately owned land would be managed consistent with the parks' land protection plans, which would be updated as needed. Privately owned

recreational cabin areas would be considered as residential types of development.

Wilsonia. Wilsonia would continue as a private recreational community and NPS-owned property and buildings could be used for more residential and public uses, such as visitor lodging and concessioner / staff housing. This action would be a change from the 1986 *Land Protection Plan*, which would need to be updated. The action would have no adverse impact on private landowners.

In terms of achieving national park purposes of providing for public enjoyment, as well as preserving and conserving resources, this action would have only a negligible, beneficial, long-term impact on public ownership and full public use of park land since the area is not visible or along a main road. Since there would be little change to public recreation, alternative C would have a negligible adverse impact on public recreational use of the area.

Oriole Lake. Public access to Oriole Lake would be sought under alternative C without seeking to purchase private inholdings. The four landowners at Oriole Lake could experience minor noise and social impacts from small levels of public access that would be offered.

In terms of achieving national park purposes, continuing private property ownership inside national parks would have a minor, adverse, long-term impact on public ownership and full public use of park land. Because this area is remote and accessed by a backcountry road, public use is expected to be quite low and mostly by local and regional residents. However, the opportunity for public access to the lake, which provides an uncommon foothills experience, would result in a minor, long-term, and beneficial impact in terms of recreational use.

Continuing private ownership would result in a minor, adverse, long-term impact because the area would not be designated as wilderness.

Silver City. Slightly expanded facilities and services at Silver City Resort would be consis-

tent with alternative C. The resort would continue to provide public lodging and visitor services (restaurant, store, and public showers), helping meet visitor needs in the area. Since there would be no changes in land status, the action would have no adverse impact on private landowners, the Silver City Resort, or the Silver City recreational community.

In terms of achieving national park purposes, continuing private property inside the parks would have a moderate, adverse, long-term impact on public ownership and full public use of park land since Silver City is on the Mineral King Road. Some visual impacts are mitigated through existing scenic conservation easements. At the same time, because visitor services would continue to be provided and modestly expanded under this alternative, the impact on public use and recreation would be minor, beneficial, and long term.

Kaweah Han. Under alternative C the goal was to encourage the owners of Kaweah Han to use the facilities for commercial lodging. However, the property has been recently purchased, and there is no indication that commercial use is desired by the new owners, so the likelihood of public commercial use is very low. If the property was used for commercial purposes, resulting use would have a minor, adverse, long-term impact on Silver City residences from access road noise and safety concerns.

Mineral King. As funds were available, land on which the most trailhead parking occurs would be acquired if the owner wished to sell, and the trailhead would be redesigned to improve visitor trailhead parking. Since the action would involve a willing seller, the impacts on the landholder would not be considered adverse.

As described for the no-action alternative, two cabins are located on this property. Acquisition could adversely affect the lessees who hold long-term leases issued by the private landowner. Because the cabin leases would no longer apply, and long-standing users would not have access to the cabins, this action could be perceived as a major, adverse, long-term impact

by the lessees. The cabins would be retained for public use. In terms of achieving park purposes, public ownership would have a moderate, beneficial, long-term impact on public use and recreation since many Mineral King visitors use the trailhead and the cabins' presence implies limited access and public use in this area. This alternative would ensure trailhead access over the long term.

Redesigning the trailhead would improve resource conditions and recreational opportunities, resulting in moderate, beneficial, long-term impacts on recreational use. If funds were not available to purchase property offered for sale, private uses within park boundaries would continue indefinitely, and park purposes would not be fully achieved.

Despite major, adverse impacts on leaseholders, there would generally be moderate, beneficial, long-term impacts on public ownership and public recreational use.

Special Use Permits on Park Land

The Boy Scout Camp permit would be extended under alternative C. There would be no impact on the Boy Scouts. At the same time, since the area would not be used for wholly public purposes, there would be a minor, adverse, long-term impact on public use and recreation as a result of a special use permit benefiting a small group of users.

Boundary Adjustments

As described under the no-action alternative, acquiring the Alley property on the North Fork of the Kaweah River to create a trailhead and improve access to the foothills environment would result in a minor, beneficial, long-term impact on public ownership, as well as public access and use, since the area is expected to see low levels of use.

Cumulative Impacts

Cumulative impacts would be similar to those described for the no-action alternative. Private

land at Wilsonia predates the creation of the park in 1890. At that time the area was not acquired, and the private land was subsequently subdivided and sold for seasonal recreational use. Over time the National Park Service has acquired some private land in Wilsonia from willing sellers.

Silver City was built in the late 1800s along the Mineral King Road. A small recreation community remained after extractive uses like mining and logging stopped.

In conjunction with past, present, and reasonably foreseeable actions, alternative C would have a negligible impact on public use and ownership.

Conclusion

Alternative C would result in moderate, beneficial, long-term impacts because a small amount of private land in and around the parks would be acquired to increase public access. Private use of private land would be continued.

On a cumulative basis, alternative C would have negligible impacts on public use and ownership.

IMPACTS OF ALTERNATIVE D

Analysis

Private Land

Similar to the preferred alternative, privately owned land would be managed consistent with the parks' land protection plans, which would be updated as needed. Privately owned recreational cabin areas would be considered as residential types of development.

Wilsonia. Under alternative D either the recreational community of Wilsonia would continue and commercial use allowed (for example, public lodging), or all structures would be acquired and the area managed by the National Park Service to support park visitor needs. Under the first option the impact on private landowners would be minor, beneficial, and long term since their uses would continue and some new uses would be allowed. Under the second option the impact

on private landholders would be major, adverse, and long term since facilities would be acquired to support public recreation.

Continuing the private community would be at odds with public ownership of land within the boundaries of a national park. However, because this area is not readily apparent to most visitors and is not along a main park road, expansion would have only a minor, adverse, long-term impact on public ownership and public use of park land.

Alternatively, if all private land was acquired to provide public recreation support facilities (such as parking or transit support), alternative D would generally have a moderate, beneficial, long-term impact on of the area due to increased public use.

Oriole Lake. As funds were available, private lands would be purchased from the four owners on a willing-seller basis, and the structures would be removed, with the road and trail providing access to a primitive picnic area. Since this action would involve willing sellers, impacts on them would not be considered adverse.

Purchasing private property would have a minor, beneficial, long-term impact on public ownership and public use of land inside the national park. At the same time, the area's remoteness and access by a backcountry road would likely result in low visitor use, mostly by local and regional residents. Since the area is remote and would have only a small picnic area, trailhead, and a trail serving a few visitors, the impact on public recreational use would be minor, beneficial, and long term.

Continuing to provide road access and picnic facilities would result in minor, adverse, long-term impacts because it would not be designated as wilderness, and wilderness characteristics might not be protected over the long term.

Silver City. Under alternative D the National Park Service would partner with Silver City Resort to provide lodging and expand visitor

services (restaurant, store, and public showers). Public access to these services could increase slightly under this alternative as a result of greater partnership efforts with the National Park Service. Private land would only be acquired on a willing-seller / willing-buyer basis. Consequently, impacts on private landowners would not be considered adverse.

Silver City Resort and private cabins would continue in accordance with the 1984 *Land Protection Plan* (NPS 1984), and remaining lots and/or property could be sold without restriction. The National Park Service has already acquired approximately 60 acres. There would be no impact on approximately 30 private landowners. Visual impacts would be mitigated through scenic conservation easements.

Generally, alternative D would result in minor, beneficial, long-term impacts on public use and ownership since the National Park Service would partner with the resort to better meet visitor needs.

Kaweah Han. In alternative D the goal was for the National Park Service or a partnership group to acquire Kaweah Han and use it as an educational center. The lodge would be evaluated for its eligibility for listing on the National Register of Historic Places. Road access, which bisects the private community of Silver City, would result in moderate, adverse, long-term impacts on private landowners in Silver City because of additional traffic, safety concerns, and noise. This would be inconsistent with management prescriptions, which preclude mixing incompatible residential and public uses.

Kaweah Han was recently purchased, and acquisition by the National Park Service would result in a major, adverse, long-term impact on the new private owners. The Kaweah Han area is not readily apparent and is not located along the Mineral King Road, so continued private ownership would have a negligible impact on park visitors. Private ownership could provide the best way to preserve rustic structures at the site.

Generally, if Kaweah Han was acquired for public use, alternative D would result in moderate, adverse, long-term impacts on private landowners in Silver City because of additional traffic, safety concerns, and noise. Limited public use of Kaweah Han would not provide sufficient benefits of public ownership. Impacts on the private owner would be major, adverse, and long term.

Mineral King. As funds were available, the largest Mineral King trailhead parking area would be acquired if offered for sale by the owner, and the trailhead would be redesigned, as described for alternative C. Since this action would involve a willing seller, impacts on the private landholder would not be considered adverse.

As described for the no-action alternative, two cabins are located on this property. Acquisition could adversely affect the lessees who hold long-term leases issued by the private landowner. Because the cabin leases would no longer apply, and long-standing users would not have access to the cabins, this action could be perceived as a major, adverse, long-term impact by the lessees. In terms of achieving park purposes, public ownership would have a moderate, beneficial, long-term impact on public use and recreation since many Mineral King visitors use the trailhead and the cabins' presence implies limited access and public use in this area. This alternative would ensure trailhead access over the long term.

Redesigning the trailhead would improve resource conditions and recreational opportunities, resulting in moderate, beneficial, long-term impacts on recreational use. If funds were not available to purchase property offered for sale, private uses within park boundaries would continue indefinitely, and park purposes would not be fully achieved.

Despite major, adverse impacts on leaseholders, there would generally be moderate, beneficial, long-term impacts on public ownership and recreational use.

Special Use Permits on Park Land

Under alternative D the Boy Scout camp would be converted to a work center or a camp for volunteers. This action would result in minor, beneficial, long-term impacts for park management, which would therefore benefit the public. Using the area for park purposes would have negligible, long-term, adverse impacts on public use and recreation since the current use does not accommodate public recreational use.

There would be moderate, adverse, long-term impacts on regional Boy Scouts since they would no longer have use of a camp to which they have had long-standing access. The Boy Scouts constitute a more public use than other special use permittees since user groups change regularly. Boy Scouts would need to find other regional camping locations.

Despite the moderate, adverse, long-term impacts on the Boy Scouts, alternative D would generally have a minor, beneficial, long-term impact because the area would be used for park purposes.

Boundary Adjustments

Under alternative D the Alley property on the North Fork of the Kaweah River would be acquired to provide a primitive stock and bicycle campground and ranger residence, and cooperative management would be pursued with the Bureau of Land Management. The area is small, and it would probably attract mostly regional and local use, meeting some recreational needs. It would also provide improved park access and access to the Colony Mill Road area, resulting in a minor to moderate, beneficial, long-term impact on public ownership, as well as public access and use.

Cumulative Impacts

As described for the no-action alternative, private land in Wilsonia predates the creation of the park in 1890. At that time the area was not acquired, and the private land was subsequently subdivided and sold for seasonal recreational use. Over time the National Park Service has

acquired some private land in Wilsonia from willing sellers.

Silver City was built in the late 1800s along the Mineral King Road, the first road into Sequoia National Park. A small recreation community remained after extractive uses like mining and logging stopped.

In conjunction with past, present, and reasonably foreseeable actions, alternative D would have a negligible impact on public use and ownership. At the same time, this alternative would have some adverse impacts on private landowners within the parks, primarily as the result of acquiring Kaweah Han.

Conclusion

Alternative D would result in moderate, beneficial, long-term impacts because public use of public land would be increased by acquiring a small amount of private land in and around the parks to increase public access. Private use of private land would be continued at Wilsonia and Silver City.

In conjunction with past, present, and reasonably foreseeable actions, alternative D would have a negligible impact on public use and ownership.

Park Management, Operations, and Facilities

METHODOLOGY FOR ANALYZING IMPACTS

The impact analysis evaluated the effects of the alternatives on the following aspects of park operations:

- staffing, infrastructure, visitor facilities, and services
- operations of non-NPS entities, including the Sequoia Natural History Association, concessioners, commercial permittees, partners, and volunteers
- operations of other federal agencies (for example, the U.S. Forest Service and the Bureau of Land Management)

The analysis was conducted in terms of how park operations and facilities might vary under the different management alternatives. The analysis is qualitative rather than quantitative because of the conceptual nature of the alternatives. Consequently, professional judgment was used to reach reasonable conclusions as to the intensity, duration, and type of potential impact.

Beneficial impacts would improve park operations and/or facilities. Adverse impacts would negatively affect park operations and/or facilities and could hinder the staff's ability to provide adequate services and facilities to visitors as well as staff. Some impacts could be beneficial to some operations or facilities and adverse or neutral to others.

IMPACTS COMMON TO ALL ALTERNATIVES

As previously discussed, Public Law 108-447 authorized the continuation of the Kaweah no. 3 hydroelectric facilities and special use permit cabins in the Mineral King area. The following discussion therefore applies to all alternatives.

Impact Thresholds for Park Management, Operations, and Facilities

Negligible — Impacts would have no discernible effect on park operations or facilities.

Minor — Impacts would be slightly detectable but are not expected to have an overall effect on park operations and facilities.

Moderate — Impacts would be clearly detectable and could have an appreciable effect on park operations and facilities.

Major — Impacts would have a substantial influence on park operations and facilities and could reduce the staff's ability to provide adequate services and facilities to visitors as well as staff.

There would be no additional impacts on park operations as a result of continuing the operation of hydroelectric facilities.

Owners of Mineral King permit cabins would be required to meet state and local standards for individual utility systems. There would be no additional impacts on park operations.

Currently representatives from the Mineral King special use permit community have worked with the park staff to develop maintenance standards for cabins / sites in the Mineral King Road Cultural Landscape District and to establish and maintain a water system in West Mineral King that provides water to the ranger station. The impact of this present partnership on park operations at Mineral King is moderate and beneficial.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Park development, which includes the majority of park operational facilities, consists of around 1,745 acres, or 0.2% of the park. About 65% of

the developed area is used for administration and operations and 11% for residential purposes.

Analysis

Impacts of Operational Needs

Utilities. Aging utilities would be replaced as needed when funds were available, and more stringent water and wastewater standards would need to be met. Studies would be undertaken to assess when infrastructure replacements were needed. Each utility system would be assessed to determine what sustainable approach would best meet needs and legal requirements, as well as make use of improved technology. Eventually, more sustainable and efficient utility systems would replace existing aging systems, resulting in moderate, beneficial impacts over the long term.

Wastewater systems at Ash Mountain were designed to work at specific levels, but they would continue to operate inefficiently due to reduced volume, and it is possible that other wastewater systems could experience similar inefficiencies. These inefficiencies result in added staff time and funds to keep the systems functioning.

Water supply would continue to be inadequate in some drought years at Grant Grove, Lodgepole, Ash Mountain, and Mineral King, and drought plans might have to be implemented.

In Wilsonia private properties would be acquired from willing sellers at the rate of approximately one property every 12 years. Nonhistoric properties owned by the National Park Service would be removed and the areas returned to more natural conditions. Over time there would be a reduced number of private utility systems except for those serving historic structures.

Over time, some comfort stations would be replaced by vault toilets, necessitating long-term use of a pumping service, resulting in a permanent cost in the maintenance budget. RV dump stations would continue to place a burden on park wastewater systems since sludge is hauled to municipal facilities outside the parks.

The impact of this alternative on the utility infrastructure and park operations would generally be moderate, adverse, and short term as a result of the aging infrastructure, but long-term impacts would be moderate and beneficial as systems were replaced.

Visitor Facilities and Services. Visitor facilities would continue to be maintained as staff and funding were available; when facilities could no longer be cost-effectively maintained, they would be replaced by more sustainable facilities. However, many visitor facilities in historic structures that have been adaptively reused are expensive to maintain. Maintenance could continue to be inadequate or burdensome in some areas or due to unforeseen circumstances.

The impact on park operations of maintaining visitor facilities and services would continue to be minor, adverse, and short term due to the aging buildings and peak-season demands.

Winter Operations. Winter park operational needs and snow removal would continue to have a substantial impact on seasonal operations. The entire length of Generals Highway would be kept open during winter, with winter road closures generally of short duration. However, heavy snowfall could result in minor to major adverse impacts on park operations over the short term. However, since this is an ongoing situation, the impact of the no-action alternative on winter operations would generally be negligible and adverse over the long term.

Administrative Helicopter Use. Administrative helicopter use would continue to support both search-and-rescue operations as well as maintenance and backcountry deliveries. The park operational use of helicopters is valuable, and it would be considered a minimum tool in order to accomplish backcountry work in a timely fashion and to speed up backcountry seasonal openings. The impact of continued helicopter use on park operations would be negligible and beneficial over the long term.

Administrative Stock Use. Administrative stock use, which comprises over 40% of the

stock use in the parks, would continue to be vital for supporting backcountry operations. Stock are primarily used to improve resource conditions, facilitate public access, and deliver supplies. Impacts of administrative stock use are mitigated through such methods as monitoring, regulation, supplemental feed, and winter pasturing outside the parks.

The impact of continued administrative stock use would be negligible and beneficial over the long term.

Administrative Snowmobile Use. Snowmobiles are used by park staff to conduct research, snow surveys, and winter search and rescue. Continued use would result in negligible, beneficial, long-term impacts on operations.

Impacts of Other Entities on Park Operations

Sequoia Natural History Association. The cooperating association would continue to staff bookstores and to run visitor trips and activities such as cave tours to support the parks' purpose and mission. The focus of the visitor trips could change over time with public interest. Support from the association would continue to have moderate, beneficial, long-term impacts on park operations.

Volunteers. Over 1,000 people volunteer and support the parks in numerous ways; these efforts are critical to park operations because of insufficient full-time staffing. Stock user groups would continue to participate in backcountry trail building, resulting in moderate to major, beneficial impacts on park operations. Inadequate housing would continue as minor, adverse, long-term impacts on volunteers. Generally, impacts on park operations from a continued large volunteer program would be major and beneficial over the long term.

Concessioners. Concessioners who provide lodging, food service, and other visitor support services would continue to do so. In the case of Grant Grove and Wuksachi, lodging facilities would be expanded to the extent contractually allowed. Concessioners running stables and pack

trips for visitors would continue to supply their own facilities, which they would need to replace as necessary. Inadequate housing would remain a problem in some areas, as would staffing, resulting in minor to moderate, adverse, long-term impacts on concession operations. Impacts of concessioners on park operations would be moderate and beneficial over the long term.

Commercial Permit Holders. Business permits would be continued in order to provide special services to a relatively small number of visitors. The number and types of permits vary, depending largely on recreational trends. Because the permits address the needs of a small number of visitors and are renewed annually, their services would continue to have minor, beneficial, short-term impacts on park operations and the provision of visitor services.

Partners. There would be no additional impacts to partners.

Impacts on Staffing

Staffing priorities would not change under the no-action alternative, but staffing would expand slightly over time. Some park operations could be impacted over time. A special or intensive maintenance project, such as responding to a fallen tree across a road or heavy snowfall on the Generals Highway, could affect visitor experiences. Without staff increases, the education staff at the Lodgepole visitor center would be insufficient to also staff the Giant Forest museum, affecting visitor experiences. Staff housing would remain inadequate in some areas and could result in the inability to find and retain seasonal and permanent staff. For example, affordable housing in the gateway community of Three Rivers may not be available, resulting in long commutes.

Altogether, impacts of insufficient park staffing would be minor, adverse, and short and long term.

Cumulative Impacts

U.S. Forest Service. NPS staff would continue to provide maintenance, fire, emergency and sequoia management consultation for Giant Sequoia National Monument. Continued park participation would have a moderate, long-term, adverse impact on park operations and budgets.

Gate receipts would continue to be shared with Sequoia National Forest, with no additional impacts in the short or long term.

Habitat shared between the national parks and Sierra National Forest would continue to be managed jointly in accordance with the recommendations of the Sierra Nevada Ecosystem Project. There would be no additional impacts.

Management purposes of the two agencies could continue to diverge, with the NPS mission geared more toward preservation and the USFS mission toward providing for multiple uses, including some not allowed in the parks, such as grazing, logging, hunting, and snowmobiling. Some visitors could be unaware of these different missions; however, there would be negligible, beneficial impacts on park operations over the long term as a result of increased interaction related to the management of Giant Sequoia National Monument.

Bureau of Land Management. NPS staff would continue to fulfill a cooperative agreement for maintenance and oversight, resulting in a negligible, beneficial, long-term impact on BLM operations.

California Department of Transportation. Caltrans plans and manages several roads in and around the parks, including opening and closing the Kings Canyon Highway (California 180) from Grant Grove to Cedar Grove. This affects the operating season at Cedar Grove and necessitates coordination, generally resulting in moderate, beneficial, long-term impacts on park operations. The state rebuilt about 9 miles of road following a flood several years ago. There are also plans to improve California 180 west of the parks and establish six- and four-lane expressway segments, which would provide easier access to

the parks. Short-term impacts on park operations as a result of natural events that could affect the opening or closing of Kings Canyon Highway could be moderate to major and adverse.

As described above, the no-action alternative would contribute negligible to moderate, adverse impacts over the short and long terms related to inadequate staffing and housing. At the same time it would contribute negligible to major, beneficial, long-term impacts because of more sustainable facilities and infrastructure, as well as the continued use of park volunteers. On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with the no-action alternative, would generally result in minor, beneficial, long-term impacts.

Conclusion

The gradual replacement of facilities with more sustainable and efficient ones would result in moderate, beneficial impacts on all aspects of park operations over the long term. There would be negligible, beneficial impacts from the continued use of stock, helicopters, and snowmobiles for park operations. Impacts of insufficient park staffing would be minor and adverse over the short and long terms, and inadequate housing would continue to be a problem. Generally the impacts of the no-action alternative on park operations would be minor to moderate and adverse over the long term, primarily due to an aging infrastructure, inadequate housing, and insufficient staffing. Impacts on park operations from the assistance of other groups — the natural history association, volunteers, concessioners, commercial permit holders, and partners — would be minor to major and beneficial.

On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with continued park programs under the no-action alternative, would generally result in minor, beneficial, long-term impacts.

IMPACTS OF THE PREFERRED ALTERNATIVE

Most park operational facilities would be located in the park development zone, with some facilities in high- and low-use frontcountry. Development would occupy around 1,887 acres or 0.22% of the parks. About 65% of the developed area would be used for administration / operations and 11% for residential purposes. Under the preferred alternative, administrative and maintenance functions would no longer be interspersed among residential areas or campgrounds. Administrative offices would be relocated outside the parks. Existing operational and educational facilities would be improved. A limited number of park operational facilities could be found in the backcountry, primarily in the major trails zone. Residential uses would be expanded from current levels only in the Wuksachi / Lodgepole area. Residential areas would be limited to Cedar Grove, Grant Grove, Ash Mountain, and Mineral King. Any unmet needs could be provided privately outside the parks.

Analysis

Impacts of Operational Needs

Utilities. Utilities would be replaced as needed, and more stringent water and wastewater standards would need to be met. Studies would be undertaken to determine when infrastructure replacements were needed. Expanding development within the capacity of present utility systems would be the most cost-effective and sustainable approach, involving both reduced water demand and sufficient wastewater output to maintain efficient functions. The studies would determine whether the function was needed, whether it could be combined or consolidated with other functions, and whether government-built and maintained utilities would be the best way to meet needs. Also, the impact of new facilities on resource conditions would be assessed, and the best location for facilities would be identified (possibly outside the parks).

As described under the no-action alternative, water supply would continue to be inadequate in some drought years at Grant Grove, Lodgepole,

Ash Mountain, and Mineral King, resulting in the need to implement drought plans. Limited development in these areas would incorporate advanced technology to reduce water use. For example, water demand could be further reduced by installing very low-flow fixtures, such as waterless urinals, to replace present low-flow fixtures. In the Grant Grove area limited water supply could be mitigated by providing for more day use than overnight use (42–64 gallons per day [gpd] per overnight visitor compared to 10 gpd per day visitor).

Wastewater systems at Ash Mountain were designed to work at specific levels, but would continue to operate inefficiently due to reduced volume. It is possible that other wastewater systems could experience similar inefficiencies. These inefficiencies result in added staff time and funds to keep the systems functioning.

In Wilsonia private properties would be acquired from willing sellers at the rate of approximately one property every 12 years. Nonhistoric properties owned by the National Park Service would be removed, and the areas would be returned to more natural conditions. Over time there would be fewer private utility systems, except utility systems could be retained at historic structures.

Over time, some comfort stations would be replaced by vault toilets, necessitating long-term use of a pumping service, a permanent expense in the maintenance budget.

Removing RV dump stations that do not meet state standards would reduce the burden on park wastewater systems, thus improving the capacity of wastewater systems.

The impact of this alternative on the utility infrastructure and park operations would generally be moderate and adverse as a result of the aging infrastructure. Long-term impacts would be moderate and beneficial because systems would be replaced, reducing park staff responsibilities.

Visitor Facilities and Services. Visitor facilities would be redesigned to facilitate access and circulation and to better meet the needs of chang-

ing user groups. Services would be assessed to determine whether they were still needed and whether government-provided services would be the most efficient. Providing some new visitor facilities, replacing facilities as they reached the end of their useful lives with more efficient facilities, and designing new facilities to be efficient and sustainable would result in moderate, beneficial, long-term impacts to operations. Maintenance in congested or seasonal high-use areas would need to expand. Overall, the impact on visitor services would be moderate, beneficial, and long term.

Winter Operations. Expanded winter use would make demands on park operations, including visitor services (such as increased general road patrol coverage), emergency services (such as emergency medical treatment and search-and-rescue operations), accident investigation, and snow removal. Impacts would be negligible to minor, adverse, and long term since the park is already keeping the highway open year-round and avoiding winter closures would continue to be a goal.

Administrative Helicopter Use. Administrative helicopter use would continue to provide a vital service for both search-and-rescue operations as well as maintenance operations and backcountry deliveries, similar to the no-action alternative. It would be considered a minimum tool at times for accomplishing backcountry work in a timely fashion and speeding up backcountry seasonal openings. The impact of continued helicopter use on park operations would be negligible and beneficial over the long term.

Administrative Stock Use. About half of the stock use in the park is by staff; administrative stock use would continue to be critical to supporting backcountry park operations. Reducing administrative grazing in the Ash Mountain / foothills area would require additional feed to be brought in, resulting in a minor, adverse, long-term impact on park operations and budgets. Because stock use primarily supports trail and resource improvement programs, and it facilitates public access and supply delivery, the impact of continued administrative stock use on

operations would be minor and beneficial over the long term.

Administrative Snowmobile Use. Snowmobiles would continue to be used for winter search and rescue, resulting in negligible, beneficial impacts on operations.

Impacts of Other Entities on Park Operations

Sequoia Natural History Association. The cooperating association would continue to staff bookstores and to run visitor trips and activities such as cave tours to support the parks' purpose and mission. Under the preferred alternative there would be moderate, beneficial, long-term impacts on park operations as additional and different types of programs were developed and provided by the association.

Volunteers. Under the preferred alternative volunteers would continue to support park operations, including educational, scientific, operational, and maintenance programs. Stock user groups would continue to participate in trail maintenance, resulting in moderate, beneficial, long-term impacts on backcountry trails. Additional volunteer housing facilities such as camps and dormitories would be provided. Overall, the impact of volunteers on park operations would be major and beneficial over the long term.

Concessioners. Concessioners under the preferred alternative would provide more services and facilities, with full buildout according to their contracts, resulting in more employees. Concessioners running stables and pack trips would continue to supply services in all locations except Wolverton, and their facilities would need to be maintained. Concessioners would supply services to more diverse visitors and groups, and staffing would have to be able to relate to these users. Housing for concession employees might not be able to be met in the parks, resulting in minor to moderate, adverse impacts over the long term. Overall impacts on park operations would be moderate, beneficial, and long term.

Commercial Permit Holders. Business permits would be continued in order to provide special services to visitors. Under the preferred alternative permit holders would be more likely to identify changing markets and adapt to their needs. Because these permit holders address the needs of visitors and permits are renewed annually, their services would continue to have minor, beneficial, short-term impacts on park operations and the provision of visitor services.

Partners. Partnerships would be pursued to provide education and other operations, including the management and operation of the Mineral King permit cabin area. This would result in a moderate, beneficial impact on park operations over the long term.

Impacts on Staffing

Increased park and concession staffing would be required for additional educational programs, resource protection efforts, emergency services, park transit operations, and lodging, resulting in moderate, beneficial, long-term impacts since staffing would be more closely aligned with operational needs. Selecting staff who would be responsive to changing user groups, with foreign language skills as well as good communication skills, would result in moderate, beneficial, long-term impacts.

Additional housing would be required in the Wuksachi / Lodgepole area to meet staff needs, but other employees would need to find their own housing in surrounding communities. Additional volunteer camps and work camps could help meet short-term housing needs, resulting in moderate, beneficial impacts.

Taken together, the impacts of this alternative on existing staff levels and organization would likely be moderate, beneficial, and long term as a result of increased staffing and some related housing.

Cumulative Impacts

U.S. Forest Service. As described for the no-action alternative, the following factors are

considered in the cumulative impact analysis for park operations:

- NPS staff would continue to provide maintenance, fire, emergency and sequoia management consultation for Giant Sequoia National Monument. Continued park participation would have a moderate, long-term, adverse impact on park operations and budgets.
- Gate receipts would continue to be shared with Sequoia National Forest, with no additional impacts in the short or long term.
- Habitat shared between the national parks and Sierra National Forest would continue to be managed jointly in accordance with the recommendations of the Sierra Nevada Ecosystem Project. There would be no additional impacts.
- Management purposes of the two agencies could continue to diverge, with the NPS mission geared more toward preservation and the USFS mission toward providing for multiple uses, including some not allowed in the parks, such as grazing, logging, hunting, and snowmobiling. Some visitors could be unaware of these different missions.

There would be negligible, beneficial impacts on park operations over the long term as a result of increased interaction with the U.S. Forest Service related to the management of Giant Sequoia National Monument.

Bureau of Land Management. NPS staff would continue to fulfill a cooperative agreement for maintenance and oversight, resulting in a negligible, beneficial, long-term impact on BLM operations.

California Department of Transportation. As described for the no-action alternative, Caltrans plans and manages several roads in and around the parks, including

- opening and closing the Kings Canyon Highway (California 180) from Grant Grove to Cedar Grove, which affects the operating season at Cedar Grove and necessitates coordination, generally result-

ing in moderate, beneficial, long-term impacts on park operations

- planning to improve California 180 west of the parks to create six- and four-lane expressway segments that would provide easier access to the parks

There could be moderate to major, adverse, short-term impacts on park operations as a result of natural events that could affect the opening or closing of Kings Canyon Highway.

The preferred alternative would generally contribute moderate, beneficial, long-term impacts in terms of improved infrastructure, more sustainable facilities, increased staffing, and continued use of volunteers. On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with the preferred alternative, would generally contribute more beneficial impacts on park operations than the no-action alternative, resulting in minor to moderate, long-term impacts.

Conclusion

The preferred alternative would generally have moderate, beneficial impacts on park operations because of improved infrastructure and more sustainable facilities over the long term. There would be negligible, beneficial impacts from the continued use of stock, helicopters, and snowmobiles for park operations. Assistance from other groups (the natural history association, volunteers, concessioners, commercial permit holders, and partners) would have minor to major, beneficial impacts. Adverse impacts of additional park and concession staffing on housing demand would be moderate and adverse over the long term.

On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with actions under the preferred alternative, would generally result in minor to moderate, beneficial impacts over the long term. There would be more beneficial impacts on park

operations under the preferred alternative than under the no-action alternative.

IMPACTS OF ALTERNATIVE A

Under this alternative the park development zone would consist of about 1,310 acres (about 0.15% of the park). About 60% of the developed area would be used for administration / operations and 10% for residential purposes. Most park operational facilities would be located in developed areas, with some facilities in high- and low-use frontcountry. Within the development zone, administrative and maintenance functions would no longer be interspersed among residential areas or campgrounds. Some administrative functions could occur in park villages or in museums or visitor centers in the high-use frontcountry zone. Very limited park operational facilities could be found in the backcountry, primarily in the major trails zone. Residential uses would be reduced from current levels, as would operations and villages.

Analysis

Impacts of Operational Needs

Utilities. Infrastructure would be reduced in size and facilities relocated outside the parks where possible. Existing utilities would be replaced as needed, and more stringent water and wastewater standards would need to be met. Similar to the other alternatives, value analysis studies would be undertaken to assess infrastructure when replacement was needed. These studies would assess the impact of infrastructure on resource conditions and would also determine whether the function was needed, whether it must be located inside the park, and whether government-built infrastructure would be the best way to supply it. Reduced demands on water systems would be important for areas where water supplies are limited, especially during droughts (Grant Grove, Lodgepole, Ash Mountain, and Mineral King).

Private lands inside the parks would be acquired, resulting in a reduction of individual water and wastewater systems inside the parks.

Wastewater systems at Ash Mountain were designed to work at specific levels, but they would continue to operate inefficiently due to reduced volume, and it is possible that other wastewater systems could experience similar inefficiencies. These inefficiencies result in added staff time and funds to keep the systems functioning. RV dump stations not meeting state standards would be removed, reducing the burden on park wastewater systems.

Over time some comfort stations would be replaced by vault toilets, necessitating long-term use of a pumping service, which would be a permanent expense in the maintenance budget.

Like the no-action alternative, the impact of this alternative on the utility infrastructure and park operations would generally be moderate, adverse, and short term as a result of aging infrastructure. Over the long term impacts would be moderate and beneficial as systems were replaced.

Visitor Facilities and Services. Fewer visitor facilities would be provided, and as some facilities reached the ends of their useful lives, they would be removed. Each facility would be assessed as to its function, its impact on natural ecosystems, the value added to the park, and whether it could be combined or consolidated with other facilities or moved. The impact of more efficient visitor facilities on park operations would be moderate, long term, and beneficial since maintenance in frontcountry areas could be done more efficiently.

Winter Operations. Keeping roads open during winter would not be a priority, resulting in reduced winter operations, but spring operations to reopen the roads would increase the work load during an already busy time. The overall result would be moderate, adverse, short- and long-term impacts on park operations.

Administrative Helicopter Use. Administrative helicopter use would continue only for search-and-rescue operations. Helicopters would not be seen as minimum tools, and they would not support backcountry maintenance, deliveries, or waste collection from Mount Whitney. This

could reduce the ability of park staff to efficiently perform backcountry maintenance, potentially delaying seasonal openings. The impacts of alternative A on park operations would be major, adverse, and long term.

Administrative Stock Use. No longer allowing administrative stock use for any front- or backcountry operations would adversely affect the ability of park staff to perform backcountry maintenance, slowing down and reducing the amount of work that could be accomplished and delay seasonal openings. The impact on park operations would be major, adverse, and long term.

Administrative Snowmobile Use. Allowing administrative snowmobile use only for winter search and rescue would affect staff ability to conduct snow surveys and research, would make operations less efficient, and would reduce the amount of work that could be accomplished. The impact on park operations would be major, adverse, and long term.

Impacts of Other Entities on Park Operations

Sequoia Natural History Association. Under alternative A fewer visitors to bookstores, Crystal Cave, and educational programs would result in moderate, adverse, long-term impacts on the cooperating association, which would still require people to staff bookstores and run trips and activities. Impacts on park operations from assistance provided by the association would continue to be moderate and beneficial over the long term.

Volunteers. Under alternative A the focus of volunteer activities would shift from education and maintenance to science, and an unknown number of volunteers would continue. Stock user groups could no longer participate in trail building, resulting in major, adverse, long-term impacts on backcountry trails. Inadequate volunteer housing would continue. Long-term impacts on volunteers could be major and adverse. Impacts on park operations would be moderate and adverse because the level of assistance provided by volunteer groups, such as stock user groups, could decline.

Concessioners. Reduced visitation would not necessarily result in reduced staffing levels for concessioners, adversely affecting cost-effective operations.

Prohibiting stock use would mean that concessioners would no longer be operating stables and pack trips, and their facilities would need to be removed.

While overall impacts on concession operations would be major and adverse over the long term, the impacts of concession operations on park operations would continue to be minor to moderate and beneficial over the long term.

Commercial Permit Holders. Any stock-related commercial permits would cease, and since they constitute many commercial permits, the impacts of reduced commercial operations in the parks would be a moderate, adverse, and long term since some help maintain backcountry areas.

Partners. Current partnerships with private landowners would likely dissolve with the acquisition of their properties, but the impact on essential park operations would be minor and adverse over the long term. Any new partnership groups would likely focus on improving the condition of natural resources, possibly resulting in negligible to minor benefits over the long term. Taken as a whole, the impacts on park operations would be minor, adverse, and long term.

Impacts on Staffing

Staffing. Staffing priorities would change under alternative A, with a greater focus on science and research and possibly resulting in more summer season staffing. Keeping the entire length of the Generals Highway open in winter would no longer be a goal, and winter closures would be more common, which could result in additional work to reopen the highway in spring. Maintenance staff would support resource management as well as visitor services. Eliminating stock use in the parks would adversely affect backcountry access and park operations since additional staff would be required to accomplish work done with the help of stock animals. Addi-

tionally, less housing would be available in the parks to meet staff needs. Taken together, the impact of this alternative on existing staff levels and organization would likely be major, adverse, and long term.

Cumulative Impacts

U.S. Forest Service. As described for the no-action alternative, the following factors are considered in the cumulative impact analysis for park operations:

- NPS staff would continue to provide maintenance, fire, emergency and sequoia management consultation for Giant Sequoia National Monument. Continued park participation would have a moderate, long-term, adverse impact on park operations and budgets.
- Gate receipts would continue to be shared with Sequoia National Forest, with no additional impacts in the short or long term.
- Habitat shared between the national parks and Sierra National Forest would continue to be managed jointly in accordance with the recommendations of the Sierra Nevada Ecosystem Project. There would be no additional impacts.
- Management purposes of the two agencies could continue to diverge, with the NPS mission geared more toward preservation and the USFS mission toward providing for multiple uses, including some not allowed in the parks, such as grazing, logging, hunting, and snowmobiling. Some visitors could be unaware of these different missions.

There would be negligible, beneficial impacts on park operations over the long term as a result of increased interaction with the U.S. Forest Service related to the management of Giant Sequoia National Monument.

Bureau of Land Management. NPS staff would continue to fulfill a cooperative agreement for maintenance and oversight, resulting in a negligible, beneficial, long-term impact on BLM operations.

California Department of Transportation. As described for the no-action alternative, Caltrans plans and manages several roads in and around the parks, including

- opening and closing the Kings Canyon Highway (California 180) from Grant Grove to Cedar Grove, which affects the operating season at Cedar Grove and necessitates coordination, generally resulting in moderate, beneficial, long-term impacts on park operations
- planning to improve California 180 west of the parks to create six- and four-lane expressway segments that would provide easier access to the parks

There could be moderate to major, adverse, short-term impacts on park operations as a result of natural events that could affect the opening or closing of Kings Canyon Highway.

Alternative A would contribute minor to major, adverse impacts over the short and long terms, primarily because of lack of winter maintenance on the Generals Highway. On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with alternative A, would generally contribute less beneficial and more adverse impacts on park operations than would the no-action alternative or the preferred alternative.

Conclusion

Alternative A would have major, adverse, long-term impacts on park operations as a result of reduced staff and eliminating the use of stock, helicopters, and snowmobiles for administrative purposes. Impacts on park operations from the assistance of other groups — the natural history association, volunteers, concessioners, commercial permit holders, and partners — would be minor to major and beneficial. Generally there would be moderate to major, adverse, long-term impacts on other entities from either reduced use or the acquisition and removal of privately owned land or structures.

On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with alternative A, would generally contribute less beneficial and more adverse impacts on park operations than would the no-action alternative or the preferred alternative.

IMPACTS OF ALTERNATIVE C

Under alternative C most park operational facilities would be located in the park development zone, with some facilities in the high- and low-use frontcountry zones. The development zone would include about 1,986 acres (0.23% of the park). About 55% of the developed area would be used for administration / operations and 19% for residential purposes. Within the development zone, administrative and maintenance functions would not be interspersed in residential areas or campgrounds. Some administrative functions could occur in park villages or in museums or visitor centers. Very limited park operational facilities would be found in the backcountry, primarily in the major trails zone. Residential uses would be expanded from current levels, as would operations and villages.

Analysis

Impacts of Park Operational Needs

Utilities. Existing utilities would be replaced as needed, and more stringent water and wastewater standards would need to be met. Similar to the other alternatives, value analysis studies would be undertaken to assess infrastructure when replacement was needed. Each utility system would be assessed to determine which approach would best meet needs, legal requirements, and improved technology. Expanding utilities within their design capacity would be the most cost-effective for meeting additional demand, along with sustainable technologies to reduce both water demand and wastewater treatment needs.

Water supply could continue to be inadequate in some years at Grant Grove, Lodgepole, Ash Mountain, and Mineral King, and drought plans might need to be implemented, including mea-

tures such as replacing low-flow fixtures with even lower-flow fixtures (such as waterless urinals). In the Grant Grove area, this situation could be further exacerbated by more year-round use in Wilsonia.

Wastewater systems at Ash Mountain were designed to work at specific levels, but would continue to operate inefficiently due to reduced volume. It is possible that other wastewater systems could experience similar inefficiencies. These inefficiencies result in added staff time and funds to keep the systems functioning.

In Wilsonia private properties would be acquired from willing sellers at the rate of approximately one property every 12 years. Nonhistoric properties owned by the National Park Service would be removed, and the areas would be returned to more natural conditions. Over time there would be fewer private utility systems; however, utility systems could be retained at historic structures.

Over time some comfort stations would be replaced by vault toilets, necessitating long-term use of a pumping service, the cost of which would be included in the maintenance budget.

Removing RV dump stations that do not meet state standards would reduce the burden on park wastewater systems, thus improving the capacity of wastewater systems.

The impact of this alternative on the utility infrastructure and park operations would generally be moderate, adverse, and short term as a result of aging infrastructure, similar to the preferred alternative. Long-term impacts would be moderate and beneficial as systems were replaced with more sustainable ones.

Visitor Facilities and Services. Replacing visitor facilities as they reached the end of their useful lives would result in moderate, beneficial, long-term impacts in terms of park operations. Providing additional facilities would result in adverse impacts.

Maintaining existing services and expanding maintenance in congested or seasonal high-use areas would result in additional operational

needs, although backcountry stock use would include smaller party sizes, potentially reducing routine maintenance along backcountry trails. Overall, the impact of increased visitor services on park operations would be moderate, long term, and beneficial as a result of gradually improved facilities.

Winter Operations. Continuing present winter snow removal policies would have negligible additional impacts on park operations compared to the no-action alternative.

Administrative Helicopter Use. Continuing administrative helicopter use for search-and-rescue operations, as well as for maintenance and backcountry deliveries, would continue to have negligible, beneficial, long-term impacts on park operations. Helicopter use would be considered a minimum tool in order to accomplish backcountry work in a timely fashion and to speed up backcountry seasonal openings.

Administrative Stock Use. Continuing administrative stock use to support backcountry park operations (primarily improvement of resource conditions, facilitating public access, and delivering supplies) would continue to have negligible, beneficial, long-term impacts on operations.

Administrative Snowmobile Use. Snowmobiles would continue to be used for research, snow surveys, and winter search and rescue, resulting in negligible, beneficial, long-term impacts on operations.

Impacts of Other Entities on Park Operations

Sequoia Natural History Association. Alternative C would have no impact on the cooperating association compared to the no-action alternative. The association would still require people to staff bookstores and run trips and activities, so impacts on park operations would be moderate, beneficial, and long term.

Volunteers. Volunteers would continue to support park operations, including educational, scientific, operational, and maintenance programs. Stock user groups would continue to participate in trail building, resulting in moderate to major,

beneficial impacts on backcountry operations. Volunteer housing would be built, resulting in major, beneficial impacts on volunteers. Overall, the impacts of volunteers on park operations would be major, long term, and beneficial.

Concessioners. Concessioners under alternative C would provide more services and facilities in accordance with the full buildout scenarios in their contracts, resulting in additional services and employees. Concessioners running stables and pack trips would continue to supply services in all locations except Wolverton, and their facilities would need to be maintained. The overall impacts of concession services on park operations would be moderate, beneficial, and long term, but costs and added work to provide housing for additional employees, if supplied in the parks, could result in minor to moderate, adverse impacts over the long term.

Commercial Permit Holders. Commercial permit holders would retain their permits, but smaller stock party sizes could affect backcountry trips. Some commercial groups would continue to provide backcountry maintenance. Because most permits are annual and relatively few people are involved, impacts on park operations would be minor, beneficial, and short term.

Partners. Partnerships would be pursued to provide educational and other operations, including management of the Mineral King area, resulting in moderate, beneficial, long-term impacts on park operations.

Impacts on Staffing

Increased staffing would be needed for more seasonal interpretive programs, transit operations, and other visitor services, resulting in moderate, beneficial, long-term impacts on park operations. Maintaining buildings and utilities in aging recreational communities would remain challenging. At the same time housing needs that could not be met in the parks would need to be found individually outside the parks. Since more housing would be provided, the impact of housing availability on park operations would generally be minor to moderate, adverse, and long term.

Taken together, the impacts of this alternative with increased park staffing would likely be moderate, long term, and beneficial despite increased operational and housing needs.

Cumulative Impacts

U.S. Forest Service. As described for the no-action alternative, the following factors are considered in the cumulative impact analysis for park operations:

- NPS staff would continue to provide maintenance, fire, emergency, and sequoia management consultation for Giant Sequoia National Monument. Continued park participation would have moderate, long-term, adverse impacts on park operations and budgets.
- Gate receipts would continue to be shared with Sequoia National Forest, with no additional impacts in the short or long term.
- Habitat shared between the national parks and Sierra National Forest would continue to be managed jointly in accordance with the recommendations of the Sierra Nevada Ecosystem Project. There would be no additional impacts.
- Management purposes of the two agencies could continue to diverge, with the NPS mission geared more toward preservation and the USFS mission toward providing for multiple uses, including some not allowed in the parks, such as grazing, logging, hunting, and snowmobiling. Some visitors could be unaware of these different missions.

There would be negligible, beneficial impacts on park operations over the long term as a result of increased interaction with the U.S. Forest Service related to the management of Giant Sequoia National Monument.

Bureau of Land Management. NPS staff would continue to fulfill a cooperative agreement for maintenance and oversight, resulting in negligible, beneficial, long-term impacts on BLM operations.

California Department of Transportation. As described for the no-action alternative, Caltrans

plans and manages several roads in and around the parks, including

- opening and closing the Kings Canyon Highway (California 180) from Grant Grove to Cedar Grove, which affects the operating season at Cedar Grove and necessitates coordination, generally resulting in moderate, beneficial, long-term impacts on park operations
- planning to improve California 180 west of the parks to create six- and four-lane expressway segments that would provide easier access to the parks

There could be moderate to major, adverse, short-term impacts on park operations as a result of natural events that could affect the opening or closing of Kings Canyon Highway.

Alternative C would contribute negligible to major, beneficial, long-term impacts as the result of more sustainable facilities and infrastructure, as well as continued use of park volunteers. However, impacts related to inadequate staffing and housing would contribute negligible to moderate, adverse impacts over the short and long terms. On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with actions under alternative C, would generally result in minor, beneficial, long-term impacts.

Conclusion

Overall, alternative C would generally have moderate, beneficial, long-term impacts on park operations as a result of expanded staffing and improved facilities. There would be negligible, beneficial impacts from the continued use of stock, helicopters, and snowmobiles for park operations. Impacts on park operations from the assistance of other groups — the natural history association, volunteers, concessioners, commercial permit holders, and partners — would be minor to major and beneficial.

On a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of

Land Management, and Caltrans, in conjunction with actions under alternative C, would generally result in minor, beneficial, long-term impacts.

IMPACTS OF ALTERNATIVE D

Like the other action alternatives, most park operational facilities would be located in the park development zone, with some facilities in the high- and low-use frontcountry zones. Development would consist of about 2,133 acres (0.25% of the park). About 50% of the developed area would be for administration and operations, and 10% for residential purposes. In developed areas administrative and maintenance functions would not be interspersed with residential needs or campgrounds. Some administrative functions could occur in park villages or in museums or visitor centers in the high-use frontcountry. A limited number of park operational facilities could be found in the backcountry, primarily in the major trails zone. Residential uses would be expanded from current levels, as would operations and villages.

Analysis

Impacts of Park Operational Needs

Utilities. Existing utilities would be replaced as needed, and more stringent water and wastewater standards would need to be met. As described for the other action alternatives, value analysis studies would be undertaken to assess infrastructure when replacement was needed.

With year-round use in areas like Cedar Grove, utilities might need to be expanded or upgraded. Expanding development only to the design capacity of existing utility systems would be the most cost-effective method to meet needs. Value analysis studies would also assess the best locations for new facilities, resource impacts, whether the function should be located inside or outside the parks, and whether government-built and maintained infrastructure would be the best way to meet needs.

As described for the no-action alternative, water supply would continue to be inadequate in some

years at Grant Grove, Lodgepole, Ash Mountain, and Mineral King, and drought plans would need to be implemented periodically. Water demand could be further reduced by replacing fixtures with very low-flow fixtures, such as waterless urinals. In the Grant Grove area, inadequate water supplies could be further exacerbated by more year-round use or commercial use in Wilsonia. Since Wilsonia is on private utility systems, the impact of acquiring inholdings in Wilsonia to provide additional public uses is unknown, but could be beneficial.

Wastewater systems at Ash Mountain are likely to operate inefficiently due to reduced volume from facilities moved outside the parks. Other wastewater systems could experience similar inefficiencies. Removing RV dump stations that do not meet state standards would increase the capacity of wastewater systems.

In Wilsonia private properties would be acquired from willing sellers at the rate of approximately one property every 12 years. Nonhistoric properties owned by the National Park Service would be removed, and the areas would be returned to more natural conditions. Over time there would be fewer private utility systems, except utility systems could be retained at historic structures.

Over time some comfort stations would be replaced by vault toilets, necessitating long-term use of a pumping service, the cost of which would be included in the maintenance budget.

Removing RV dump stations that do not meet state standards would reduce the burden on park wastewater systems, thus improving the capacity of wastewater systems.

Like the preferred alternative, the impact of alternative D on the utility infrastructure and park operations would be moderate and beneficial over the long term as systems were replaced, and a partnership group would run the system in Mineral King. Impacts would generally be moderate, adverse, and short term as a result of aging infrastructure.

Visitor Facilities and Services. More visitor facilities would be provided, and facilities at the end of their useful lives would be replaced with more sustainable facilities. Before approval, each facility would be assessed as to its function, its impact on park resources, what value it adds to the park, and whether it could be combined or consolidated with other functions. New facilities would be designed to be efficient and improve park operations. The impact of expanding visitor facilities on park operations would be major and largely beneficial over the long term because increased staffing would be available and facilities would be more sustainable.

Visitor services would be expanded to adapt to the needs of changing user groups. Services would be assessed to determine whether a particular service was still needed and whether government-provided services were the most efficient. Additional educational and outdoor skills training would be provided. Overall, the impact of visitor services on park operations would be moderate, beneficial, and long term.

Winter Operations. Expanded winter use would make more demands on park operations and snow removal. Impacts would be minor and adverse over the long term.

Administrative Helicopter Use. Administrative helicopter use would be continued for search and rescue, as well as for maintenance and backcountry deliveries. It would be considered a minimum tool in order to accomplish backcountry work in a timely fashion and speed up backcountry seasonal openings. The impact on park operations would be negligible, beneficial, and long term.

Administrative Stock Use. Administrative stock use would continue to support backcountry park operations, facilitating public access and delivering supplies, with negligible, beneficial, long-term impacts on resource conditions. Continuing administrative stock use in the parks would be cost-effective for backcountry maintenance operations.

Relocating corrals and grazing areas in the foothills area outside the parks would require additional feed to be brought in, a minor, adverse, long-term impact on park operations and budgets.

Administrative Snowmobile Use. Continuing administrative snowmobile use for research, snow surveys, and winter search and rescue would result in negligible, beneficial, long-term impacts on operations.

Impacts of Other Entities on Park Operations

Sequoia Natural History Association. Under alternative D there would be moderate, beneficial, long-term impacts on park operations from assistance provided by the cooperating association as additional and different types of programs were developed and offered to the public. The natural history association would be involved with more activities under this alternative than the other alternatives, with a greater impact on operations.

Volunteers. The focus of other volunteer activities would be diverse, ranging from education to science to maintenance. Stock user groups would participate in trail maintenance, resulting in moderate to major, beneficial, long-term impacts on backcountry trails. Volunteer housing would be constructed, resulting in major, beneficial impacts on volunteers. Overall, the impact of volunteer assistance on park operations would be major and beneficial over the long term.

Concessioners. Like the preferred alternative, concessioners would provide more services and facilities in accordance with the full buildout scenarios in their contracts, resulting in additional employees. Concessioners running stables and pack trips would continue to supply services in all locations except Wolverton, and their facilities would need to be maintained. Concessioners would be supplying services to more diverse visitors and groups. Overall impacts of concession services on park operations would be moderate, beneficial, and long term, but costs and added work to provide housing for additional employees, if supplied in the parks, could

result in minor to moderate, adverse impacts over the long term.

Commercial Permit Holders. There would be negligible, adverse, short-term impacts on commercial permit holder as they adapted to the needs of changing user groups.

Partners. Partnerships would be pursued to provide educational and other operations, including management of the Mineral King area, resulting in moderate, beneficial, long-term impacts on park operations.

Native American partnerships would be sought to support park interpretation and services, resulting in moderate, beneficial, long-term impacts for these groups.

Impacts on Staffing

Park staffing needs would increase the most as a result of transit operations, expanded interpretive programs, and year-round use of the parks. Staff members would need to be responsive to changing user groups, and foreign language skills, as well as good communication skills, could be important. Keeping the entire length of the Generals Highway open in winter and avoiding all winter closures would be a goal that would require more staff. Additional housing would be required in the parks to meet staff needs or it would need to be individually acquired outside the parks. Affordable housing would continue to be a problem exacerbated by increased staffing.

Taken together, the impacts of this alternative on park staff would likely be moderate, beneficial, and long term, despite affordable housing problems.

Cumulative Impacts

U.S. Forest Service. As described for the no-action alternative, the following factors are considered in the cumulative impact analysis for park operations:

- NPS staff would continue to provide maintenance, fire, emergency and sequoia

management consultation for Giant Sequoia National Monument. Continued park participation would have moderate, long-term, adverse impacts on park operations and budgets.

- Gate receipts would continue to be shared with Sequoia National Forest, with no additional impacts in the short or long term.
- Habitat shared between the national parks and Sierra National Forest would continue to be managed jointly in accordance with the recommendations of the Sierra Nevada Ecosystem Project. There would be no additional impacts.
- Management purposes of the two agencies could continue to diverge, with the NPS mission geared more toward preservation and the USFS mission toward providing for multiple uses, including some not allowed in the parks, such as grazing, logging, hunting, and snowmobiling. Some visitors could be unaware of these different missions.

There would be negligible, beneficial impacts on park operations over the long term as a result of increased interaction with the U.S. Forest Service related to the management of Giant Sequoia National Monument.

Bureau of Land Management. NPS staff would continue to fulfill a cooperative agreement for maintenance and oversight, resulting in negligible, beneficial, long-term impacts on BLM operations.

California Department of Transportation. As described for the no-action alternative, Caltrans plans and manages several roads in and around the parks, including

- opening and closing the Kings Canyon Highway (California 180) from Grant Grove to Cedar Grove, which affects the operating season at Cedar Grove and necessitates coordination, generally resulting in moderate, beneficial, long-term impacts on park operations

- planning to improve California 180 west of the parks to create six- and four-lane expressway segments that would provide easier access to the parks

There could be moderate to major, adverse, short-term impacts on park operations as a result of natural events that could affect the opening or closing of Kings Canyon Highway.

Alternative D would generally contribute moderate, beneficial impacts over the long term because of improved infrastructure, more sustainable facilities, increased staffing, and continued use of volunteers. Like the preferred alternative, on a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with the actions of alternative D, would generally result in minor to moderate, beneficial, long-term impacts. Impacts on park operations would be more beneficial than under the no-action alternative.

Conclusion

Alternative D would generally have moderate to major, beneficial impacts on park operations over the long term as a result of improved facilities and increased park staffing. There would be negligible, beneficial impacts from the continued use of stock, helicopters, and snowmobiles for park operations. Impacts on park operations from the assistance of other groups — the natural history association, volunteers, concessioners, commercial permit holders, and partners — would be minor to major and beneficial. Impacts as a result of housing shortages would be moderate, adverse, and long term.

Like the preferred alternative, on a cumulative basis, continuing programs and work with the U.S. Forest Service, the Bureau of Land Management, and Caltrans, in conjunction with the actions of alternative D, would generally result in minor to moderate, beneficial, long-term impacts. Impacts on park operations would be more beneficial than under the no-action alternative.

Socioeconomic Environment

METHODOLOGY FOR ANALYZING IMPACTS

Sequoia and Kings Canyon National Parks are an important part of the local socioeconomic environment of Fresno and Tulare counties, as well as Inyo County. However, there is no road access within the parks from the east, and Inyo County stands as a separate social and economic unit because it is isolated from Fresno and Tulare counties by the Sierra Nevada. Visitor access through Inyo County is limited to wilderness visitors. Therefore, Inyo County is not included in the analysis because none of the action alternatives would make any changes in the management and visitor use of the parks that would have any significant socioeconomic impacts on Inyo County.

Socioeconomic impacts for Fresno and Tulare counties were determined on the basis of applied logic and professional expertise and judgment. Economic data, historic visitor use data, expected future visitor use, and future developments within the park were all considered in identifying and discussing potential impacts. A qualitative analysis is sufficient to compare the effects of alternatives for decision-making purposes.

Impacts on socioeconomic conditions are expected to fall into four categories:

- *Local and Regional Economies* — Changes in the two-county regional economy, including local gateway communities, would include impacts on the regional and local socioeconomic base due to changes in park operations and other management or development actions. The socioeconomic base includes such factors as population, income, employment, and earnings. More staff seeking housing outside the parks could be expected to benefit the local tax base. Park development and removal projects during the life of the general management plan could be expected to benefit the

local construction industry. The cost estimates developed for the alternatives include many projects common to every alternative, some of which have already been funded. Projects could be funded in a variety of ways. About \$107 million in projects have already been funded or committed through the NPS line-item construction program (\$23 million), the Federal Lands Highway Program (over \$26.6 million), and the fee demonstration program (\$0.7 million), plus there are nearly \$57 million in projects reflecting concessioner commitments.

- *Private Land* — Some inholdings could be acquired by the National Park Service on a willing-seller / willing-buyer basis. If the park acquired an inholding, then some private land would no longer be subject to local taxes. This action could affect a county's property tax receipts.
- *Park Concessioners* — New concessioner contracts could call for changes in the availability of goods and services provided by concessioners, which could affect the visiting public and the regional economy.
- *Park Staffing and Budget* — Each alternative would have different staffing and budget needs, which could affect adjacent communities.

Context, intensity, and duration of impacts were used to compare the action alternatives to the no-action alternative. Context refers to the relative area within which impacts would occur; for the most part impacts would affect a regional area (Fresno and Tulare counties) or a local area (e.g., the Three Rivers gateway community).

Impact intensity is the degree to which a topic is beneficially or adversely affected (see accompanying text box). For this analysis, impacts on recreational visitation were qualitatively evaluated and described.

Socioeconomic Impact Thresholds

Negligible — No effects would occur, or the effects on socioeconomic conditions would be below or at the level of detection.

Minor — The effects on socioeconomic conditions would be small but detectable, and only a small number of firms and/or a small portion of the population would be affected. The impact would be slight and would not be detectable outside the affected area.

Moderate — The effects on socioeconomic conditions would be readily apparent. Any effects would result in changes to socioeconomic conditions on a local scale (e.g., in a gateway community) within the affected area.

Major — The effects on socioeconomic conditions would be readily apparent. Measurable changes in social or economic conditions at the county or two-county regional level would occur. The impact would be severely adverse or exceptionally beneficial within the affected area.

A short-term impact would last less than three years, and a long-term impact longer than three years (and could be considered a permanent change in conditions).

IMPACTS COMMON TO ALL ALTERNATIVES

As previously discussed, Public Law 108-447 authorized the continuation of the Kaweah no. 3 hydroelectric facilities and special use permit cabins in the Mineral King area. The following discussion therefore applies to all alternatives.

Utility Use — Hydroelectric Facilities. The operation of hydroelectric generating facilities in Sequoia National Park by Southern California Edison may continue as it has in the past. These hydroelectric facilities provide a limited amount of electricity seasonally to the local power grid. Benefits to the parks include being able to use some water from the impoundments to fight local wildland fires. Also, Southern California

Edison will compensate the park, as required by Public Law 108-447. Impacts are expected to be minor to moderate, beneficial, and long term as a result of compensation to the parks.

Mineral King Permit Cabins — Cabin Cove, West Mineral King, East Mineral King. Permits to use private cabins at Cabin Cove, West Mineral King, and East Mineral King will be issued in accordance with the provisions of Public Law 108-447 and administered in accordance with NPS *Management Policies 2001* and *Director’s Order #53: Special Use Permits* (see appendix G). Continuing approximately 60 permits for private cabins in the Mineral King area will result in ongoing annual fee income to Sequoia National Park, plus property taxes to Tulare County. Impacts would be negligible to minor, beneficial, and long term.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Analysis

Facilities and services within the parks would remain essentially the same as now. Without a long-term, comprehensive management plan, park managers would accommodate changing visitor use patterns, uses, and volumes, along with changes in resource conditions, as they occurred or in response to pressure from various interest groups. While visitation could fluctuate, an overall growth of 23% for 1997–2010 is assumed.

Local and Regional Economies

Additional funds for specific projects that have already been identified would amount to \$125 million in direct expenditures. Because these projects would be phased over a number of years, impacts on individual firms and employees in terms of increased income and more jobs could be moderate to major, beneficial, and short term. Impacts on the regional economy in terms of economic indicators such as a major decrease in income levels, unemployment, or poverty would be negligible because the economy had

more than \$17 billion in earnings and over 591,000 jobs in 2000.

Sequoia and Kings Canyon National Parks would continue to be important contributors to the local economy as a result of jobs provided, and wages and operational expenditures by the National Park Service. In addition, the parks serve as primary attractions for local and regional tourism. The visiting public would continue to generate tourist-related spending within the local economy, which benefits local businesses by generating income and providing employment opportunities.

Present trends in park use would continue to provide the impetus for increased development in adjacent communities, especially along corridors leading to the parks. However, the two-county region would not be affected due to the size and diversity of the regional economy.

Private Land within the Parks

Inholdings at Wilsonia in Kings Canyon National Park and at Oriole Lake in the Mineral King area of Sequoia National Park would be acquired on a willing-seller basis. There are approximately 275 private property landowners within the two parks. Inholders who sold to the federal government would benefit from selling their property rights for fair market value, and the public would benefit from having additional property and resources protected within the parks. Because title for the affected properties would be transferred from private individuals to the federal government, these parcels would be removed from the local real estate tax bases. The amount of property tax revenue subsequently lost to the two counties would be relatively small compared to the total tax revenues collected by Fresno and Tulare counties. In FY 2000 real estate property taxes in Tulare County amounted to \$155.7 million (for 228,984 parcels), and in Fresno County, \$373.7 million (241,200 parcels).

Park Concessioners

Concession facilities and services would continue as they are now, except that limited expansion of lodging facilities at Grant Grove and Wuksachi would be allowed in accordance with the concession contracts.

Park Staffing and Budget

Implementing this alternative would require staff levels of 275.2 permanent employees (full-time equivalents or FTEs)* and 305.3 seasonal employees, plus unpaid volunteers. In 2001 there were 261.8 permanent and 290.4 seasonal employees. The parks' base budget was \$11.4 million in 2000.

Cumulative Impacts

Improvements in road and transportation access outside the parks include Caltrans improvements of California 180 and 65 and the potential development of a high-speed rail system connecting central California with southern California and the San Francisco Bay area. Transportation and circulation improvements within the parks include improvements to Generals Highway and a transit system for Giant Forest. Together these actions could generate increased visitation, resulting in additional tourist-related spending within the region and gateway towns, thereby increasing business opportunities, income, and employment.

In conjunction with other past, present, and reasonably foreseeable actions, the no-action alternative would continue to have a moderate to major, beneficial impact on the socioeconomic climate of the area over the short term, primarily because of ongoing construction projects. Improvements in transportation and access both outside and within the parks could generate additional visitation and tourist-related expenditures, benefiting the two-county regional and gateway economies. Over the long term these

* A full-time equivalent is equal to one person working full time for one year. So, four people working full time for three months each would equal one FTE.

impacts would be moderate for gateway communities but negligible at the regional level.

Conclusion

Approved projects that would be funded under the no-action alternative would amount to about \$125 million. These projects would be phased over a number of years, so impacts on individual firms and employees could be moderate to major and beneficial over the short term, but impacts on the regional economy would be negligible. The current range and level of impacts on adjacent communities due to tourist spending would continue to be beneficial, providing income, employment, and business opportunities to the affected area's economy.

The acquisition of private lands within the parks on a willing-seller / willing-buyer basis would benefit the general public because additional resources within the parks would be protected and available for public access.

Current impacts relating to concessioners would continue, with negligible changes in short- or long-term effects on their business operations.

The parks' staff levels and base budget would not change under the no-action alternative other than as a result of adjustments for inflation and rising labor and materials costs.

Cumulative improvements in transportation and access both outside and within the parks would generate additional visitation and tourist-related expenditures in the two-county regional and gateway economies. Over the long term these effects would be moderate and beneficial for gateway communities but negligible for the regional economy.

IMPACTS OF THE PREFERRED ALTERNATIVE

Analysis

Developing additional facilities (e.g., redesigning and refurbishing campgrounds, enhancing educational facilities, and providing new work

centers) at various locations throughout the parks would increase visitor access and accommodate sustainable growth in visitor use of 30%.

Local and Regional Economies

An estimated \$144 million in direct expenditures would be spent for various projects, or \$19 million more than under the no-action alternative. These projects would be accomplished in phases over the life of the plan. The resulting impacts to individual firms and workers due to increased income and more jobs would be moderate to major and beneficial over the short term. Impacts to the regional economy in terms of a substantial decrease in unemployment or poverty would be negligible because of the relative size of the regional economy (approximately \$17 billion in earnings and over 591,000 jobs in 2000).

Providing additional facilities and improved access would encourage more visitor use at the parks. The amount of additional use is indeterminate at this time. However, this increased use could result in some additional spending within the gateway communities, which would benefit some retail establishments, restaurants, or motels in nearby travel corridors.

Moving administrative functions and park employee housing to areas outside the parks would result in the purchase or long-term lease of land and the construction of buildings in gateway areas. New facility construction would result in beneficial, short-term impacts on the local economy, mostly affecting the construction sector. The purchase of land (on a willing-buyer / willing-seller basis) by the federal government would result in some long-term loss of local real-estate tax revenue. However, the amount of property tax revenue lost to the two counties would be negligible compared to the total tax revenues collected by Fresno County (\$373.7 million in FY 2000) and Tulare County (\$155.7 million in FY 2000).

Private Land within the Parks

Private land at Oriole Lake and in the Mineral King Valley (e.g., the Disney properties) would

be acquired on a willing-seller / willing-buyer basis. Private land at Silver City and Kaweah Han in the Mineral King area of Sequoia National Park, and at Wilsonia in Kings Canyon National Park would remain. Inholders who chose to sell to the federal government would benefit from receiving fair market value for their properties, and the public would receive long-term benefits because additional property and resources would be protected within the parks. Properties acquired by the federal government would be removed from Fresno and Tulare counties' real estate tax base; however, the amount of property tax revenue lost to the two counties would be negligible compared to their total tax revenues.

Park Concessioners

Under the preferred alternative some concessioner-provided facilities and services would be expanded, as well as incidental business permits and or other commercial permits. Like the no-action alternative, lodging at Wuksachi and Grant Grove village would be expanded in accordance with the present concession contract. This expansion of concession services and facilities would provide additional business and employment opportunities for a few firms and a small number of additional workers.

Park Staffing and Budget

Implementing the preferred alternative would require a park staff of 312.8 permanent employees (an increase of 37.6 FTEs compared to the no-action alternative) and 347 seasonal employees (an increase of 41.7). The parks' base budget would need to be increased substantially. The parks would make additional expenditures for labor and materials to support the staffing increases. The resulting impacts on the local economy (e.g., Three Rivers), compared to the no-action alternative, would be minor to moderate because of a relatively small increase in population. Additional park employees could increase the demand for housing outside the parks, and they would probably spend money for goods and services in the gateway communities. While the impacts would be moderate at the

gateway community level, the impact on the regional economy would be negligible because of the size of the two-county economy.

Cumulative Impacts

As discussed for the no-action alternative, improvements in road and transportation access outside the parks include Caltrans improvements of California 180 and 65 and the potential development of a high-speed rail system connecting central California with southern California and the San Francisco Bay area. Transportation and circulation improvements within the parks include improvements to Generals Highway and a transit system for Giant Forest. Together these actions could generate increased park visitation.

More visitors could result in additional tourist-related spending within the region and gateway towns, increasing business opportunities, income, and employment. Improving facilities within the parks would further generate economic benefits to the growing regional economy in the form of direct spending. The need for additional park staff housing, combined with the increasing desirability of living in the gateway communities, would add to the demand for local housing and other locally provided goods. Hiring additional staff could result in a small increase in the local population, which contributes to the overall growth in gateway communities.

The preferred alternative, in conjunction with other past, present, and reasonably foreseeable actions, would have negligible to moderate, beneficial impacts over the long term on the socioeconomic climate of the local gateway communities. However, impacts at the regional level would be negligible.

Conclusion

Approximately \$144 million would be spent over the life of the plan on various projects, an increase of only \$19 million compared to the no-action alternative. These expenditures could result in moderate to major, short-term, beneficial impacts on individual firms and employees because of increased business and profits, more

employment opportunities, and higher income. Overall impacts on the regional economy, however, in terms of economic indicators (income, unemployment, poverty) would be negligible because of the economy's size and the fact that projects would be phased over the next 15 to 20 years. These projects would encourage more visitation to the parks, with beneficial effects on adjacent communities in terms of increased visitor expenditures for locally provided goods and services. Moving administrative functions and park employee housing outside the parks would result in the purchase or long-term lease of land and the construction of buildings in local gateway areas, with short-term, beneficial impacts on the local economy, mostly affecting the construction sector.

The acquisition of private land within the parks on a willing-selling / willing-buyer basis, as well as the expiration of special use permits, would have negligible, long-term impacts on the property tax bases and revenue of both Fresno and Tulare counties.

There would be some additional moderate, beneficial impacts over the long term for concessioners and other businesses within the parks due to the expansion of facilities and increased visitor use.

An increase in park staffing levels by 37.6 full-time employees and 41.7 seasonal employees, along with a substantial budget increase, would have a moderate impact on the local gateway communities' economies because staff would likely purchase many goods and services locally. The impact on the regional economy, however, would be negligible.

Cumulative improvements in transportation and access both outside and within the parks and improved park facilities would generate additional visitation and tourist-related expenditures in the gateway communities and the two-county region. Additional staff would result in a small increase in the local population, contributing to the overall economic growth of the gateway communities. These would be moderate, beneficial impacts over the long term.

IMPACTS OF ALTERNATIVE A

Analysis

Some facilities throughout the developed areas of the park (e.g., the Atwell Mill campground, the Lodgepole campground, and Cedar Grove) would be removed or redesigned to provide fewer sites, and sites would be restored to more natural conditions. Visitor use would be restricted to protect resources and ease congestion, and visitation could decrease by up to 10%.

Local and Regional Economies

An estimated \$126.6 million in direct expenditures would be spent over the life of the plan on various projects, an increase of only \$1.6 million compared to the no-action alternative. This work would provide short-term business and employment opportunities for some firms and individuals, primarily in the construction and landscaping industries. Benefits for the affected firms and workers in terms of increased income and more jobs could be moderate to major, but there would be negligible impacts on regional economic indicators such as unemployment, income, or poverty because work would be phased over the next 15 to 20 years, and the spending increase compared to the no-action alternative would be negligible.

Park operations and the visiting public would continue to generate spending within the local economy, a beneficial impact. However, fewer visitor facilities and restrictions on visitor uses, such as no stock use and reduced parking at various sites, would likely lead to reductions in visitor use. Fewer people visiting the parks during the peak summer season could reduce park-related economic activity in the gateway communities. Some retail establishments, restaurants, or motels in nearby travel corridors could experience a minor to moderate decline in business (e.g., lower sales, decline in income, fewer jobs). However, a reduction in some facilities and services in the parks (such as smaller campgrounds and administrative facilities located outside the parks) could increase business opportunities in gateway communities. Thus, it is not possible at this time to determine if

alternative A would have a net beneficial or adverse effect on the economies of gateway communities.

Private Land within the Parks

Inholdings at Wilsonia in Kings Canyon National Park, and at Oriole Lake and Silver City in Sequoia National Park, would be acquired on a willing-seller / willing-buyer basis. The impacts would be similar to the no-action alternative except inholdings at Silver City would also be acquired. Some real estate property tax revenue would be lost to Fresno and Tulare counties, with negligible impacts when compared to total tax revenues.

Concessioners

Concessioners, incidental business permit holders, or other commercial permit holders would be affected by actions such as eliminating lodging at Cedar Grove, reducing lodging at Grant Grove, and eliminating stock use within the parks. Two concessioner contracts would have to be terminated or renegotiated to allow for a reduction in services, with the National Park Service compensating the concessioners, as specified in the contracts.

Eliminating stock use in the parks would affect approximately 22 firms that provide horse or llama pack services. Permits for these services could be terminated upon their normal expiration dates.

These long-term actions would reduce the presence of concessioners and other commercial activity within the park. Some firms and employees would be adversely affected as a result of less income and fewer employment opportunities. Such reductions could be moderate to major for individual firms and employees. Over the long term the affected firms and individuals would adjust and find new opportunities within the region. The long-term impact on the regional economy would be negligible.

Park Staffing and Budget

Alternative A would require a park staff of 280.9 permanent employees, an increase of 5.7 FTEs compared to the no-action alternative, and 311.6 seasonal employees, an increase of 6.3 FTEs. The parks' base budget would increase slightly. The subsequent impact on the local and regional economies would be negligible and beneficial over the long term because of the small increase in jobs.

Cumulative Effects

As discussed for the no-action alternative, improvements in road and transportation access outside the parks include Caltrans improvements of California 180 and 65 and the potential development of a high-speed rail system connecting central California with southern California and the San Francisco Bay area. Transportation and circulation improvements within the parks include improvements to Generals Highway and a transit system for the Giant Forest. Together these actions could generate increased visitation to the two parks, contrary to the limited visitation goal of alternative A.

Restricting visitor use and removing or reducing lodging and camping facilities within the parks would reduce visitation to the parks, and some potential visitors would go to other nearby recreation areas. This displacement effect could increase visitation to Giant Sequoia National Monument and Sequoia National Forest to the extent that comparable or acceptable substitute facilities and recreational experiences were available, or if comparable facilities and experiences were not offered, the number of regional recreational visitors passing through the gateway communities (e.g., Three Rivers) could be reduced. Decreases in facilities within the parks could encourage the private sector to develop more lodging and camping facilities outside the parks, as long as there was sufficient demand. However, if visitation to the parks was substantially reduced, the gateway economies could suffer from reduced patronage, leading to decreased incomes, decreased profits, less business, and fewer employment opportunities. It is possible that the opposite effects could occur —

changes in expenditure patterns could happen because fewer visitors might be more relaxed and more likely to spend more per person. The exact effects cannot be accurately predicted.

On a cumulative basis, restricting visitation and removing or reducing lodging and camping facilities within the parks would reduce visitation to the parks, which could increase visitation to Giant Sequoia National Monument and Sequoia National Forest to the extent that comparable facilities were offered. This could produce either a negligible to minor, beneficial or negative impact over the long term.

Conclusion

Based on expenditures of \$126.6 million for restoration and other projects (an increase of only \$1.6 million over the no-action alternative), impacts on individual firms and individuals would be moderate to major, beneficial, and short term. The projects would be accomplished in phases over the next 15 to 20 years. Impacts on the economies of gateway communities would most likely be minor to moderate and beneficial over the long term, but benefits to the regional economy would be negligible. Whether these effects were beneficial or adverse would depend on whether the public's demand for facilities and services removed from the parks were supplied by the private sector in adjacent areas.

The impacts of private land within the parks being acquired on a willing-seller / willing-buyer basis would be the same as the no-action alternative except that more properties and owners could be affected. Both Fresno and Tulare counties would experience negligible, long-term decreases in their respective property tax bases and revenue.

Some concessioners and their employees, and commercial stock users and their employees would experience long-term, moderate to major, adverse impacts with the loss of business and jobs. Over the long term these firms and individuals would find other commercial and employment opportunities within the regional

economy, resulting in negligible impacts. The public could look to the private sector within the gateway communities to provide services no longer offered in the parks.

Park staffing increases of 5.7 permanent employees and 6.3 seasonal employees, and a small increase in the parks' budget, would have long-term, negligible, beneficial impacts on the local and regional economies because of the small increase in jobs.

On a cumulative basis, restricting visitation and removing or reducing lodging and camping facilities within the parks would reduce visitation to the parks, which could increase visitation to Giant Sequoia National Monument and Sequoia National Forest to the extent that comparable facilities were offered. Decreases in park facilities could encourage private sector development of more lodging and camping facilities outside the parks to meet demand. Decreased visitor spending is expected; however, the opposite could occur because of changes in visitor expenditure patterns. Either way, the effects are expected to be long term and of minor intensity at the local and regional levels.

IMPACTS OF ALTERNATIVE C

Analysis

Various projects relating to park facility expansion and service improvements (such as expanding park housing and maintenance areas at Cedar Grove, and improving roads and parking at Lodgepole) would be undertaken. Visitor use is estimated to increase by 30% over the life of the plan, the same as the preferred alternative.

Local and Regional Economies

Projects under alternative C would provide business and employment opportunities for some firms and individuals, primarily in the construction industry. An estimated \$159.5 million would be spent for various projects, an increase of \$34.5 million compared to the no-action alternative. These projects would not be accomplished all at the same time but rather would

occur in phases over the next 15 to 20 years. Over the short term impacts on individual firms and workers could be moderate to major and beneficial; however, impacts on the regional economy would be negligible because the total value would be about 0.9% of the region's \$17 billion in earnings in 2000. The number of jobs created would be only a small fraction of the 591,000 jobs that existed in 2000.

Providing additional facilities and improved access would encourage more visitor use at the parks. The amount of additional use is projected at 30% over the life of the plan, the same as the preferred alternative. This increased use could result in some additional spending within the gateway communities, which would benefit retail establishments, restaurants, or motels in the nearby travel corridors.

Sequoia and Kings Canyon National Parks would continue to be important contributors to the local economy as a result of wages and operational expenditures, as well as visitor expenditures. Any improvement in visitor facilities in the parks could enhance visitation and subsequent expenditures in the local area.

Private Land within the Parks

Inholdings in the Mineral King Valley (e.g., the Disney properties) would be acquired on a willing-seller / willing-buyer basis. Inholdings at Oriole Lake, Silver City, and Kaweah Han in Sequoia National Park and at Wilsonia in Kings Canyon National Park would remain. Inholders who chose to sell to the federal government would benefit from receiving fair market value for their properties, and the public would receive long-term benefits because additional property and resources would be protected within the parks. Properties acquired by the federal government would be removed from the Fresno and Tulare counties' real estate tax base; however, the amount of property tax revenue lost to the two counties would be negligible compared to their total tax revenues. There would be no loss of property tax revenues for inholdings that remained in the parks (i.e., Wilsonia, Oriole Lake, Kaweah Han, and Silver City).

Park Concessioners

Concession facilities and services would continue to provide goods and services within the parks to the extent allowed by existing contracts. Some expansion of concession activities (for example, at Cedar Grove and Wuksachi) would provide additional business and employment opportunities for a few firms and a small number of additional workers.

Park Staffing and Budget

Implementing alternative C would require a park staff of 312.8 permanent employees (an increase of 37.6 FTEs) and 347 seasonal employees (an increase of 41.7 FTEs), requiring a substantial increase in the parks' base budget. Long-term impacts on the local economy would be minor and beneficial, and on the regional economy, negligible and beneficial because of the modest increase in park jobs.

Cumulative Effects

As discussed for the no-action alternative, improvements in road and transportation access outside the parks include Caltrans improvements of California 180 and 65 and the potential development of a high-speed rail system connecting central California with southern California and the San Francisco Bay area. Transportation and circulation improvements within the parks include improvements to Generals Highway and a transit system for Giant Forest. Together these actions could generate increased visitation to the two parks.

In conjunction with other past, present, and reasonably foreseeable actions, alternative C would result in additional tourist-related spending within the region and gateway towns, increasing business opportunities, income, and employment. For the local economy these would be long-term effects of moderate intensity, but for the regional economy they would be negligible. Improving facilities within the parks would contribute beneficial economic impacts to the regional economy in the form of direct spending. The need for housing additional park staff, combined with the increasing desirability

of living in the gateway communities, would add to the demand for local housing and other locally provided goods. Hiring additional staff would result in a small increase in the local population, which would contribute to the overall growth in the gateway communities.

Conclusion

An estimated \$159.5 million would be spent over the life of the plan to construct various projects, an increase of \$34.5 million compared to the no-action alternative. Benefits for individual firms and employees in the construction industry would be moderate to major, short term, and beneficial. Impacts on the regional economy would be negligible because of the size of the projects, which would be phased over the next 15 to 20 years.

The acquisition of private lands within the parks on a willing-selling / willing-buyer basis would have negligible, long-term impacts on the property tax bases and revenue of both Fresno and Tulare counties.

Park concessioners would benefit over the long term as a result of a growth in visitor services. Effects would be negligible.

An increase in park staffing levels by 37.6 permanent employees and 41.7 seasonal employees, along with a substantial rise in the parks' budget, would have a minor, beneficial, long-term impact on the local economy but a negligible impact on the regional economy.

Cumulative improvements in transportation and access both outside and within the parks and improved park facilities would generate additional visitation and tourist-related expenditures in the gateway communities and the two-county region. The long-term results would be beneficial and moderate. Additional staff would result in a small increase in the local population, which contributes to the overall economic growth of the gateway communities. Over the long term these would be moderate, beneficial impacts locally, but negligible impacts regionally.

IMPACTS OF ALTERNATIVE D

Analysis

Developing additional facilities (e.g., a 1,700-car parking lot at Wolverton, and a new visitor center at Cedar Grove) throughout the parks would accommodate additional visitors and increase public access. Increases in visitor use of up to 48% are expected by 2010.

Local and Regional Economies

An estimated \$250.6 million would be spent over the life of the plan, an increase of \$125.6 million compared to the no-action alternative. These projects would be accomplished in phases over the next 15 to 20 years. Benefits (e.g., increased income, more jobs) for individual firms and workers would be moderate to major and short term. There would be minor impacts on economic indicators (e.g., unemployment and poverty) because of the size of the projects and their phasing. Total project-related expenditures would amount to less than 1% of the counties' \$17 billion in earnings in 2000, and the number of jobs created would be only a small fraction of the 591,000 jobs that existed in 2000.

Providing additional facilities and improved access would encourage more visitor use at the parks. The amount of additional use is indeterminate at this time. However, this increased use could result in some additional spending within the gateway communities, which would benefit some retail establishments, restaurants, or motels in nearby travel corridors. Such long-term positive impacts would be noticeable at the local level.

Sequoia and Kings Canyon National Parks would continue to be important contributors to the local economy as a result of wages and operational expenditures, as well as visitor expenditures. Any improvement in visitor facilities in the parks could enhance visitation and subsequent expenditures in the local area.

Private Land within the Parks

Private lands at Wilsonia in Kings Canyon National Park, and at Oriole Lake and Silver City in Sequoia National Park, would be acquired on a willing-seller / will-buyer basis. The impacts would be the same as under the no-action alternative except that private lands at Silver City would also be acquired. The amount of property tax revenue lost to the two counties would be negligible compared to total tax revenues.

Park Concessioners

Concession facilities and services would continue to provide goods and services that would otherwise be unavailable within the parks. Alternative D calls for some expansion of facilities and services that would be provided or managed by concessioners or holders of incidental business permits or other commercial permits. Expanding concession services and facilities would provide additional business and employment opportunities for a few firms and a small number of additional workers.

Park Staffing and Budget

Under alternative D park staffing would increase to 340.8 permanent employees (an increase of 65.6 FTEs compared to the no-action alternative) and 378.1 seasonal employees (an additional 72.8 FTEs), the largest increase of any alternative. The parks' base budget would have to increase substantially, resulting in moderate, beneficial impacts on the local economy because of a modest increase in jobs, but only a negligible, beneficial impact on the much larger regional economy.

Cumulative Effects

As discussed for the no-action alternative, improvements in road and transportation access outside the parks include Caltrans improvements of California 180 and 65 and the potential development of a high-speed rail system connecting central California with southern California and the San Francisco Bay area. Transportation and circulation improvements within the parks include improvements to Generals Highway and a

transit system for Giant Forest. Together these actions could generate increased visitation to the two parks.

In conjunction with past, present, and reasonably foreseeable actions, alternative D would provide moderate, long-term benefits at the local level (gateway community) and minor impacts at the regional level. More visitors could result in additional tourist-related spending within the region and gateway towns, resulting in increased business opportunities, income, and employment. Improved facilities within the parks would further contribute economic benefits to the growing regional economy in the form of direct spending. Housing needs for additional park staff, combined with the increasing desirability of living in the gateway communities, would add to the demand for local housing and other locally provided goods. Hiring additional staff would result in a small increase in the local population, which contributes to the overall growth in the gateway communities.

Conclusion

Approximately \$250.6 million would be spent over the life of the plan on various projects, an increase of \$125.6 million compared to the no-action alternative. While impacts on individual firms and employees in the construction industry could be moderate to major, beneficial, and short term, impacts on the regional economy would be negligible and beneficial because of the size projects, which would be phased over the next 15 to 20 years. These projects would encourage greater visitation to the parks, with beneficial effects on adjacent communities, particularly for firms along the access corridors; impacts would be minor to moderate and beneficial over the long term.

Local property taxes from the acquisition of private lands within the parks on a willing-seller / willing-buyer basis would result in negligible, adverse, long-term impacts on property tax bases of both Fresno and Tulare counties.

Impacts on park concessioners and other businesses would be beneficial over the long term as a result of providing additional visitor services.

Park staffing levels would increase by 65.6 permanent employees and 72.8 seasonal employees, the most of any alternative. The parks' budget would have to increase the most of any alternative, but with minor, beneficial impacts on the local economy and negligible, beneficial impacts on the regional economy.

Cumulative improvements in transportation and access both outside and within the parks, along with improved park facilities, would generate additional visitation and tourist-related expenditures in the gateway economies and the two-county regional. Additional staff would result in a small increase in the local population, which contributes to the overall economic growth of the gateway communities. For the local economy these would be moderate, beneficial impacts over the long term, but for the regional economy they would be negligible impacts.

Unavoidable Adverse Effects

This section summarizes the adverse impacts that could not be avoided once an alternative was implemented. These are the impacts that would remain after mitigation was implemented.

THE NO-ACTION ALTERNATIVE

Natural Resources

There would be continued unavoidable impacts on vegetation and soils, primarily in existing areas of concentrated use and development. The maximum size of the development zone would be 1,745 acres, but not all of this area would be subject to development.

There would also be unavoidable, adverse impacts on meadows, riparian, and wetland communities in developed areas, around popular lakes and streams, at stream crossings, and below water withdrawal diversions.

Cultural Resources

The inevitable loss of cultural landscape values in the Big Stump Basin, which would be managed as a recovering sequoia grove, would be unavoidable.

THE PREFERRED ALTERNATIVE

Natural Resources

There would be continued unavoidable impacts on vegetation and soils, primarily in existing areas of concentrated use and development. The maximum size of the development zone would be 1,887 acres, but not all of this area would be subject to development.

Cultural Resources

The inevitable loss of cultural landscape values in part of the Big Stump Basin managed as a recovering sequoia grove would be unavoidable.

Removing historic structures at Wolverton that could not be adaptively used, and providing infill housing at Lodgepole would have unavoidable adverse effects on the historic structures, as well as the potential historic district.

ALTERNATIVE A

Natural Resources

There would be continued unavoidable impacts on vegetation and soils, primarily in existing areas of concentrated use and development. The maximum size of the development zone would be 1,310 acres (the least of any alternative), but not all of this area would be subject to development.

Cultural Resources

The inevitable loss of cultural landscape values in the Big Stump Basin, which would be managed as a recovering sequoia grove, would be an unavoidable adverse impact.

The loss of structures that could not be adaptively reused at the Redwood Mountain resident, the potential General Grant National Park historic district, the Wilsonia Historic District, the Cabin Creek ranger resident and dormitory, the upper Ash Mountain housing area, the Sycamore CCC camp, and the CCC recreation hall at Ash Mountain would be unavoidable adverse impacts. Removing backcountry structures that could not be adaptively used or allowing them to molder would result in unavoidable adverse impacts.

Visitor Experience

No longer providing public lodging in the Silver City area would be an unavoidable adverse effect on visitor experiences.

This alternative would result in unavoidable adverse impacts on most visitors as the result of reducing facilities, such as Potwisha campground, Wolverton winter use facilities, and Cedar Grove

lodging. Prohibiting horses and other stock throughout the parks would result in adverse impacts to those visitors seeking to use stock.

Special Use Permits

Removing the Boy Scout camp would result in an unavoidable adverse impact on regional Boy Scouts and others who use the facility annually.

ALTERNATIVE C

Natural Resources

There would be continued unavoidable impacts on vegetation and soils, primarily in existing areas of concentrated use and development. The maximum size of the development zone would be 1,986 acres, but not all of this area would be subject to development.

Cultural Resources

The inevitable loss of cultural landscape values in part of the Big Stump Basin managed as a recovering sequoia grove would be unavoidable.

Removing historic structures at Wolverton that could not be adaptively used would have unavoidable adverse impacts on the potential historic district.

Removing backcountry structures that could not be adaptively used or allowing them to molder would result in unavoidable adverse impacts.

ALTERNATIVE D

Natural Resources

There would be continued unavoidable impacts on vegetation and soils, primarily in existing areas of concentrated use and development. The

maximum size of the development zone would be 2,133 acres, but not all of this area would be subject to development.

Constructing a Grant Grove bypass road would have unavoidable adverse impacts on soils, vegetation, and wildlife. The extent of impacts would depend on site-specific conditions and project design.

Wilderness

More concentrated use by larger groups in the park's backcountry would result in unavoidable adverse impacts on wilderness values.

Continuing road access and providing picnic facilities at Oriole Lake could adversely affect wilderness values.

Cultural Resources

The inevitable loss of cultural landscape values in part of the Big Stump Basin managed as a recovering sequoia grove would be unavoidable.

Removing structures from Wolverton that could not be adaptively used would adversely affect this potential historic district.

Visitor Experience

Converting the Potwisha campground to a day use area or a new visitor center would unavoidably change camping in the foothills since this is the major foothills campground.

Special Use Permits

Removing the Boy Scout camp would unavoidably affect the regional Boy Scouts and others who use the facility annually.

Relationship of Short-term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

This section discusses the effects of short-term use of resources resulting under any of the alternatives on the long-term productivity of vegetation and wildlife.

Human uses throughout the parks could have negligible to minor impacts on wildlife productivity. Visitor impacts would be confined and controlled to reduce impacts on vegetative productivity in the high-use frontcountry and development zones. Backcountry access to some areas would be limited periodically to protect wildlife habitat, particularly for special status species. The potential effects of water withdrawals on short- and long-term productivity of sequoia groves would be monitored and studied under all alternatives.

THE NO-ACTION ALTERNATIVE

Approximately 1,745 acres or 2% of the parks would be included in the development zone. Vegetation and habitat productivity would continue to be affected by these areas. Since the developed areas are so small compared to the size of the parks, there would be no overall effect on long-term productivity.

THE PREFERRED ALTERNATIVE

The development zone could increase by approximately 142 acres or 8% under the preferred alternative. If feasible, an additional high Sierra camp could have a minor impact on approximately 40 acres of vegetation and local wildlife. Peak-season water withdrawals would be limited, and additional conservation measures would be taken, thus reducing any potential effects on productivity in sequoia groves. Even with increased development, the developed areas are so small compared to the size of the parks that there would be no overall effect on long-term productivity.

ALTERNATIVE A

The development zone would decrease by approximately 435 acres or 25% compared to the no-action alternative. Reduced water withdrawals in alternative A could benefit sequoia grove productivity. Even with reduced development, the developed areas are so small compared to the size of the parks that there would be no overall effect on long-term productivity.

ALTERNATIVE C

The development zone could increase by approximately 241 acres or 14% compared to the no-action alternative. Under alternative C dispersed backcountry use could affect wildlife productivity throughout a broader area. Peak-season water withdrawals would be limited, and additional conservation measures would be taken, thus reducing any potential effects on productivity in sequoia groves. While developed areas would increase slightly, when compared to the size of the parks there would be no overall effect on long-term productivity.

ALTERNATIVE D

The development zone could increase by approximately 388 acres or 22% compared to the no-action alternative. If feasible, an additional high Sierra camp could have a minor impact on approximately 40 acres of vegetation and local wildlife, similar to the preferred alternative. Peak-season water withdrawals would be limited, and additional conservation measures would be taken, thus reducing any potential effects on productivity in sequoia groves. Even with a 20% or more increase in development, all developed areas would be so small compared to the size of the parks that there would be no overall effect on long-term productivity.

Irreversible and Irrecoverable Commitments of Resources

An irreversible commitment of resources cannot be changed once it occurs except possibly in the extreme long term; an irretrievable commitment means the resource is lost for a period of time and is unlikely to be recovered or reused. Under all alternatives, management actions would contribute to resource protection and preservation and would be expected to minimize the occurrence of irreversible or irretrievable impacts.

THE NO-ACTION ALTERNATIVE

The loss of soils and wildlife habitat would continue, primarily in areas of concentrated use and development. Limited amounts of non-renewable resources, such as rock, from local, previously impacted areas would be reused in park operations and construction projects.

Cultural resources that were removed or allowed to molder would result in irreversible and irretrievable impacts. Decisions related to the method of removal or treatment would be determined in consultation with the state historic preservation officer, and all resources would be fully documented as a mitigation strategy.

THE PREFERRED ALTERNATIVE

The loss of soils and wildlife habitat would continue, primarily in areas of concentrated use and development. Limited amounts of non-renewable resources from local, previously impacted areas, such as rock, would be reused in park operations and construction projects.

As described for the no-action alternative, cultural resources that were removed or allowed to molder would result in irreversible and irretrievable impacts. Decisions related to the method of removal or treatment would be determined in consultation with the state historic preservation

officer, and all resources would be fully documented as a mitigation strategy.

ALTERNATIVE A

The loss of soils and wildlife habitat would continue, primarily in areas of concentrated use and development. Limited amounts of non-renewable resources from local, previously impacted areas, such as rock, would be reused in park operations and construction projects.

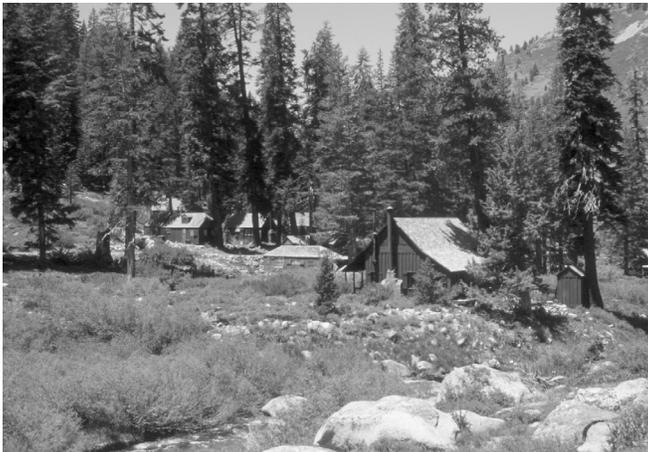
As described for the no-action alternative, cultural resources that were removed or allowed to molder would result in irreversible and irretrievable impacts. Decisions related to the method of removal or treatment would be determined in consultation with the state historic preservation officer, and all resources would be fully documented as a mitigation strategy.

ALTERNATIVES C AND D

The loss of soils and wildlife habitat would continue, primarily in areas of concentrated use and development. Limited amounts of non-renewable resources from local, previously impacted areas, such as rock and downed timber, would be reused in park operations and construction projects.

As described for the no-action alternative, removing cultural resources or allowing them to molder would result in irreversible and irretrievable impacts. Decisions related to the method of removal or treatment would be determined in consultation with the state historic preservation officer, and all resources would be fully documented as a mitigation strategy.

Consultation and Coordination



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Public Involvement History

PUBLIC SCOPING

Scoping for the general management plan began in July 1997 with newsletter 1, which briefed the public on the planning process, issues, and general information. The newsletter had a response form for people to comment about what issues they felt the plan needed to address, and it announced a series of open house type meetings at the parks. At the open houses, which were supplemented by evening campfire programs, visitors were encouraged to share views and to identify the most critical issues they felt were facing the parks. Additionally, the planning team talked with park visitors along trails and waiting in traffic queues to encourage their involvement.

During the summer of 1997 meetings were held specifically to reach park visitors. They were held July 31 at Giant Forest / Dorst; August 1 at Ash Mountain / Potwisha; August 2 at Mineral King (which had an additional meeting at the Mineral King District Association picnic); August 3 at Grant Grove; August 4 at Cedar Grove; and August 5 at Lodgepole.

Newsletter 1 was reprinted in a winter version and announced informal public scoping meetings in Three Rivers, Visalia, and Clovis from February 25, 1998, to February 27, 1998.

Newsletter 1 was posted on the NPS planning web page and was made available at visitor centers throughout the parks.

As a result of the scoping process, a mailing list with around 3,700 names was developed. All newsletters and plans are posted on either the parks' Website or the NPS planning website.

Public Information Newsletters 2 and 3

Following the scoping phase, public scoping comments were summarized in newsletter 2, which was sent out in summer 1998. This newsletter also presented visions for the park,

issues, types of decisions that would have to be made, and background information about the Mineral King area. The newsletter further updated recipients about changes and plans that were underway.

Newsletter 3, published in March 1999, described a transportation study conducted in 1997–98 and a 1998 visitor satisfaction survey. It also summarized the finding of a 1998 study to determine the eligibility of Mineral King Road corridor for the National Register of Historic Places as a cultural landscape. This newsletter announced public planning workshops that would be held in April 1999 throughout California to help generate a range of management alternatives for the general management plan.

Planning Workbook / Newsletter 4

To prepare the public for the public workshops, a large format, 24-page workbook was distributed. This workbook described the planning process; introduced management zoning; reiterated the mission, purpose, and significance of the parks; touched on other factors affecting management (such as laws, policies, and special designations); and presented a brief timeline for the parks. The main part of the workbook consisted of discussions of the issues and tradeoffs, along with GIS maps illustrating conditions. The workbook contained a response form, and 745 responses were received and were put into a database, along with transcripts of written comments.

Workshops to Generate a Range of Alternatives

During 1999 public workshops were held in San Francisco and Sacramento on April 17; in Bishop on April 18; in Los Angeles on April 19, in Three Rivers on April 20; in Visalia on April 21, and in Fresno / Clovis on April 22. Attendees worked in groups to develop a parkwide

vision, and then a vision for a developed area of their choice. Over 300 people attended the meetings. While each meeting had its own character, several workshops had sufficient time for groups to present their ideas and every workshop displayed what all groups or individuals had produced. All ideas from maps and sheets were recorded.

Newsletter 5 — The Range of Alternatives

In the winter of 2000 an informational newsletter was sent out to describe the range of four alternatives that would be assessed in the draft environmental impact statement. The alternatives were based on the range of ideas proposed by the public at the alternatives workshops. The newsletter did not include a preferred alternative, which was to be developed during the course of the environmental analysis.

The newsletter also presented parkwide zoning prescriptions that told what could happen in each type of zone. Visions for both parks and for specific areas were described, followed by related actions that would take place. An accompanying foldout with alternative zoning maps allowed readers to compare the alternatives.

Newsletter 5 was also sent to people on mailing lists for the wilderness stewardship / stock use plan and those with commercial permits.

Newsletter 6 — Status

In late fall 2000 a status newsletter was sent out that included a number of announcements as well as a discussion about designated wilderness. The newsletter announced that summary newsletters would be sent to everyone on the mailing list, but that the draft environmental impact statement would be sent only to those who requested it. The draft statement would be available on the Internet, at local libraries and organizations, at the park library, and at visitor centers. Also, copies would be sent to organizations and agencies.

Newsletter 7 — Status

In spring 2002 a status newsletter was sent out with information about the new superintendent and an explanation of the delay in the draft general management plan. The newsletter described additional work on management zones, the development of a preferred alternative, and mapping for the plan. The newsletter also asked recipients to let the planning team know if they wanted a paper copy of the document rather than a CD ROM version,

NATIVE AMERICAN CONSULTATIONS

During July 1999 Native American consultations were held on both sides of the Sierra Nevada (see appendix D for a report). Government-to-government communication has continued throughout the plan's progress, and detailed records have been kept of all consultations with Native American groups. Discussion topics have included:

- Why the park needs to have a new general management plan in light of the outdated status of the plan that is now in place.
- The way the NPS planning process works.
- The need and desire to share information, such as where traditional plant-gathering areas might be in the parks as ethnographic resources, and what NPS research on resources might be relevant to American Indian perspectives.
- How to provide convenient access for tribal members to enter the parks without paying the visitor-use fee when coming in for traditional cultural purposes.
- The need for effective procedures to keep communicating on a government-to-government basis at various stages in the planning process, and to ensure tribal representation in the process, including on-site park visits of tribal officials and elders.

Park staff recognize the need for the tribes and the park to share background information about each other's cultural perspectives. It is recognized that traditional plant-gathering areas are

important for such purposes as basket-making. With sharing in mind, follow-up telephone calls have regularly been made to invite the tribes to comment and share concerns at pertinent stages in the planning process, such as upon the range of draft management alternatives. Tribal relationships with traditional lands within the parks will continue to be the subject of regular government-to-government communication between the parks and interested tribes.

AGENCIES CONSULTED

Park staff consulted with the Bureau of Land Management. Consultations with the staff from the U. S. Forest Service and Giant Sequoia National Monument have included meeting with the planning team and participating as advisors for the monument plan.

Under the 1995 “Programmatic Agreement Among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers,” park superintendents have been delegated responsibility to consult directly with the state historic preservation office and the advisory council regarding compliance with section 106 of the National Historic Preservation Act. Official letters of notification about the start of the general management planning process were sent by the superintendent to both the state historic preservation office and the advisory council on May 18, 1999. Beginning in 1998, the park staff worked with the state office on the determination of eligibility and nomination of the Mineral King Road Cultural Landscape District to the National Register of Historic Places.

In December 1999 the planning team initiated informal consultation with the U.S. Fish and Wildlife Service with a request for a list of threatened and endangered species that may occur in the parks. A response dated February 2000 was received, and this information was used in conducting the environmental analysis.

INFORMATIONAL BRIEFINGS

During the scoping and development of the general management plan, the team or park staff briefed or met with representatives of the following stakeholders and interested parties.

Regular Briefings:

Sequoia Natural History Association
Park Concessioners
Delaware North Park Services
Kings Canyon Park Services
Cedar Grove Pack Station
Mineral King Pack Station

Special Use Permittees:

Southern California Edison
Mineral King District Association —
August 1, 1997
Boy Scouts of America

Private Landowners:

Wilsonia District Association — August 3,
1997
Silver City landowners
Oriole Lake landowners

Other stakeholders briefed on the general management plan included the following:

Backcountry Horsemen of California
California Department of Transportation
Clean Air groups
Educational institutions
Fresno County
Friends of the River
High Sierra Hikers
Local or regional business groups
Mineral King Advocates — August 1, 1997
Mineral King Preservation Society —
August 1, 1997
National Parks Conservation Association
Save the Redwoods League
Sequoia federal managers group
Sierra Club
The National Park Foundation
Three Rivers community planner
Tulare Country Historical Society
Tulare County

List of Recipients of the Environmental Impact Statement

California Congressional Delegation

Senator Barbara Boxer
Senator Dianne Feinstein

Representative Devin Nunes
Representative George Radanovich
Representative William Thomas
Representative Calvin Dooley
Representative Buck McKeon

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
Forest Service
Region 5 Office
Inyo National Forest
Sequoia National Forest and Giant
Sequoia National Monument
Sierra National Forest

Department of the Interior
Assistant Secretary for Fish, Wildlife and
Parks
United States Fish and Wildlife Service,
Sacramento
United States Geological Survey
Regional Office, Seattle
Office of the Regional Solicitor
Pacific West Regional Office
Office of the Solicitor
Washington, DC
Bureau of Land Management
Bakersfield District Office
California State Office
National Park Service
Pacific West Regional Office
Washington Office
Channel Islands National Park
Death Valley National Park
Devils Postpile National Monument
Joshua Tree National Park
Manzanar National Historic Site
Mojave National Preserve
Pinnacles National Park

Santa Monica Mountains National
Recreation Area
Yosemite National Park
Department of Transportation
Federal Aviation Administration
Western Pacific Region
Western Region
Department of Defense
Army Corps of Engineers, Lake Kaweah
Lemoore Naval Air Station
Edwards Air Force Base
China Lake Naval Weapons Center
Environmental Protection Agency
Region IX
Federal Energy Regulatory Commission

Indian Tribal Government

California Native American Heritage
Commission
Big Pine Paiute Tribe of Owens Valley
Big Sandy Rancheria of Mono Indians
Bishop Indian Tribal Council
Cold Springs Rancheria of Mono Indians
Dunlap Band of Mono Indians
Fort Independence Indian Reservation
Fort Independence Paiute Indians
Kern Valley Indian Community
North Fork Mono Rancheria
North Fork Rancheria of Mono Indians
Paiute-Shoshone of Lone Pine
Sierra Foothill Wuksachi Tribe
Santa Rosa Rancheria
Table Mountain Rancheria
Tule River Indian Reservation
Wukchumni Tribal Council

State of California

Governor Arnold Schwarzenegger
State Senator Roy Ashburn
State Senator Charles Poochigian
State Assemblyman Bill Maze
State Assemblywoman Sarah Reyes
State Assemblyman Steve Samuelian

Air Resources Board

California Environmental Protection Agency
Department of Transportation
District 6
Office of Historic Preservation
Resources Agency
Department of Fish and Game
Department of Parks and Recreation
Department of Forestry and Fire Protection
Department of Water Resources
State Water Resources Control Board

Regional, County, and Local Governments

San Joaquin Valley Air Pollution Control
District
Central Valley Regional Water Quality Control
Board

Fresno County Board of Supervisors
Inyo County Board of Supervisors
Kern County Board of Supervisors
Kings County Board of Supervisors
Tulare County Board of Supervisors

Bakersfield, Mayor of
Bishop, Mayor of
Fresno, Mayor of
Visalia, Mayor of
Fresno County Library
Inyo County Library
Kern County Library
Tulare County Free Library

Organizations and Businesses

Backcountry Horsemen of California
Bishop Chamber of Commerce
California Native Plant Society
California Nature Conservancy
Fresno Chamber of Commerce
Fresno County Audubon Society
Friends of the River
Friends of the South Fork Kings
High Sierra Hikers Association
Hume Lake Christian Camp
Mineral King District Association
Mineral King Preservation Society
Montecito-Sequoia Resort
National Parks Conservation Association
National Trust for Historic Preservation

Natural Resources Defense Council
Save-the-Redwoods League
Sequoia Forest Alliance
Sequoia Regional Visitors Council
Sequoia Riverlands Trust
Sierra Club
Sierra Los Tulares Land Trust
Three Rivers Lemon Cove Business Association
Tulare County Audubon Society
Visalia Chamber of Commerce
Wilderness Society
Wilderness Watch
Wilsonia Historic District Trust
Wilsonia Village Incorporated

Within-Parks Partners and Businesses

Boy Scouts of America, Western Los Angeles
County Council, Inc.
Cedar Grove Pack Station
Delaware North Companies Parks and Resorts
Kings Canyon Park Services
Mineral King Pack Station
Pacific Gas and Electric Company
SBC Incorporated
Sequoia and Kings Canyon National Parks
Foundation
Sequoia Natural History Association
Silver City Resort
Southern California Edison Company, Limited
Verizon California, Incorporated

Media

Associated Press — Fresno
Bakersfield Californian
Fresno Bee
Inyo Register
Kaweah Commonwealth
Los Angeles Times
Sacramento Bee
San Francisco Chronicle
Visalia Times—Delta

Comments and responses on the *Draft Environmental Impact Statement* are included in volume 3.

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*Appendixes, Glossary, Bibliography,
Preparers, Index*



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Appendix A: Laws and Executive Orders

- September 25, 1890** — Sequoia National Park established, including only the drainage of the South Fork of the Kaweah River — Garfield Grove and Hockett Meadow (26 Stat. 478, 16 USC 41).
- October 1, 1890** — General Grant National Park established. Sequoia boundary modified to include Giant Forest and its surroundings (26 Stat. 650).
- 1907** — Permit granted to construct Kaweah no. 3 hydroelectric plant.
- May 1913** — 50-year permit granted by secretary of the interior for operation of Kaweah no. 3.
- July 3, 1926** — Sequoia National Park expanded to Sierra Nevada crest, adding Kern Canyon and Mount Whitney areas. Mineral King Valley is excluded and declared Sequoia National Game Refuge (44 Stat. 818).
- March 4, 1940** — Kings Canyon National Park established by Congress and boundary is expanded to approximate present condition (54 Stat. 41, 16 USC 80a).
- June 21, 1940** — Presidential proclamation adds land in Redwood Canyon (~10,000 acres) to Kings Canyon National Park (54 Stat. 2710).
- December 21, 1943** — Act to authorize acquisition and addition of land now used for the Buckeye housing area to Sequoia National Park, including land exchanges with Southern California Edison Company (57 Stat. 606).
- July 21, 1949** — Sequoia National Park boundary changed pursuant to 1943 statute.
- October 19, 1951** — Sequoia National Park boundary changed pursuant to 1943 statute.
- August 14, 1958** — About 10 acres of Sequoia National Park (Cabin Cove) transferred to the Sequoia National Game Refuge, within Sequoia National Forest (72 Stat. 604, 16 USC 45a-3). Summit Meadow transferred to Sequoia National Forest (72 Stat. 616). About 210 acres of Sequoia National Forest lands at Big Stump added to Kings Canyon National Park (PL 85-666, 72 Stat. 617).
- June 21, 1963** — Secretary of the interior is authorized to permit continued operation of Kaweah no. 3 (PL 88-47).
- August 6, 1965** — Tehipite Valley (2,659 acres) and floor of the Kings Canyon (2,879 acres) transferred to Kings Canyon National Park from Sierra National Forest and Sequoia National Forest, respectively (PL 89-111, 79 Stat. 446).
- 1976** — Sequoia and Kings Canyon National Park designated an international biosphere reserve.
- November 10, 1978** — Mineral King Valley (Sequoia National Game Refuge) added to Sequoia National Park (PL 95-625).
- September 28, 1984** — California Wilderness Act of 1984 establishes Sequoia/Kings Canyon Wilderness; transfers Chimney Rock (also known as the Jennie Lakes addition) to Kings Canyon National Park (PL 98-425, 98 Stat. 1619).
- June 19, 1986** — Secretary of the interior is authorized to permit Kaweah no. 3 to operate for 10 years (PL 99-338).
- November 3, 1987** — The Wild and Scenic Rivers Act (16 USC 1274(a)) is amended to add the Middle Fork and the South Fork of the Kings River, including all park segments (PL 100-150, 101 Stat. 881).
- November 24, 1987** — The Wild and Scenic Rivers Act is amended to add the North Fork of the Kern River, including all park portions (PL 100-174).
- December 28, 2000** — The secretary of the interior is instructed to acquire Dillonwood, with an automatic boundary change (PL 106-574, 16 USC 45(g)).
- December 5, 2001** — National Park Service takes possession of Dillonwood.
- December 8, 2004** — Public Law 108-447 amends Public Law 99-338 by authorizing the secretary of the interior to extend the permit for operation of SCE Kaweah [hydroelectric] Project for up to two periods of ten years each. Section 314 of the National Parks and Recreation Act of 1978 (PL 95-625; 92 Stat. 3480) is amended to remove the end date of permits for cabins in Mineral King Valley and to provide for the transfer of such permits to heirs, successors, and assigns.

Appendix B: Mission Goals for Sequoia and Kings Canyon National Parks

Mission Goals: Resource Management

Mission Goal Ia: Natural and cultural resources and associated values are protected, restored, maintained in good condition, and managed within their broader ecosystem and cultural context.

Natural Resources

Vegetation

Native plants are preserved as part of natural functioning ecosystems.

Native plant species and threatened/endangered and sensitive plant species are inventoried, monitored, protected, and restored/maintained over time.

Native plant species extirpated from the parks are restored, where feasible.

Exotic plant species and exotic plant diseases are controlled/contained, where feasible.

The giant sequoia groves — particularly Giant Forest — and the ecosystems they occupy are restored, maintained, and protected.

Plant communities that have been altered by fire suppression are restored/ maintained through restoration of the natural fire regime to the maximum extent possible.

Plant communities that have been altered by domestic grazing are restored to as natural a condition as feasible.

Areas disturbed by administrative / visitor use, past developments and construction, where feasible, are returned to natural conditions.

Vegetation in the parks' development zone is restored and/or maintained as a healthy, vigorous vegetative community that approximates the "natural" state, given the constraints of past and present human intervention, while providing as safe an environment as possible for human use and enjoyment.

Recreational pack and saddle stock will be allowed within guidelines that protect the parks' natural resources and values, the processes that shape them, and the quality of experience distinctive to them.

Aquatic and Water Ecosystems

Aquatic and water ecosystems are restored and/or maintained so that physical, chemical, and biotic processes function uninfluenced by human activities.

Aquatic environments are inventoried and classified by physical and chemical characteristics and by biotic communities present.

A long-term monitoring program is developed to record ambient conditions and to document changes and trends in physical and chemical characteristics and biotic communities.

Changes within the aquatic environments that are caused by facilities, management activities, or visitor use patterns are located and documented, and unnatural changes are mitigated.

Park waters meet applicable state and federal water quality standards.

Impacts of acid deposition and contaminants from external influences are detected, evaluated, and mitigated.

Lakes and streams with exotic trout are returned to natural conditions.

Extant native species or genetically unique groups are restored to their former range to the extent feasible.

Waters incapable of sustaining fish populations through natural reproduction will be allowed to become barren.

Wildlife

Natural populations of wildlife, in which animal behavior and ecological processes are essentially unaltered by human activities, are perpetuated.

Native animal species and threatened/ endangered and sensitive animal species are inventoried, monitored, protected, and restored/maintained over time.

Native animal species extirpated from the parks are restored, where feasible.

Exotic animal species are controlled/ contained, where feasible.

Interactions between wildlife and people are mitigated, where feasible.

The natural distribution, ecology, and behavior of black bears and other native species are maintained/restored and free of human influences.

Air Resources

Air quality is returned to natural conditions.

Facilities and management activities are in compliance with the Clean Air Act and state and local air quality policies.

Impacts and levels of park air pollution are monitored.

Park staff, visitors, the public, and regulatory agencies are educated about park air quality.

The parks participate in federal, state, and local regulatory actions that affect the parks.

Effects of anthropogenic climatic change on ecosystems are minimized.

The natural ambient appearance of the night sky is maintained in all areas of the parks' natural zone. No native plant or animal populations are adversely affected by artificial lights within the parks.

The natural ambient soundscape (the absence of human-caused sounds) is maintained throughout the parks' natural zone. Within developed areas or areas of primary park features, human-caused noise is limited to daytime hours and is of a level, frequency, and duration that does not adversely impact national park values. No native plant or animal populations are adversely affected by human-caused sound within the parks.

Geological, Soil, and Paleontological Resources

Geological resources, including cave natural and cultural resources and karstic processes, which are of scientific, scenic and recreational value, are restored, protected, and maintained.

Geological processes and soils are not substantially impacted by human change.

Scientific studies and research concerning caves and karst resources and systems are conducted to increase the parks' scientific knowledge and broaden the understanding of its cave resources.

Cave natural and cultural resources, and karstic processes are preserved, restored, protected, and maintained.

Opportunities for the scientific study of cave resources and systems are provided and promoted to better understand and document park cave resources and caves in general.

Educational and recreational opportunities to explore park caves are provided for the parks' visitors.

Known paleontological resources are in excellent condition.

Abandoned mined lands are closed and/or mitigated as appropriate.

Cultural Resources

Prehistoric and Historic Archeological Sites

Archeological sites are inventoried and evaluated following current standards.

Significant sites are nominated for listing on the National Register of Historic Places.

Archeological sites are inspected and monitored, with priority given to sites listed on or eligible for the national register.

Actions are taken to protect threatened or negatively affected significant sites from threats or ongoing impacts.

Historic Structures

Historic structures are inventoried and evaluated following current standards.

Significant structures are nominated for listing on the National Register of Historic Places.

Historic structures are inspected and monitored, with a priority given to structures listed on or eligible for the national register.

Actions are taken to protect threatened or negatively affected significant historic structures from threats or ongoing impacts

Eligible structures are added to the List of Classified Structures.

Objects, Archival, Manuscript Collections

Museum objects are added to the National Catalog of Museum Objects within the parameters of the parks' "Scope of Collections."

Archival and manuscript collections are increased within the parameters of the parks' "Scope of Collections."

Material weaknesses are addressed in a timely fashion.

Consultations required by the Native American Graves Protection and Repatriation Act have been completed.

Cultural Landscapes

A cultural landscape inventory is undertaken for all developed areas within the parks.

All cultural landscapes are evaluated for eligibility for listing on the National Register of Historic Places.

Cultural landscapes eligible for the national register are nominated and listed.

Cultural landscapes are inspected and monitored.

Actions are taken to protect threatened or negatively affected significant cultural landscapes from threats or ongoing impacts.

Ethnographic Resources

An ethnographic overview is prepared.

Ethnographic sites are recorded in the cultural sites inventory once the component is established.

Ethnographic sites are inspected and monitored.

Actions are taken to protect threatened or negatively affected significant ethnographic resources from threats or ongoing impacts.

Mission Goal Ib: Legally designated and protected wilderness is managed to meet the standards and ideals of the Wilderness Act and as a component of a larger regional wilderness area.

Natural resources within wilderness areas are restored where feasible to natural conditions.

Natural resources within wilderness areas are managed to preserve wilderness character.

Cultural resources within wilderness areas are managed so as to not adversely affect their known or potential status for listing on the national register, while preserving wilderness character.

Mission Goal Ic: The parks contribute to knowledge about natural and cultural resources; management decisions about resources and visitors are based on the best available scholarly and scientific information.

Natural Resources

A thorough knowledge of the state of the parks' natural resources is acquired over time.

Scientific research that promotes an understanding of the parks' resources and the impacts that affect those resources is encouraged.

The general ecosystem elements and processes of the parks, the natural forces controlling them, and the potential for human activities to affect them are understood, using the best available knowledge.

A long-term ecological monitoring program, including vital signs and a complete inventory of the parks' natural resources, is implemented.

Giant sequoia ecology and the impacts of human activities on the trees and the ecosystem they inhabit are known, based on the best available knowledge.

Current and potential effects on the parks' natural resources from external stressors, including exotic organism invasions, air pollution, anthropogenic global change, and boundary/island effects are understood, using the best available knowledge.

An information storage and analysis system that effectively and efficiently provides the parks with accurate and comprehensive parks' natural resources information is developed.

Significant natural resource information is made available to visitors, the public, and the park staff.

Cultural Resources

A thorough knowledge of the state of the parks' cultural resources is acquired over time.

Scientific research that promotes a better understanding of the parks' cultural resources and museum collections is encouraged.

A long-term monitoring plan for the parks' cultural resources, including recognition of vital signs, is developed.

Current and potential impacts that adversely affect, or have the potential to adversely affect, the parks' cultural resources or museum collections are known and understood, using the best available knowledge.

Databases involving the parks' cultural resources and museum collections are maintained and updated.

All research affecting the parks' cultural resources or museum collections is published or

made available to the public through other appropriate media.

MISSION GOALS: VISITOR EXPERIENCE

Mission Goal IIa: Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.

Visitor and employee safety and health are protected.

Park recreational uses are promoted and regulated. Basic visitor needs are met, in keeping with the parks' purposes.

New and remodeled buildings, outdoor developed areas, and features are accessible to all visitors, including those with disabilities, in compliance with federal standards. However, it may not be possible to make all sites or historic buildings accessible because the required changes would affect the integrity of the feature or the historic structure. In these cases interpretive brochures or programs could help convey an experience to visitors.

Mission Goal IIb. Park visitors and the general public understand and appreciate the preservation of the parks and their resources for this and future generations.

Visitors understand and appreciate park values and resources and have the information necessary to adapt to the park environments. Visitors have opportunities to enjoy the park in ways that leave park resources unimpaired for future generations.

Park use and development are designed or managed to conserve park resources in an unimpaired state and to ensure that visitors continue to have the opportunity for high-quality experiences.

Mission Goal IVa. Sequoia and Kings Canyon National Parks use current management practices, systems, and technologies to better preserve park resources and to better provide for public enjoyment.

Facilities in all zones comply with the local expression of the parks' architectural guidelines; facilities in the backcountry reflect a primitive character.

Park staff work with appropriate experts to make the parks' facilities and programs sustainable.

New and remodeled buildings and facilities reflect the NPS commitment to energy and resource conservation, as well as durability.

Park staff support and encourage suppliers, permittees, and contractors to follow sustainable practices.

Utilities are limited to those determined to be necessary and appropriate for each site. Services are provided in the most efficient and sustainable way possible, and utilities are located in such a manner that conserves park resources in an unimpaired state and that is inconspicuous. Related aboveground elements and access points are screened from visitors wherever possible.

Facilities and park development meet minimum Leadership in Energy / Environmental Design (LEED) standards.

Appendix C: Cultural Resources in Sequoia and Kings Canyon National Parks

Archeological and Ethnographic Resources

Parkwide surveys and consultations for archeological and ethnographic resources, respectively, have not occurred. In the backcountry 26 archeological sites have been recorded that show obsidian fragments. The presence of obsidian tools, which were highly prized for their sharpness, suggests trade since mineral analysis of the obsidian shows that some of it came from distant sources (Roper Wickstrom 1992). Sites in east-west passes like Taboose Pass in Kings Canyon National Park suggest trade routes as well as the presence of women with children accompanying the men hunters because grinding stones indicate food preparation associated with stone structures thought to have served as hunting blinds as well as temporary shelters. At least one site suggests evidence of use over many years because of the range of artifacts, from prehistoric stone tools to 19th century trade beads, with dates ranging from 1200 B.C. to A.D. 1850.

The Groenfeldt archeological site was added to the National Register of Historic Places on March 30, 1978, and Hospital Rock on August 29, 1977. The latter has ethnographic as well as archeological significance and merits a nomination amendment for eligibility evaluation as a possible traditional cultural property.

The Native American consultations report (see appendix D) discusses the mutual idea of identifying certain plant gathering areas in the parks important to neighboring American Indian tribes. Other types of possible ethnographic resources, including sacred sites and places for the indigenous use of fire as an environmental management tool, were not brought up as points of discussion and importance by the tribes consulted. Such topics are appropriate for continued Native American consultations, as well as whether certain ethnographic resources might be eligible for traditional cultural property status on the National Register of Historic Places.

List of Classified Structures

Ash Mountain
Entrance Sign
Garage 296

Garage for Residence 92 & 100
Garage for Residence 93 & 94
Garage for Residence 96
Gas Station
Residence 5 and Garage
Residence 7
Residence 9 and Garage
Residence 12 and Garage
Residence 14
Residence 15 and Garage
Residence 16
Residence 17A
Residence 29
Residence 64 and Garage (also for Residence 63)
Residence 77 and Garage (also for Residence 78)
Residence 88 and Garage (also for Residence 87)
Residence 91 and Garage (also for Residence 90)
Residence 95 and Garage
Residence 97 and Garage
Residential Area Rock Work
Sycamore Village Store House
Sycamore Village Store House
Sycamore Village Recreational Hall
Sycamore Village Tack and Hay Storage
Backcountry
Barton-Lackey Cabin
Cabin Creek Ranger Residence
Cabin Creek Dormitory and Garage
Cloud Canyon Shorty Lovelace Cabin
Gardiner Creek Shorty Lovelace Cabin
Granite Pass Shorty Lovelace Cabin
Hockett Meadow Ranger Station
Hockett Meadow Tack-Storage Room
Kern Canyon Ranger Station
Kern River Trail Bridge
Lewis Camp Irrigation Canal
Muir Hut
Quinn Ranger Station
Pear Lake Ski Hut
Redwood Meadow Ranger Station
Redwood Meadow Tack-Storage Cabin
Redwood Mountain Ranger Station
Redwood Mountain Equipment Storage
Sawmill Site Ditches
Smithsonian Institution Shelter
Tyndall Creek Shepherd's Cabin
Woods Creek Shorty Lovelace Cabin
Vidette Meadow Shorty Lovelace Cabin
Cedar Grove
Knapp Cabin

Ranger Station
 Storage Shed

Crystal Cave
 Barrier Gate
 Comfort Station & Generator
 Trail

Generals Highway
 Clover Creek Bridge (Lodgepole)
 Generals Highway
 Hospital Rock Automobile Watering Stations
 Hospital Rock Stone Steps
 Hospital Rock Stone Water Fountain
 Marble Fork Bridge (Lodgepole)
 Silliman Creek Culvert
 Tunnel Rock

Giant Forest
 Cattle Cabin
 Colony Mill Road
 Giant Forest District Ranger's Residence
 Giant Forest Market
 Moro Rock Comfort Station
 Moro Rock Stairway
 Squatter's Cabin
 Tharp's Log
 Village Comfort Station

Grant Grove
 Chief Ranger's Horse Barn
 Chief Ranger's Residence
 Gamlin Cabin
 Old Superintendent's House
 Warehouse and Maintenance Shop

Mineral King
 Alles Cabin
 Atwell Mill Ranger Station
 Atwell Mill Ranger Station Garage

Lodgepole
 Carpenter's Shop
 Comfort Station
 Comfort Station and Showers
 Residence 81
 Residence 82
 Residence 85

Lost Grove Comfort Station
 Wolverton
 Residence 89

Cultural Landscape Inventory

The Cultural Landscape Inventory (CLI) is an evaluated inventory of all cultural landscapes in which the National Park Service has or plans to acquire any legal interest (“evaluated” means that the inventory focuses on National Register eligible landscapes). The purpose of the CLI is to identify, document, analyze, and evaluate cultural landscape resources in a concise manner, with sufficient information for a National Register determination of eligibility. The CLI does not make treatment recommendations, and it can address a landscape (e.g., an entire park) or a component landscape (e.g., a section of a park). CLI levels serve various purposes, as described below:

- Level 0** — Includes preliminary identification of landscapes and component landscapes within a park, identification of immediate threats to cultural landscape resources, and a determination of cultural landscape inventory priorities.
- Level 1** — Includes a reconnaissance survey of a specific landscape or component landscape, basic overview of cultural landscape resources, and preliminary assessment of significance sufficient to determine if a level 2 evaluation is needed. Level 1 involves a brief site visit and use of existing documentation.
- Level 2** — Includes identification and analysis of significant landscape characteristics and preparation of statement of significance, condition assessment, and integrity evaluation. Level 2 also includes an analysis of the history of landscape treatment and provides information for National Register of Historic Places determination of eligibility. Level 2 involves historical research and fieldwork.
- Level 3** — Includes description, analysis, and evaluation of a specific landscape feature.

TABLE C-1: CULTURAL LANDSCAPE INVENTORY, SEQUOIA AND KINGS CANYON NATIONAL PARKS

Inventory Unit	Level 0	Level 1
Ash Mountain	x	x
Atwell Mill campground	x	
Barton Lackey complex	x	
Bear Paw Meadow	x	
Buckeye Flat campground	x	x
Buckeye housing area	x	x
Cedar Grove ranger station	x	
Colony Mill Road	x	
Crystal Cave developments	x	x
Dillonwood	x	
Early trail system	x	
High Sierra Trail	x	
Muir Trail	x	
General Sherman Tree area	x	
Generals Highway	x	x
Giant Forest	x	x
Grant Grove	x	x
Hospital Rock	x	x
Kern ranger station	x	
Lodgepole	x	x
Middle Fork Canyon hydroelectric developments	x	
Mineral King Historic District	x	
Potwisha campground	x	x
Sycamore CCC Camp	x	x

Appendix D: Native American Consultations

By

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SUMMARY

Various American Indian tribes have occupied over time or are contemporary neighbors of the lands that now comprise Sequoia and Kings Canyon National Parks, California. As part of its ongoing planning, the National Park Service (NPS) conducted consultations with affiliated tribes (Steward 1935; Herron 1980; Elsasser 1988) on both sides of the Sierra Nevada during the week of July 11, 1999. The results of these meetings are outlined in the present report.

During these consultations, American Indians spoke of two major ideas for NPS consideration. The first is for interested tribes and the NPS to share information for their mutual benefit about areas in the parks where certain plants that continue to be used traditionally grow, including interest in sharing fire expertise and receiving advice on instituting a tribal prescribed fire program.

The second is to pursue the construction of a traditional Indian village in the parks for visitor education. Visitors would interact at this “village” to learn about American Indian beliefs as well as certain aspects of the traditional material culture such as tool production and the use of particular items of everyday life. These key ideas are delineated below along with other concerns heard during the consultation trip.

NOMENCLATURE

The term *American Indian* is employed in this report if a particular people’s tribal name is not mentioned,

such as the Sierra Foothills Wuksachi. Taken from federal law and executive orders, the broader term *Native American* is used when referring to the process of conducting consultations. *Native American consultations* nationwide include American Indians and other Native Americans such as Alaska Natives and Native Hawaiians.

PURPOSE OF TRIP

The purpose of Native American consultations in this instance was to seek information for park planning and to build better relationships among the neighboring tribes and the two parks. Input specifically was sought for the ongoing general management plan underway for Sequoia and Kings Canyon National Parks and the environmental impact statement that will accompany it (GMP/EIS).

During the July 1999 trip, the National Park Service conducted Native American consultations on the east and west sides of the Sierra Nevada at the request of Michael J. Tollefson, then superintendent of Sequoia and Kings Canyon National Parks. The National Park Service recognizes that indigenous peoples may have traditional interests and rights in lands now under NPS management, as well as concerns and contributions to make for future park management plans. In general, Native American consultations are required by various federal laws, executive orders, regulations, and policies. They are needed, for example, to comply with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, most recently in 1992. Implementing regulations of the

Council on Environmental Quality for the National Environmental Policy Act of 1969 (NEPA) also call for Native American consultations.

Information was sought on this trip about past and present American Indian links to the two parks. Queries were made about possible ethnographic resources within the parks. Ethnographic resources consist of features of the landscape that are linked by members of a contemporary community to their traditional ways of life. Such linkage would include social practices, cultural values, and intellectual beliefs of a group or a people that are pertinent to their history, heritage, and identity. Not only may historic places and structures be included, but also natural places and materials associated with culturally defined uses. This is especially true of places where American Indians gather certain plants for personal medicinal purposes or for the weaving of baskets, as this report mentions for the Wuksachi. Natural areas may be associated with any number of traditional everyday cultural activities or with practices of special cultural significance (Nabokov et al. 1994:iii; NPS 1997d:168; NPS 1998:1, 9; Schoepfle et al. 1998:2).

The parks' then Superintendent Michael Tollefson designated Thomas L. Burge, the parks' Native American coordinator and cultural resource specialist, as his representative for the consultation meetings. During the trip Lawrence F. Van Horn assisted Mr. Burge. Dr. Van Horn is a cultural resource specialist in Planning and Design Services at the Denver Service Center of the National Park Service. On the eastern side of the Sierra Nevada, Burge and Van Horn consulted in the Owens Valley, California. On the western slope, consultations took place in the northern and southern foothills relating to the parks' geography.

Burge and Van Horn conducted small-group meetings or interviews among the eight tribes visited. Discussion was encouraged in each instance. Two interviews with former tribal chairpersons were conducted — with Terald Goodwin of Lone Pine and with Vernon Miller of Fort Independence — mentioned below. The same arrangement was true for the Wuksachi meeting. It was an extended interview with Marie Dominguez Riley, tribal chairperson; this interview lasted the afternoon of Friday, July 16, 1999.

Burge and Van Horn met and talked with a total of 33 people. For the parks' record and the possibility of follow-up communication, their names, titles or positions, and mailing addresses with telephone

numbers and electronic mail addresses, if available, are listed later in this report.

In addition to the tribes affiliated with the parks as suggested by the work of anthropologists Julian Steward (1935), John Herron (1980), and Albert Elsasser (1988) as noted earlier, Burge and Van Horn were guided in the selection of tribes and groups to contact by the California Native American Heritage Commission (McNulty 1999). The 33 persons visited and those additionally recommended to be contacted by the California Native American Heritage Commission have been put on the GMP mailing list for updated information about the plan's progress. The 33 persons visited and those recommended individuals not yet contacted are listed later in this report with their names and other communication information.

On Thursday, July 15, 1999, Ralph Moore, then the parks' wilderness coordinator, joined Burge and Van Horn. This was to the offices of the Big Sandy and North Fork Rancherías. Mr. Moore talked about parallel, ongoing efforts in planning for the back-country and wilderness areas of the parks, and he invited future communication about these areas of the parks.

Related to tribal sovereignty, the meetings were mainly intended to represent government-to-government communications, which are conducted with federally recognized tribes. In practice, all but one of the meetings represented in this report were conducted with federally recognized tribes. The Sierra Foothills Wuksachi Tribe of the Western Mono or Monache people on the western slope of the Sierra Nevada was the one tribe consulted that is not currently federally recognized. The latter consultation was conducted as a matter of courtesy and policy (NPS 2001c). In past years, the tribe has lent its name to the Wuksachi village development and participated in the 1999 Memorial Day opening ceremonies of this new lodging and dining hotel complex for visitors in Sequoia National Park. The Sierra Foothills Wuksachi Tribe is in the process of seeking federal recognition from the Bureau of Indian Affairs.

The list below indicates whether officers and tribal council members or staffers of the tribal government were present plus tribal community members. In addition, two former tribal chairpersons were met with individually and interviewed as elders of their respective tribes. These were Vernon Miller, former tribal chairperson of the Fort Independence Indian Community of Paiute Indians, and Terald Goodwin, former tribal chairperson of the Paiute-Shoshone Indians of the Lone Pine Community. By way of

example of a meeting, Neddeen Naylor, another former tribal chairperson of the Paiute-Shoshone Indians of the Lone Pine Community attended the main meeting held with the Lone Pine Community, which was hosted by Irene Button, treasurer of the Paiute-Shoshone Indians of the Lone Pine Community.

TRIBES VISITED

Thirteen tribal governments or groups and one Indian group associated with a museum in Bishop, California, were scheduled for consultation on the trip. The museum is known as the Owens Valley Paiute-Shoshone Indian Cultural Center, which promotes interest in Indian heritage in the Owens Valley and the surrounding mountains including the Sierra Nevada to the west. The tribal peoples affiliated with the parks were identified initially through reviewing the works of anthropologists Julian Steward (1935), John Herron (1980), and Albert Elsasser (1988), as follows: the Owens Valley Paiute (including the Shoshone who migrated from the Great Basin and joined the Paiute in the Owens Valley), the Yokuts, the Tubatulabal, and the Western Mono (also known as the Monache people). The Wuksachi Tribe is a band or division of the Western Mono people. Different bands or divisions of these peoples constitute various tribal governments or organizations today, as can be seen in the two lists that follow of the tribes visited on this trip and those not yet visited.

It is believed that Mono people at some point about 500 years ago crossed the Sierra Nevada from the east and settled on the western slope (Elsasser 1988:26). They are known today generally as the Western Mono or Monache people. The Paiute and Shoshone remained on the eastern slope with the result that the Owens Valley Paiutes speak Eastern Mono. The Eastern Mono and Western Mono languages today remain mutually intelligible to some extent (Shiple 1978:88; Elsasser 1988:26). This was confirmed on the trip by Paiute elder Neddeen Naylor at Lone Pine.

Western Mono and Eastern Mono peoples are members of the Uto-Aztecan family of American Indian languages. Tubatulabal and Western Shoshone (also known as Newe) are too (Crum 1994:11). In contrast, the “westside” Yokuts of Table Mountain and Tule River are Yokutsan speakers of the Penutian language family (Shiple 1978:83).

Eight tribal governments were visited. An asterisk (*) beside a tribe’s name in the list below signifies two things: (1) that the tribe is federally recognized and

thus eligible to receive services from the Bureau of Indian Affairs (BIA) of the United States Department of the Interior, and (2) that the meeting with this tribe had government-to-government status consistent with recognized levels of tribal sovereignty. The federally recognized tribal names shown in this report are given as officially listed in the *Federal Register* 65, no. 49 (Mar. 13, 2000): 13298–303).

Eastern Slope of the Sierra Nevada

*Big Pine Band of Owens Valley Paiute-Shoshone Indians of the Big Pine Reservation, California (population 403). Present: Janet Gutierrez, tribal vice chairperson; Alan Bacock, environmental planner of the tribal staff; and community members Jeanette Negrete, Dorothy Stewart, and Richard Stewart. Matthew Morales, a graduate student in social science from Northern Arizona University, Flagstaff, Arizona, also attended. He lived in the Big Pine community the summer of 1999.

*Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation, California (population 58). Present: Wendy Stine, tribal chairperson; Michael Swift, tribal vice chairperson; and Pearl Symmes Budke, community member. Vernon Miller, former tribal chairperson, was interviewed separately at the Eastern California Museum, an opportunity arranged by Bill Michael, director.

*Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California (population 235). Present: Irene Button, treasurer; Neddeen Naylor, former tribal chairperson; community members Ann Marie Astills, Leslie Button, Eugene Button, Bruce Cotton, and Frank Diaz. Terald Goodwin, former tribal chairperson, was interviewed separately at his home.

Western Slope of the Sierra Nevada

*Big Sandy Rancheria of Mono Indians of California (includes members of the Western Mono or Monache people, population 108). Present: Tribal staffers Wiley Carpenter and Kathlien Childers, manager and environmental specialist, respectively, Environmental Programs Office of the tribe; and Michelle LeBeau, community member and attorney at law.

*Cold Springs Rancheria of Mono Indians of California (a division of the Western Mono or Monache people, population 163). Present: Tribal staffers Lonnie Bill and Virgil Lewis, environmental coordinator and environmental assistant, respectively.

*North Fork Rancheria of Mono Indians of California (a division of Western Mono or Monache people, population 75). Present: Delores Roberts, tribal chairperson; and tribal council members Barbara Coleman, Connie DeSilva, Alvin McDonald, Ron Roberts, and Juanita Williams.

Sierra Foothills Wuksachi Tribe (a division of the Western Mono or Monache people, population 100). Present: Marie Dominguez Riley, tribal chairperson.

*Tule River Indian Tribe of the Tule River Reservation, California (includes members of the Yokuts people, population 803). Present: Alec Garfield, tribal council member; and Ken Cauwet, development manager of the tribal staff.

FURTHER CONSULTATION

Appointments with six of the fourteen tribal entities identified prior to the trip could not be scheduled. These six are listed below. Federal recognition is indicated by an asterisk (*) beside a tribe's name. Further communication is called for in conjunction with the need for ongoing Native American consultations.

Eastern Slope of the Sierra Nevada

Kern Valley Indian Community (also known as the Tubatulabal Tribe, population 400)

Owens Valley Paiute-Shoshone Indian Cultural Center (population not applicable)

*Paiute-Shoshone Indians of the Bishop Community of the Bishop Colony (population 1,437)

Western Slope of the Sierra Nevada

Dunlap Band of Mono Indians (population unknown)

*Table Mountain Rancheria of California (of the Yokuts Tribe, population 81)

Wukchumni Tribe (of Mono Indians, population unknown)

AMERICAN INDIAN CONCERNS

American Indian concerns as encountered during the consultation meetings fall into two categories: (1) topics relevant to the general management plan (GMP) and (2) topics that can be addressed independently of the GMP through administrative means. Actions that may be proposed regarding ways the parks could be managed over the next fifteen to twenty years come under the general purview of the GMP, a planning effort currently underway for the

parks. Such proposals must go through a public input and review process before agency approval and implementation. Some topics, however, can be addressed more immediately under administrative procedures; such procedures are in support of NPS *Management Policies* (NPS 2001b).

Reconstructing an American Indian village in the parks for visitor education may be identified as a GMP issue. This idea was advanced primarily by Marie Dominguez Riley as chairperson of the Sierra Foothills Wuksachi Tribe, a western slope tribal group. Interestingly, the overall concerns with active involvement in visitor education, conducting daily arts and crafts demonstrations, and designating a meeting place or constructing a specific structure for American Indian use were also voiced by members of the Cold Springs Mono Rancheria and the North Fork Mono Rancheria.

Additionally, the ongoing preparation of the parks' fire management plan was discussed with each group or individual during the course of the consultation meetings. The planning process, legal sideboards, and a fire fact sheet were discussed briefly. Direct comments on any aspect of the parks' fire management program were solicited. Marie Dominguez Riley expressed clear interest for the Sierra Foothills Wuksachi. She related that tribal members were most familiar with area United States Forest Service lands but would want to work closely with Sequoia-Kings Canyon planners to help identify park areas for possible access, use, and gathering activities relative to the role of fire, or even planning for fire suppression activities. She noted that her group's interest could include such things as protecting or encouraging the growth of sedges or acorns.

A member of the Big Pine Paiute community (Richard Stewart) supported the use of prescribed fires and noted that they can be an avenue for assistance, employment, or interpretation opportunities for tribal members. Several members of the Tule River Indian Tribe voiced interest in pursuing opportunities for training partnerships with the NPS in a variety of areas including fire management and fire suppression. It was suggested that the Intergovernmental Transfer Act may be a mechanism to share expertise and advance training opportunities. North Fork Mono Rancheria attendees similarly expressed interest in sharing expertise and receiving advice on instituting a tribal, prescribed fire program.

The desire to share with the NPS American Indian knowledge about continuing traditional uses of various plants and their locations in the parks, and in

turn for the NPS to share resource management strategies and research information (including fire management planning efforts) with interested tribes concerning such locations, are appropriate GMP topics. Such areas might be zoned in the GMP as suitable for certain activities and not others, or for certain levels of activities, including gathering and prescribed burning. This was another idea articulated by Marie Dominguez Riley. In practice, the parks' continuing Native American consultations would serve to gather specific information about the places in the parks where particular plants grow, about the ongoing traditional uses of such plants, and about any special ways the plants might be harvested or picked to ensure their conservation and propagation. Access to and use of park resources is discussed in Chapters 5, 6, and 8 of the *NPS Management Policies* (NPS 2001b).

American Indian desires to sell authentic, local and regional Indian arts and crafts, such as bead work, pottery, and basketry, were expressed on both sides of the Sierra Nevada. Mention was made by Marie Dominguez Riley for the Sierra Foothills. The same interest was also brought up in discussion earlier in the trip on the eastern slope for the Big Pine Paiute people, by Dorothy and Richard Stewart, mother and son artists. This idea could be considered and encouraged administratively as it is not a GMP issue. Guidance can be found in Chapter 10 of the *NPS Management Policies* (NPS 2001b).

During the July 1999 consultations, American Indians expressed their wish that the NPS not charge affiliated Indians, in pursuit of traditional purposes, the admission fee required of visitors to enter the parks. Several tribes raised this topic, including the Sierra Foothills Wuksachi, the Tule River Tribe, and the Cold Springs Mono Tribe. Such expedited entry into the parks without fee for traditional purposes could be decided administratively and is outlined in Chapter 8 of the *Management Policies 2001* (NPS 2001b).

Questions were asked about ordinary camping and about packing horses. A Paiute woman, Wendy Stine, the current tribal chairperson at Fort Independence, wanted to know about fees and the locations of campgrounds in the parks to camp overnight with her family. A Shoshone man, Terald Goodwin, a former tribal chairperson at Lone Pine, has packed horses commercially in the past for backcountry visitors. He would enter the Sierra Nevada from the eastern side through United States Forest Service (USFS) land in the southern part of the Owens Valley and end up in Sequoia National Park. He maintains a few horses

today in Lone Pine where he runs a recycling business. He entertains the idea of packing horses again after retiring from recycling. He wanted to be reassured that he could go back to packing horses. He would need to familiarize himself with the packing and backcountry regulations and permit requirements of the two different agencies, the USFS and the NPS. The fact that a person, who happens to be the chairperson of a tribal council on the eastern slope of the Sierra Nevada (Fort Independence), asked a general-information question about family camping spots, and their rules and fees, suggests that such information about the parks could be more widely distributed. But there are no GMP or administrative issues here concerning these two inquiries.

The Paiute Tribe at Big Pine and the Wuksachi Tribe at Sanger expressed a desire for more active participation in park interpretation programs. The expressions were made by Dorothy Stewart and her son Richard Stewart for the Paiute and by Marie Dominguez Riley for the Wuksachi. Pertinent questions were raised along with several examples of how to better include the historic and contemporary roles of Indian peoples into the parks' interpretive efforts. The questions dealt with interpreting "Whose history?" and "Whose culture?"

An example of how the scope of interpretation could be broadened was offered by Marie Dominguez Riley in noting that her grandfather was very active in logging activities in the Converse Basin area adjacent to the Grant Grove area of Kings Canyon National Park. Marie suggested that this story, and similar stories about the Indian presence in historic logging operations, could be added to existing interpretive work. She noted, too, that ceremonial activities still occur in the nearby federal forest and park areas, such as the recent efforts to bring closure to the Ghost Dance of 1870 in the Eshom Valley, a historic ceremony that had been disrupted by non-Indians in the late 1800s (Gayton 1930). The Eshom Valley of Eshom Creek is east of the village of Badger on the western side of the Sierra Nevada and west of the boundary between Kings Canyon National Park and Sequoia National Park that is in the Redwood Canyon area of Redwood Creek.

In moving towards the idea of involving American Indians more directly in interpretive efforts, it was noted that "higher ups" (those who make and affect decisions) should be involved in future meetings. It was noted further that the NPS should make real efforts to find support monies to facilitate American Indian involvement, such as travel expenses and stipends for elders. Several members of the Big Pine

Paiute Tribe voiced similar concerns with not only increasing the involvement of American Indians in the parks' interpretation efforts, but also they underscored that the parks' efforts often miss the "living," contemporary aspect of local cultures. An extension of the idea of more direct interpretive involvement was a desire to see a substantial effort to involve Indian youth in park educational programs. A strong desire for "partnerships," or opportunities to cooperate with the National Park Service, emerged, especially from the Big Pine Paiute community. Attendees from the Tule River Indian Tribe also noted an interest in tribal involvement in interpretation.

The idea that many members of the general public are often surprised that American Indian groups are "still here" and fully active in the modern world surfaced, too. This occurred in the conversations at the North Fork Mono Rancheria and the Cold Springs Mono Rancheria. They are survivors on lands not too far from those they occupied at European contact. It was noted at several of the meetings that the parks' interpretive program could be one way to raise the visibility of contemporary area Indian groups, perhaps by way of the parks' maps and brochures.

New opportunities need to be created, it was said, for American Indians to contribute to interpretive content on Indian history and culture in the area and, if possible, to interact with visitors as paid interpretive guides. The latter could appropriately be implemented at Wuksachi village (a commercial, concession-run facility) in Sequoia National Park, as outlined by Marie Dominguez Riley, as the area is part of the Wuksachi traditional territory. Further, it was felt that the concession facility could lend itself to American Indian-led talks and craft demonstrations. Chapter 7 of the *Management Policies* outlines appropriate mechanisms for such consultation and demonstration work (NPS 2001b).

As an example of material for interpreting Indian use of trails through the high Sierra Nevada, Dorothy and Richard Stewart told of one of their Paiute ancestors three generations ago who hiked through the mountains as a young man as the most direct route between the two sides. He took a job in a more populous area on the west side and then returned home to the east side the same way in the same manner some time later. This brief family story is indicative of the types of oral history information still available and which could more fully inform interpretation efforts geared, especially, to the park visitor.

Seeking and incorporating more American Indian material and affording American Indians participa-

tion in interpretation could be handled now through park administrative decisions. More active participation could entail (1) increased Indian input into the content of park interpretation programs through further Native American consultations and (2) the possibility of American Indians serving as interpretive guides. The parks could investigate various sources of funding to see if the latter were financially feasible. See *Management Policies*, chapter 7 (NPS 2001b).

RECOMMENDATIONS

In the interest of maintaining and improving long-term relations it would clearly be beneficial to all concerned that the Native American consultations initiated by the parks continue. Contacts from the July 1999 trip are listed below for further communication. Several information-sharing meetings could be scheduled by park staff throughout a given year and held on both sides of the Sierra Nevada.

It is recommended that precise locations and species types of traditional plant gathering areas in the parks of the Wuksachi Tribe be investigated through further Native American consultations with the tribe and Marie Dominguez, tribal chairperson. Such knowledge could contribute to possible alternative zoning considerations in the ongoing GMP and should be reported to the GMP team. Over the long term, it is recommended that the parks continue to consult with the Wuksachi to learn more about traditional plant areas and their uses. The Wuksachi would like to share indigenous knowledge to improve park practices for plant sustainability. And the Wuksachi would like to receive the findings of any park research affecting the plant sustainability of such areas.

It is recommended that precise locations, species types, and the indigenous knowledge of traditional plant gathering areas in the parks with, minimally, the Sierra Foothills Wuksachi Tribe be investigated through further consultations. Such knowledge could contribute to possible alternative zoning considerations and management prescriptions in the ongoing GMP and should be reported to the GMP team. Additionally, the Sierra Foothills Wuksachi Tribe, in particular, would like to receive the findings of any park research affecting the plant sustainability of such areas.

Also with regard to the Sierra Foothills Wuksachi Tribe, it is recommended that the feasibility be considered of pursuing the re-construction of a traditional Wuksachi village in Sequoia National Park under one or more of the GMP alternatives.

Further Native American consultations with the Sierra Foothills Wuksachi and other interested tribal groups would be appropriate to explore.

It is recommended administratively that the NPS help interested American Indian tribes and groups arrange for and promote the sale of genuine Indian art and crafts, such as pottery, beadwork, basketry, cradleboards, dreamcatchers, and the like in the parks that are made locally and regionally. Dorothy and Richard Stewart (Paiutes) and Marie Dominguez Riley (Wuksachi) are people to talk with on this subject.

When pursuing traditional purposes, it is recommended administratively that the idea be adopted and promoted actively of not charging affiliated Indians the admission fee required of visitors to enter the parks. Expedited entry into the parks without fee for these neighboring affiliated Indians would be the goal and would articulate well with current agency policy (NPS 2001b).

By working with American Indian groups administratively, park interpretation and education programs could incorporate more information about the history and culture of the parks' Indian neighbors. It is recommended that the parks explore ways to increase American Indian participation in interpretation, including the possibility of paid interpretive guides through alternative ways of funding. Guidance in these efforts can be found in the recently updated *Management Policies* (NPS 2001b).

NATIVE AMERICAN CONSULTATION MEETINGS

The following persons were met and talked with in small groups or individually the week of July 11, 1999. (Listed alphabetically by last name.)

1. Ann Marie Astills, Community Member, Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
2. Alan Bacock, Environmental Planner, Big Pine Band of Owens Valley Paiute-Shoshone Indians of the Big Pine Reservation, California
3. Lonnie Bill, Environmental Coordinator, Cold Springs Rancheria of Mono Indians of California
4. Pearl Symmes Budke, Community Member, Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation, California
5. Irene Button, Treasurer, Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
6. Leslie Button, Community Member, Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
7. Eugene Button, Community Member, Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
8. Wiley Carpenter, Programs Manager, Environmental Programs Office, Big Sandy Rancheria of Mono Indians of California
9. Ken Cauwet, Development Manager (Non-Indian), Tule River Tribal Council, Tule River Indian Tribe of the Tule River Reservation, California
10. Kathlien Childers, Environmental Specialist (Non-Indian), Environmental Programs Office, Big Sandy Rancheria of Mono Indians of California
11. Barbara Coleman, Tribal Council Member, North Fork Rancheria of Mono Indians of California
12. Bruce Cotton, Community Member, Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
13. Connie DeSilva, Tribal Council Member, North Fork Rancheria of Mono Indians of California
14. Frank J. Diaz, Co-Chair and Community Member, respectively, Koso Native Graves Protection Association and Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
15. Marie Dominguez Riley, Chairperson, Sierra Foothills Wuksachi Tribe
16. Alec Garfield, Tribal Council Member, Tule River Tribal Council, Tule River Indian Tribe of the Tule River Reservation, California
17. Terald Goodwin, Community Member (Former Tribal Chairperson), Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California

18. Janet Gutierrez, Vice Chairperson, Big Pine Band of Owens Valley Paiute-Shoshone Indians of the Big Pine Reservation, California
19. Michelle LeBeau, Esq., Attorney at Law and Community Member, Big Sandy Rancheria of Mono Indians of California
20. Virgil D. Lewis, Tribal Environmental Assistant, Cold Springs Rancheria of Mono Indians of California
21. Alvin McDonald, Tribal Council Member, North Fork Rancheria of Mono Indians of California
22. Bill Michael, Director (Non-Indian), Eastern California Museum of Inyo County
23. Vernon J. Miller, Community Member (Former Tribal Chairperson), Fort Independence Indian Community of Paiute Indians, Fort Independence Indian Reservation
24. Matthew Morales, Graduate Student Intern (Non-Indian), Big Pine Paiute Tribe of the Owens Valley, Big Pine Indian Reservation
25. Neddeen Naylor, Community Member (Former Tribal Chairperson), Paiute-Shoshone Indians of the Lone Pine Community
26. Jeanette Negrete, Community Member, Big Pine Band of Owens Valley Paiute-Shoshone Indians of the Big Pine Reservation, California
27. Delores Roberts, Chairperson, North Fork Rancheria of the Mono Indians of California
28. Ron Roberts, Tribal Council Member, North Fork Rancheria of the Mono Indians of California
29. Dorothy Stewart, Artist and Community Member, Big Pine Band of Owens Valley Paiute-Shoshone Indians of the Big Pine Reservation, California
30. Richard Stewart, Artist and Community Member, Big Pine Band of Owens Valley Paiute-Shoshone Indians of the Big Pine Reservation, California
31. Wendy L. Stine, Chairperson, Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation, California
32. Michael D. Swift, Vice Chairperson, Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation, California
33. Juanita Williams, Tribal Council Member, North Fork Rancheria of the Mono Indians of California

Appendix E: Water and Wastewater Use

TABLE E-1: SUMMARY OF WATER USE AND ISSUES

Park Area	Ownership	Water Source / Location	Size	Water Capacity	Annual Water Use in 2000 (gallons)	Facilities and Distribution System	Comment
Kings Canyon National Park							
Cedar Grove Area							
Sheep Creek	Public	Sheep Creek	Large	86,400 gpd	43,698	165,000 gal tank, 84,000 gal backup tank, 27,000 ft distribution pipe	No backup generator. During power outages must be hand chlorinated. Main is good; galvanized steel pipe laterals should be replaced with plastic. Need use meter between tank and distribution vault. Valve boxes not secure (need concrete and vandal-resistant lids). Need new manufactured intake screen. Line from intake to tank is CCC era spiral wound steel (need replacement soon). Sand filter backwash discharge needs holding tank and leachfield.
Lewis Creek	Private	Connected to Sheep Creek	Small		11,250	2,000 gal concrete tank	Same as above.
Copper Creek	Private	Copper Creek	Small	2,880 gpd	33,100	50 gal. tank, 300 lin. ft. of distribution pipe	Rebury PE line from waterhead (only 12" deep) to prevent damage from wildlife, sun, heat, and vandalism.
Packer Dorm	Private	Kings River	Small	14,000 gpd	127,400	Tank 2,300 gal, 2,500 distribution pipe	All buried pipe is old and corroded. Laterals between source and tank – so chlorine retention times at those faucets and sprinklers are too low, and Cl residuals are too high. Electric controls for pump are at generator rather than pumphouse. Current system pulls surface water; a well is preferred.
Grant Grove Area							
Grant Grove	Public	Round Meadow artesian well near Panoramic Point road, Rona Springs, Merritt Springs, 400' well	Large	Total combined water capacity from four sources is 22.1 to 65 gpm. Normal production is 108,000 gpd; drought production 31,824 gpd. Demand projected to be 53,650 gpd. Round Meadow well capacity 7.5–25 gpm. Rona and Merritt springs combined capacity 5–8 gpm. Well capacity 32 gpm during wet weather.	8,608,000	1,200,000 gal. storage reservoir near Rona and Merritt springs; another storage reservoir 15,000 lin. ft. asbestos cement lines and thousands of feet of steel and cast iron piping.	Drought plan developed that relies heavily on storage reservoirs that must also retain a 200,000-gallon fire reserve. The storage capacity could be depleted in 55 days. Conservation measures have been taken; active measures could include closure of public showers and laundry facilities to add 33 days. 400' well likely to have water drop by as much as 70% to 9.6 gpm. Aggressive nature of water dissolves copper from pipes into water. Groundwater contamination from Wilsonia septic systems. Remaining 15,000' lin. ft. of asbestos-cement lined water mains need to be replaced; 5,000 lin. ft. just replaced. Lines located in sensitive areas. Root intrusions into water lines increase line failures.
Wilsonia	Private	11+ wells				8+ water storage tanks	No information about Masonic tract

APPENDIXES

Park Area	Owner-ship	Water Source / Location	Size	Water Capacity	Annual Water Use in 2000 (gallons)	Facilities and Distribution System	Comment
Sequoia National Park							
Dorst to Giant Forest Area							
Lost Grove	Public	Spring fed				2,200 gal tank 1,200 lin. ft. of pipeline	Nonpotable.
Cabin Creek	Public	Cabin Creek				1,000 gal tank 1,500 lin. ft. of pipeline	New waterline needed to filter building. New filtration needed.
Dorst	Public	Turkey Creek	Medium	13 gpm	647,275	50,000 gal tank 10,625 lin. ft. of pipeline	15% of distribution line needs to be replaced
Wuksachi / Red Fir						Water tank	Supplied by Wolverton
Lodgepole	Public	Surface water Silliman Creek	Large		28,951,040 (combined Lodgepole and Wolverton use)	Storage reservoir Chlorination facilities Multi-media filtration system 26,000' distribution lines	Drought plan able to keep up with demands in recent drought years. Waterhead intake damaged; sandbox leaks. Distribution lines 40 years old and damaged by roots and rock movement. Being replaced in campground area the past 3 years. Current work in tent area only.
Wolverton	Public	Wolverton Creek	Large	Capable of producing 129,000 gpd	(see above)	Four major storage reservoirs (see Pinewood, Wuksachi), Chlorination facilities Slow sand filtration plant 140,000 lin. ft. of pipelines	System serves Wolverton, Wuksachi, Giant Forest / Pinewood. Low flows to waterhead at drought times. Careful monitoring needed to meet demand. Distribution lines in Giant Forest are 60+ years old, some in sensitive natural areas that could cause major damage if need to be repaired.
Pinewood						Two 50,000 gal. tanks	Supplied by Wolverton. Tanks need to be relined.
Bearpaw (Backcountry)		Spring	Small		81,810	5,000 gal tank 2,680 lin. ft. of pipe	Nonpotable. Deteriorating walls in waterhead collection basin, which needs to be enlarged. Pipe to ranger station needs to be rehabbed, and PVC waterline to campground needs to be replaced and buried.
Crescent Meadow	Public	Creek	Medium		382,778	5,000 gal tank 13,200 lin. ft. pipe	Needs new filtration system, new storage reservoir for adequate chlorine contact time. Waterhead dam area needs the dam raised to allow for better supply of water. Pipeline has multiple areas with repairs from failures. Section to Moro Rock comfort station needs to be replaced.
Crystal Parking lot	Public	Creek fed	Medium		230,048	10,000 gal tank 2,200 lin. ft. of pipeline	Needs new filtration system to replace outdated 3M bag filters. Low flows to waterhead in drought times. Careful monitoring to meet demand and keep turbidities in compliance. Water system off line at Cave.
Foothills Area							
Buckeye	Public	New well	Medium	60 gpm	238,833	5,000 gal tank 2,532 lin. ft. of pipeline	
Hospital Rock	Public	New well	Medium	12 gpm	313,170	10,000 gal tank stor-	

Park Area	Ownership	Water Source / Location	Size	Water Capacity	Annual Water Use in 2000 (gallons)	Facilities and Distribution System	Comment
		replaced spring				age reservoir, chlorinator 1,000 lin. ft. of pipelines	
Potwisha	Public	Well	Medium		679,995	20,000 gal tank. Storage reservoir, chlorinator 1,800 lin. ft. of pipelines	New distribution lines constructed in 2001.
Ash Mountain	Public	Spring / surface water	Large	New multi-media filtration system improved water quality	10,213 (presumably total for all areas)	Storage reservoir, chlorination facilities 25,500 lin. ft. of pipelines	Drought plan developed Waterhead requires extensive maintenance because dam removed 100,000 gal. storage tank leaks and has areas of weakness For distribution system, additional 2,500 lin. ft. need to be replaced
Mineral King Area							
Atwell Mill	Public	Creek	Small	7,200 gpd	18,590	1,000 gal tank	
Cold Spring	Private	Spring	Small	26,000 gpd	46,614	5,000 gal tank	
Permit Cabins at Mineral King	Private	Various: Spring Creek (5), unnamed creek (1) Deadwood Creek (1), West Mineral King water system (29), Monarch Creek (6), CC creek (1), private springs (4) Crystal spring (1), pipe in creek of East Mineral King water system (1)					
Silver City	Private	Creek	Small	5,700 gpd	18,590	3,000 gal tank	

TABLE E-2: SUMMARY OF WASTEWATER AND SEWER FACILITIES

Facilities	Design Capacity (gallons per day) and usage	Comment
Kings Canyon National Park		
Cedar Grove Area (3,268,980 gallons of effluent in 2000); no other information provided.		
Sheep Creek	Wastewater treatment plant	55,000 gpd
Lewis Creek	Septic system	750 gpd
Copper Creek	Vault toilet	NA
Packer Dorm	Septic system	750 gpd
Grant Grove Area (5,664,618 gallons of effluent in 2000)		
Grant Grove	Collection system. 3 lift stations (Sunset, Pine Camp, Swale work center) Tertiary wastewater treatment plant.	85,000 gpd with 213 lbs/day biological oxygen demand (BOD) Summer demand is 53,650 with 134 lbs/day of BOD. Winter capacity is 42,000 gpd. 1999 flows were 11,892, with proposed increases of 12, 250 gpd for a total winter demand of 24,442 gpd.
		Performing as designed to satisfaction of Regional Water Quality Control Board. 6-8" cast-iron pipe system around 50 years old. Slip-lined in 1990s. 30 manholes repaired and grouted. Root intrusion into manholes plagues winter operations. Pine camp lift station expansion needed. Future compliance with water quality objectives in 1995 Tulare Lake Basin Waste Discharge Requirements for Grant Grove will be adopted by the Regional Water Quality Control Board. Current design is unlikely to meet standards; significant modifications will need to be budgeted and completed. It is controversial for the Visalia wastewater treatment plant to accept NPS biosolids / sludge. An alternate disposal arrangement should be researched.

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	Facilities	Design Capacity (gallons per day) and usage	Comment
Wilsonia	Approximately 235 septic systems	Undocumented	Serious water quality concerns
Sequoia National Park			
Lodgepole District (Dorst to Giant Forest) (8,833,227 gallons of effluent in 2000)			
Lost Grove	Septic tank	3,000 gal	
Cabin Creek	Septic tank	3,000 gal	
Dorst	Septic tanks Dump station	14 3,000 gal tanks; four leachfields rehabbed in 1999. 2000 gal tank; leachfield rehabbed in 1999.	Pumped annually by outside contractor with park funds.
Halstead Meadow	Vault toilet		Cleaned and pumped every two years. Sewage goes to Cover Creek plant.
Red Fir	Sprayfields for Clover Creek plant		New sprayfield, many areas with defective valves and lateral line due to inferior construction. Repairs made in 2001. 8 of 17 leachfield control valves must be replaced. Old sprayfields, repairs to main line, risers, and sprinkler heads being replaced.
Wuksachi Village	Collection system		20,000 lin. ft. of line connects to Clover Creek plant.
Clover Creek Treatment Plant at Wuksachi	Activated sludge extended aeration plant.	180,000 gpd capacity Actual demand is 70,000 gpd in summer and 20,000 gpd in winter.	Summer sludge drying beds. Winter sludge accumulated in digesters. Clear effluent to leachfields or sprayfields Dried sludge sent to City of Visalia WWTP. Winter flows have increased with addition of new concession facilities. Overhaul of headworks needed to improve operational efficiency. Winter use basins will eventually need enclosed roofs.
Lodgepole	Collection system. 2 lift stations Vault toilet in picnic area RV dump station	Cleaned and pumped every two years. Sewage goes to Cover Creek plant. 3,000 gal septic tank. New leachfield installed in 1987.	5,200 lin. ft. of line. Collection system slip lined in 1990s. Problem with runoff infiltration in the spring. Smaller booster station with larger station that pumps sewage 6,000 lin. ft. to Clover Creek plant. Pumped twice annually by contractor with park funds. No charge for use.
Wolverton	Leachfield for corral Picnic area?		NPS area has pit toilets.
Wolverton / Sherman Shuttle area	Ten-stall vault proposed (6 women / 4 men)	3,000 gal septic tank	
Sherman Tree	Current septic Four-stall vault toilet proposed	3,000 gal septic /leachfield	Sewage is being removed by pumper truck daily and transported to Clover Creek plant for processing. System to be abandoned when new vault comes on line. Vault uses evaporative process to reduce liquids.
Pinewood – supplied by Wolverton	Sewered toilet with septic tank and leachfield		2001 installation
Bearpaw – Backcountry	Septic system	3,000 gal septic	Pumped and cleaned in 1992
Giant Forest	Septic tank / leachfield for Museum area Two-stall vault proposed for Round Meadow		New tank / leachfield installed in 1999. 4 facilities (museum, residence 55, museum and lower Kaweah comfort stations) in museum area connected to system
Crescent Meadow	Existing – septic tank / leachfields at Crescent Meadow / Moro Rock Vault proposed for Moro Rock / Crescent Meadow	3,000 gal septic tank each	Moro Rock leachfield rehabbed in 1997. Winter season vault toilet at Moro Rock.
Crystal Cave	Cave system Parking lot?	5,000 gal septic tank w/spray disposal (parking lot)	Cave system leachfield is not in compliance and no longer in use.
Foothills Area			
Buckeye Campground	Septic tank	2,500 gal septic tank	Low flush toilets cause sewage flow problems in pipes going to septic tank.
Hospital Rock	Septic tank	2,500 gal	
Potwisha	Upper comfort station / septic tank Lower comfort station / septic tank RV dump station septic tank	2,500 gal tank 3,000 gal tank 4,000 gal tank	Low flush toilets cause sewage flow problems in pipes going to septic tank for both comfort stations. Dump station pumped out twice annually by contractor with park funds. No charge to visitors.
Ash Mountain Treatment Plant	11,200' collection lines 2 lift stations Activated sludge plant 2 polishing ponds	17,000 gpd inflow rating. (1,634,300 gal. of effluent in 2000)	Collection lines sliplined in 1996/97. Sludge pumped by local company and truck to Visalia wastewater treatment plant. California state standards variance for sprayfield must

	Facilities	Design Capacity (gallons per day) and usage	Comment
	Effluent sprayfield & backup		be obtained for wet and rainy seasons; new standards may require change in practices. Pumping now must occur 4-5 times annually due to increasing sewage, creating budget concern.
Buckeye Housing Area	2,700' lines Activated sludge treatment plant. Polishing pond Sprayfield	Rated at 3,600 gpd (309,800 gallons of effluent in 2000)	Aging system. Sludge pumped by local company and truck to Visalia wastewater treatment plan. Changing California standards mean effluent may soon require leachfields with sprayfields only for summer use. Backup location must be found. Pumping now must occur four times annually (rather than twice) due to changes in housing policy, resulting in process upsets and budget impacts.
North Fork	No facilities	NA	
South Fork	Vault toilet	1,000 gal septic tank for camp host	
Mineral King Area			
Mineral King	Ranger station and campground	Septic tank – 750 gal @ 50 gpd	Campground vault toilets pumped when needed
Permit Cabins at Mineral King	Information received from 48 cabins.	Individual leachfields (200-1,000 SF) and septic systems (50-1,500 gal)	Sizes of septic systems vary and are often unknown. Some septic tanks have been pumped out regularly and recently, others not. While most graywater from cabin sinks also goes to septic tanks, there are 9 cabins where graywater goes directly onto vegetation or ground surface and 8 cabins putting graywater into sumps or subsurface drain pits.
Silver City	4 government housing	1,250 gal septic tank @ 50 gpd	New leachfield Oct 2000.

Appendix F: Choosing by Advantages

CHOOSING THE PREFERRED ALTERNATIVE

The National Park Service used a decision-making process called Choosing by Advantages (CBA) to help make early, value-based decisions and to develop a preferred alternative for the Sequoia and Kings Canyon general management plan. This value engineering process is used to improve value or make selections in many types of construction and planning projects. Congress mandated a decision-making system so that logical decisions could be made and tracked, taking into account both cost-effectiveness and the NPS mission.

The CBA process was customized to meet the high level of complexity of this general management plan. Two workshops with park staff took place in October 2001. At the first workshop, held October 2–4, 2001, the decision factors and variables within those decision factors were developed. Decision factors are areas where there are differences in alternatives, actions that are common to all alternatives (e.g., congressionally mandated programs for protecting natural or cultural resources) are not considered in the CBA process because there would be no difference between the alternatives. Workshop participants identified 19 factors, as listed below.

Protect Cultural and Natural Resources

1. Protect natural resources — Prevent loss, and maintain and improve conditions.
2. Preserve cultural resources — Prevent loss, and maintain and improve conditions.

Provide for Visitor Enjoyment

3. Provide visitor services.
4. Provide educational opportunities.
5. Provide wilderness and backcountry experiences.
6. Provide traditional recreational experiences.
7. Provide new or non-traditional recreational experiences.
8. Provide stock experience opportunities.

Improve Efficiency of Park Operations

9. Improve operational efficiency and sustainability.
 - 9A. Operations
 - 9B. Stock / helicopter use

10. Effective use of housing.
11. Effective use of concessioner.

Provide Cost-Effective, Environmentally Responsible, and Otherwise Beneficial Development for the National Park Service

12. Relationship to Native American and tribal groups and organizations.
13. Relationship to private land inside park boundaries (inholdings).
14. Utility use of public land.
15. Non-profit use of public land.
16. Private use of public land.
17. Relationship to regional land use patterns.
18. Relationship to adjacent/local public land agencies.
19. Socioeconomic influence.

Park staff then scrutinized each alternative to describe broadly how each variable was addressed and to summarize the differences at the second CBA workshop, held October 22–26, 2001. The alternatives were assessed and ranked according to the decision factors, and then a preferred alternative was developed. Attributes for each decision factor or variable were listed, and then the set of attributes that was the least preferred for each factor was identified. For each factor, all other alternatives were described *by their advantages* relative to that least preferred set of attributes. A pre-agreed common terminology scale was used to compare advantages. The most advantageous sets of attributes could be identified for each factor. Comparing the importance of most advantageous sets of attributes for all factors, a paramount advantage was chosen and assigned a numeric value of 1000. That paramount advantage was for factor 4 — the ability of the alternative to provide all kinds of educational opportunities:

- orientation to park and recreational opportunities
- access to programs and activities (ranger programs, guided and self-guided activities, park newspaper, publications, waysides, exhibits)
- educational / orientation outreach beyond park boundaries (traveling programs, Internet sites)
- appropriate visitor-oriented facilities (visitor centers, ranger contact stations, museums, education / nature centers, trail centers, wilderness contact stations, orientation kiosks)

SCORING

Compared to that paramount advantage other numeric values were assigned first to the most advantageous set of attributes for every factor, and then for other sets of alternative attributes for that same factor. Least preferred sets of attributes had no advantages and therefore received no points. All relative numeric values were reconsidered to see if anything had been overlooked. Then the numeric value of advantages for each alternative was added, and the most advantageous alternative was identified — alternative D, with 6,325 advantage points (see Table F-1).

COST ESTIMATES, LIFE-CYCLE COSTS, AND FUNDING

Initial cost estimates (referred to as class C estimates) were then applied to alternatives A, B, C, and D (see Table F-2). These costs were for comparative purposes only. Class C costs are well in advance of most projects, so these numbers should not be used for construction cost estimating or budgeting.

Life-cycle cost estimates were also developed for each alternative. Life-cycle costing includes all significant costs of ownership of an item, system, or facility, over a specified length of time. Economic

analysis is used to put out-year expenditures on a common basis. For the purposes of this general management plan, life-cycle costs only focused on areas where there was a significant difference in operating or staffing the park between plan alternatives.

Expenditures of over \$104 million are common to all alternatives and consist of actions that are already planned and funded, including over \$57 million of concession commitments, \$22.9 million in the line-item construction program, and over \$26 million in the Federal Lands Highway Program. Other actions in the plan would be financed through transportation programs, the fee demonstration program, concessioners, or donated funds.

The difference in costs of alternatives relates to those actions that have not yet been funded and the life-cycle costs for the alternatives. Not-yet-funded costs ranged from a high of \$146 million for alternative D, to a low of \$21 million for the no-action alternative, with the preferred alternative having a not-yet funded cost of \$39 million. The preferred alternative would increase the advantages of alternative D while reducing the not-yet-funded costs by around \$107 million.

Life-cycle costs include the common costs. While

TABLE F-1: SUMMARY OF ADVANTAGES FOR THE GENERAL MANAGEMENT PLAN ALTERNATIVES

Factor	Alternative A	Alternative B (No-Action Alternative)	Alternative C	Alternative D	Preferred Alternative
1. Natural Resource Protection	100	325	0	50	200
2. Cultural Resource Preservation	200	0	400	300	300
3. Visitor Services	100	0	350	450	400
4. Educational Opportunities	0	200	600	1000	950
5. Wilderness /Backcountry Experiences	0	100	400	450	550
6. Traditional recreational Experiences	200	0	950	550	800
7. New or Non-traditional Recreational Experiences	400	0	100	800	600
8. Recreational Stock Use	75	0	250	150	350
9a. Park Operations	100	0	500	500	500
9b. Administrative Stock / Helicopter Use	300	0	250	250	275
10. Housing	250	0	300	300	350
11. Concessions		NSA			
12. Native American Relationships	0	0	50	150	125
13. Private Land Use inside Park Boundaries (Inholdings)	200	100	0	400	400
14. Utility Use (Hydroelectric Facilities)	0	100	0	0	100*
15. Non-profit Use of Public Land	10	0	10	25	25
16. Private Use of Public Land	300	450	0	550	550
17. Relationships to Regional Land Use Patterns	100	0	100	250	250
18. Relationships to Adjacent / Local Public Land Agencies	100	0	150	100	200
19. Socioeconomic Influence	10	0	10	50	75
Total Advantage	2,445	1,275	4,420	6,325	7,000

* This alternative originally recommended removal of facilities because they are inconsistent with NPS policy. This section documents the decision-making process, and this is not altered by subsequent changes in law.

TABLE F-2: SUMMARY OF ADVANTAGES, INITIAL CLASS C COSTS, AND LIFE-CYCLE COSTS

	Alternative A	Alternative B (No-Action Alternative)	Alternative C	Alternative D	Preferred Alternative
Advantage Total Points	1,275	2,445	4,420	6,325	7,000
LIC funded (common to all)	\$22,914,000	\$22,914,000	\$22,914,000	\$22,914,000	\$22,914,000
FLHP funded (common to all)	\$26,652,000	\$26,652,000	\$26,652,000	\$26,652,000	\$26,652,000
Concession commitment (common to all)	\$57,000,000	\$57,000,000	\$57,000,000	\$57,000,000	\$57,000,000
Total already funded / committed	\$104,566,000	\$104,566,000	\$104,566,000	\$104,566,000	\$104,566,000
Initial Total Cost	\$175,504,000	\$125,000,000	\$159,465,000	\$250,600,000	\$144,000,000
Not yet funded	\$70,938,000	\$21,434,000	\$54,899,000	\$146,034,000	\$39,434,000
Life-Cycle Cost	\$287,000,000	\$288,700,000	\$341,700,000	\$449,200,000	\$326,600,000

alternative D had the greatest number of advantage points (6,325), the initial and life-cycle cost were also very high — almost \$250.6 million in initial costs, and life-cycle costs in excess of \$449 million for the next 25 years. In contrast the lowest life-cycle cost alternative was alternative A, with just over \$126 million in initial costs, and a life-cycle cost of \$287 million. The preferred alternative had initial costs of \$144 million and a life-cycle cost of \$326 million.

THE PREFERRED ALTERNATIVE

The preferred alternative was then crafted to maintain or increase advantages while reducing costs. Every factor, attribute, and advantages was reexamined. Alternative D served as the base for the preferred alternative, advantages were added to it, and some actions that that did not bring advantages were removed (for example, the 1700-car parking garage at a cost of \$48 million, and a \$20, million Grant Grove bypass road) because an analysis indicated they were not needed. Additionally, instead of replacing visitor centers, existing visitor centers would be expanded and exhibits replaced. The resulting preferred alternative reduced cost by over \$110 million and increased advantages by 675 points (see Table F-1).

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** Participated only in second CBA session ranking alternatives and developing the preferred.

Appendix G: Special Park Uses

This appendix provides excerpts about NPS policies applying to special park uses. They are taken from the *NPS Management Policies 2001* and *Director's Order #53: Special Park Uses*.

NPS MANAGEMENT POLICIES 2001

Section 8.6: Special Park Uses

8.6.1 General. A special park use is defined as a short-term activity that takes place in a park area, and that:

- Provides a benefit to an individual, group, or organization rather than the public at large;
- Requires written authorization and some degree of management control from the Service in order to protect park resources and the public interest;
- Is not prohibited by law or regulation;
- Is not initiated, sponsored, or conducted by the Service; and
- Is not managed under a concession contract (see chapter 10), a recreation activity for which the NPS charges a fee, or a lease (see chapter 5).

8.6.1.1 Requests for Permits. Each request to permit a special park use or to renew authorization of an existing use will be reviewed and evaluated by the superintendent according to the terms of applicable legislation, regulations, and management planning documents, using criteria and procedures outlined in *Director's Order #53: Special Park Uses*. When considering permit requests, superintendents will take into account the Service-wide implications of their decisions. A superintendent must deny initial requests, or requests for renewal, upon finding that the proposed activity would not be allowed under the criteria listed in section 8.2.

The superintendent likewise must terminate previously authorized special park uses based on such a finding.

8.6.1.2 Fees. Appropriate fees for cost recovery, as well as performance bond and liability insurance requirements, will be imposed, consistent with applicable statutory authorities and regulations. All costs incurred by the Service in writing the permit, monitoring, providing protection services, restoring park areas, or otherwise supporting a special park use will be reimbursed by the permittee. When appropri-

ate, the Service will also include a fair charge for the use of the land or facility.

DIRECTOR'S ORDER #53: SPECIAL PARK USES

3. Policy Guidance

3.3 Right or Privilege. A superintendent must determine whether a request for a special park use is prohibited or mandated, or involves a right or a privilege. A right is based on property ownership, legislative or treaty entitlement, or Constitutional guarantee. Where none of these factors is present, the use is a privilege over which the superintendent may exercise varying degrees of discretion and control. Generally speaking, citizens must be afforded the opportunity to exercise their rights; however, a superintendent may establish permit conditions to protect park visitors, park resources and values. When considering a privilege, the superintendent has the additional task of determining whether the activity will be allowed.

3.4 Compliance. The decision to issue or deny a permit for a special park use flows from the appropriate compliance under the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act of 1966 (NHPA), and other applicable laws. For example in the case of NEPA, if the proposed special use is not covered by a categorical exclusion, the superintendent, in preparing an EA or EIS, is responsible for identifying reasonable alternatives, both inside and outside the park, and completing appropriate compliance documentation. Although the superintendent may require the applicant to prepare this documentation, the NPS remains responsible for its content. Regardless of who prepares compliance documents, the applicant is responsible for paying all NPS costs incurred in meeting NEPA and 106 compliance requirements.

3.5 Permit Terms and Conditions. Superintendents will establish permit conditions that protect NPS and public interests, including park resources and values. Special park uses may be authorized for a period of not-to-exceed 5 years.

3.6 Permit Fees and NPS Cost Recovery. Except as identified in Section 3.7 below, the NPS will charge fees and recover costs for special use permits unless prohibited by law or Executive order, or when the proposed use is protected by the First Amendment or involves another right and not a privilege. Charges

should reflect the fair market value of the use requested. The fair market value of a special park use is the value of the lands or facilities used, plus the NPS costs incurred in managing or supporting the use. The NPS will retain funds recovered for the cost of managing a special park use. Charges arising from the use of NPS lands and facilities must be deposited in the U. S. Treasury, unless otherwise specifically authorized by law.

When special use permit fees are proposed to be increased, the superintendent will notify the permittee and/or the public of the increase at least sixty (60) days prior to the fee changes taking effect.

5. Permitting and Renewal Considerations

5.1 Reasons for Issuing a Permit. There are three primary reasons for issuing a permit, regardless of type:

To impose conditions to manage the activity and prevent impairment or derogation of resources, values, and purposes for which the park was established;

To obtain the signature of the permittee agreeing to the conditions and other statements contained within the document; and

To establish a written account of the special use for inclusion in the administrative record.

5.2 Basic Requirements. To receive consideration, a proposal to engage in a special park use must be submitted in writing; be consistent with applicable legislation, Federal regulations and administrative policies; avoid visitor use conflicts; and should not create unacceptable impacts to park resources.

6. Permit Provisions

Superintendents will ensure that measures to protect the United States' interests are incorporated into permits for special park uses. To ensure this protection, superintendents will include in each permit issued some, or all, of the following items, depending on the activity. (The following items, however, may not be imposed on First Amendment activities.)

6.1 Performance Bonds. Performance bonds or deposits are the permittee's guarantee of compliance

with permit conditions and reimbursement to the park for damage to resources and/or facilities as a result of the permittee's activities. An amount adequate to cover the cost of restoration, repair, rehabilitation and cleanup of the area may be required. Should resource damage beyond that envisioned by the original performance bond result from the permittee's use, the park may file suit against the permittee under the authority of *16 U.S.C. 19jj*, Park System Resource Protection.

6.2 Liability Insurance. Liability insurance protects the government from negligent actions by permittees. Insurance in an amount sufficient to protect the interests of the United States may be required as a condition of the permit.

6.3 Property Insurance. Adequate property insurance coverage should be required whenever Federal buildings and/or facilities are being made available pursuant to a permit.

6.4 Hold Harmless/Indemnification. This is a legal statement intended for use as a condition of a permit. It states that the Federal government, its agents and employees, cannot be held liable for claims for damages or suits for any injuries or deaths from any cause occasioned by the permittees' occupancy and use of the land included within the permit.

6.5 Tort Claim Provision. This statement is used in lieu of an indemnification requirement when issuing permits to other Federal agencies. While it is directed mostly at the occupancy of NPS property by the other agency, it might be used for other purposes.

6.6 Anti-Deficiency Act. This statement protects the NPS against claims arising from an executed Agreement, which would be in excess of the fiscal year appropriation for that agreement.

6.7 Bankruptcy Termination. While this statement is primarily aimed at agricultural Special Use Permits, it might be appropriate under other circumstances and other instruments, depending on the use. Its purpose is to prevent the park or park lands from being claimed as an asset or becoming involved in any part of a settlement if the permittee becomes involved in bankruptcy proceedings.

Glossary

accessibility — Buildings, facilities, and programs are required to be made accessible to people with disabilities. Legislation that provides for this includes: the Architectural Barriers Act of 1968, the Rehabilitation Act of 1973, 1984 Uniform Federal Accessibility Standards (UFAS), and the Americans with Disabilities Act of 1990.

adaptive management — Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

anthropogenic — Caused by or attributed to humans.

ADT — Average daily traffic. The average number of vehicles that use a roadway during one day.

backcountry — More remote, roadless, and less intensely used park areas where the majority of use is by overnight campers who hike or ride stock. Backcountry includes federally designated wilderness.

carrying capacity — The upper limit of human use and desired visitor experiences while maintaining desired resource conditions without degradation. Management prescriptions in the general management plan conceptually describe the desired social experiences or carrying capacity for each zone.

commercial service — Any visitor-related service, activity, or facility for which compensation, monetary or otherwise, is exchanged. By law, all commercial services in parks must be authorized by the

superintendent. These would include, but not be limited to, lodging, food and beverage, gift sales, convenience item and supply sales, firewood sales, marina operations, and activities such as guiding, outfitting, interpretation, and touring. Commercial services can originate within the park or outside.

de minimis — In the context of the Clean Air Act's general conformity requirements, *de minimis* levels are annual quantities of air pollutant emissions below which a federal action in a non-attainment or maintenance area is presumed to conform to a state's implementation plan without undergoing more rigorous air quality analysis or modeling.

Conformity *de minimis* levels are levels of emissions below which a federal action in a non-attainment or maintenance area is presumed to conform to a state's implementation plan and would not require further review. Actions in attainment areas are presumed to conform and do not require analysis with respect to *de minimis* levels. Emission values representing the Clean Air Act conformity *de minimis* levels are shown in the table at the bottom of the page.

DO #2 — *Director's Order #2: Park Planning*. Establishes a tiered planning approach for preparing general management plans. Park purpose and significance statements guide the plan, which sets the vision for **what** the park should be. The general management plan in turn gives broad direction and goals for more detailed implementation plans.

DO #12 — *Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-*

Conformity *de minimis* Levels

Non-Attainment Area (NAA)	Tons/year	Maintenance Areas	Tons/year
Ozone (VOCs or NO _x):		Ozone (NO _x), SO ₂ or NO ₂ : All maintenance areas	100
Serious NAA's	50	Ozone (VOCs):	
Severe NAA's	25	Maintenance areas inside an ozone transport region	50
Extreme NAA's	10	Maintenance areas outside an ozone transport region	100
Other ozone NAA's outside an ozone transport region	100	Carbon monoxide: All maintenance areas	100
Marginal and moderate NAA's inside an ozone transport region:		PM ₁₀ : All maintenance areas	100
VOC	50	Pb: All maintenance areas	25
NO _x	100		
Carbon monoxide: All NAA's	100		
SO ₂ or NO ₂ : All NAA's	100		
PM ₁₀ :			
Moderate NAA's	100		
Serious NAA's	70		
Pb: All NAA's	25		

SOURCE: 40 CFR Chapter 1, sec. 51.853 Applicability.

making. Provides NPS guidance for implementing the regulations of the Council on Environmental Quality for the National Environmental Policy Act.

draft environmental impact statement (DEIS) — A document that describes and assesses the impacts of proposed alternative actions and is available for public comment for a minimum of 60 days.

effect — The result of actions on natural and cultural resources, aesthetics, economic, social or human health and safety. Effects can be direct, indirect, or cumulative. Used interchangeably with “impact.”

enabling legislation — The legislation that establishes national parks and that can be modified by subsequent legislation. Enabling legislation often describes the park purpose — the special attributes that caused the areas to be set aside with the mandate to protect these resources in an unimpaired condition for future generations.

endemism — The relative abundance of endemic species found within a geographic area or region. High endemism indicates that there are many native species found only in that area or region. Low endemism indicates that most species found in that area are also found in other places.

final environmental impact statement (FEIS) — The document that responds to public comments on the draft environmental impact statement and may include corrections and revisions as a result of public comment.

fire management plan — An implementation plan that details how the natural fire regimes and prescribed fires will be managed in the parks.

frontcountry — Areas that are easily accessible to visitors (as opposed to backcountry) and that are more highly used, often by single-day visitors to the parks. The frontcountry contains developed park areas and is generally along or accessed by transportation corridors.

general management plan — A legislatively required plan that usually guides park management for 15–20 years. It is accompanied by a draft and final environmental impact statement.

Historic American Buildings Survey (HABS), Historic American Engineering Record (HAER), Historic American Landscapes Survey (HALS) — On July 23, 1934, the National Park Service, the Library of Congress, and the American Institute of Architects established the Historic American Build-

ings Survey to administer a long-range plan to comprehensively document historic American architecture. Since its establishment, more than 28,000 structures have been documented through measured drawings, written histories, and large-format photography, which have been made publicly available through the Library of Congress.

Growing out of HABS, the Historic American Engineering Record was established on January 10, 1969, by the National Park Service, the Library of Congress, and the American Society of Civil Engineers to identify and record sites, structures, and objects significant in the history and development of engineering and industry in the United States. With a similar documentation process of measured and interpretive drawings, written histories, and large-format photography, HAER has documented, and made publicly available through the Library of Congress, information on more than 7,500 engineering and industrial sites and processes.

In October 2000 the National Park Service, the Library of Congress, and the American Society of Landscape Architects established the Historic American Landscapes Survey for the systematic documentation of these landscapes. The intent of the new HALS program is to document significant historic landscapes throughout the country via measured drawings, large-format photography, written narrative, and other documentation techniques. HALS will document the dynamics of landscapes not already seen in the existing HABS/HAER program models.

hydrophytic — Vegetation that is adapted for development, growth, and reproduction in wet soils.

impact — See effect.

impact topic — A specific category of analysis for impacts, such as wildlife, vegetation, or historic structures. Impact topics are identified through public scoping and a determination of what aspects of the human environment would be affected if an action was implemented. An analysis of impacts for a specific topic may be required as a result of a public law (Endangered Species Act) or an executive order (e.g., wetlands, floodplains).

implementation plan — A plan that tiers off the general management plan and that specified how one or more of the desired resource conditions, visitor experiences, or proposed actions will be accomplished. Implementation plans can be specific resource protection plans or construction documents.

incidental business permit (IBP) — A type of commercial service. An incidental business begins and ends outside a park, as do all transactions and advertising associated with the service. The service is authorized by a permit and may not exceed a two-year term. No land or facilities are assigned to the permit holder, who has no exclusive rights to use park facilities. All permits contain conditions that can limit use both spatially and temporally for the protection of resources and the enhancement of the visitor experience. Incidental business permits are soon to be converted to commercial use authorizations (CUAs) per Public Law 105-391.

inholding — Privately owned land that is inside the boundary of the parks.

karst — A type of topography characterized by caves, sinkholes, disappearing streams, and underground drainage. Karst forms when groundwater dissolves pockets of limestone, dolomite, or gypsum in bedrock.

lentic — A nonflowing or standing body of fresh water, such as a lake or pond.

level of service (LOS) — A transportation term that describes how well a road functions. LOS A is the best, with free-flowing traffic, and LOS F is the worst, with the roadway at capacity, resulting in stop-and-go traffic, long lines.

lotic — A flowing body of fresh water, such as a river or stream.

maintenance area — A geographic region that at some time in the past was designated as a non-attainment area but has been redesignated through a formal rule-making process as being in attainment with the national ambient air quality standards. Maintenance areas continue to be monitored more rigorously than attainment areas and to be subject to controls to keep it in attainment with the national standards.

national ambient air quality standards (NAAQS) — Concentrations of criteria pollutants in ambient air (outdoor air to which the public may be exposed) below which it is safe for humans or other receptors to be permanently exposed. The Clean Air Act establishes two types of national air quality standards.

Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly.

Secondary standards set limits to protect public welfare, including protection against decreased

visibility, damage to animals, crops, vegetation, and buildings.

management prescription — A term that describes desired resource conditions and visitor experiences in a particular area that will be achieved by implementing the general management plan. Typically there will be numerous management prescriptions that apply to different types of areas, that prescribe different resource conditions, and that foster various visitor experiences.

management zone — The geographic location for implementing a management prescription.

mitigation — Measures that are taken to reduce the intensity of an adverse impact. Examples include alternative actions that would avoid the impact, that would minimize the impact by limiting the magnitude of the action, that would rectify the impact by repairing, rehabilitating, or restoring a resource, that would reduce impacts through preservation or maintenance; or that would compensate for the impact through replacement or substitution (e.g., creating a wetland environment at another location).

National Register of Historic Places — The federal listing of nationally, regionally, or locally significant properties, sites, or landscapes. Sites listed on the national register listing must be considered when making management decisions if an action could affect that site. Parks are to assess properties over 50 year old to determine their eligibility for nomination to the national register.

Native American consultation — Various laws, policies, and executive orders require consultation with indigenous peoples who may have traditional or contemporary interests in the lands now occupied by parks. This compliance activity is considered government-to-government consultation. There are 13 named tribes or groups with traditional or contemporary interests in Sequoia / Kings Canyon national parks.

National Environmental Policy Act of 1969 (NEPA) — This public law requires federal agencies to look at alternatives for proposed major federal actions and to fully analyze the impacts of those alternatives on the human environment before a decision is made.

nephelometric turbidity unit (NTU) — A measure of turbidity or cloudiness in a water sample. Suspended materials in water (e.g., plankton, sewage, silt, clay) scatter and absorb light passing through it. The amount of light scattered is determined by a

photocell, which is then converted to an NTU measurement.

oligotrophic — A water body characterized by a low supply of plant nutrients.

paleoecological — The study of ancient or prehistoric ecosystems.

peak season — High-use times from Memorial Day to Labor Day, when most park visitation occurs.

programmatic accessibility — Section 504 of the Rehabilitation Act of 1973 expands access for people with disabilities. “No otherwise qualified individual . . . shall be excluded from or be denied the benefits of . . . any program or activity.” Programs could include activities, educational programs, and interpretive exhibits.

public involvement — Public input sought in planning for public lands and required under the National Environmental Policy Act. Comment is sought at the initial scoping and at the DEIS stages. Substantive comment on the DEIS must be responded to in the FEIS.

record of decision (ROD) — The document that states which alternative analyzed in an environmental impact statement has been selected for implementation and explains the basis for the decision. The decision is published in the *Federal Register*.

section 106 compliance — Section 106 of the National Historic Preservation Act of 1966 mandates that federal agencies take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Place. The Advisory Council on Historic Preservation is to be given opportunity to comment on proposed actions.

special park uses — As defined by *Director’s Order #53: Special Park Uses*, a special park use is a short-term activity that takes place in a park area and:

- provides a benefit to an individual, group or organization, rather than the public at large;
- requires written authorization and some degree of management control from the NPS in order to protect park resources and the public interest;
- is not prohibited by law or regulation; and
- is neither initiated, sponsored, nor conducted by the NPS.”

special use permit — Instrument issued by a superintendent to an individual or organization to

allow the use of NPS-administered resources or to authorize activities in 36 CFR Parts 1–7 that require a permit.

special use permit cabins — Privately owned cabins originally permitted by PL 95-625, sec. 314, to be on federal land in the Mineral King area of Sequoia National Park until the death of the original permittee of record (or the spouse) or for 25 years, whichever was later. These provisions were changed by PL 108-447 on December 8, 2004, which allows permits to be transferred to heirs, successors, and assigns and struck the time limitation on permits (div. E, sec. 139(b)). The cabins were originally allowed to be on public land under a U. S. Forest Service program, which has since been discontinued.

stock — Animals such as horses, mules, or llamas that can be ridden or used to carry supplies.

sustainable — The use of park resources and environments in a way that does not deplete or permanently damage them, thereby allowing the uses to continue for an extended time.

tiered planning — An approach to planning that progresses from conceptual plans to site-specific action plans. For the National Park Service, the general management plan sets the broad vision for what the parks should be, and other layers of implementation planning provide the details of how to accomplish the vision.

vision — A broad philosophical statement that describes what the parks should be with regard to future resource conditions and human experiences.

VMT — Vehicle miles traveled. Measure used to compute automobile emissions.

wilderness — An area set aside by Congress as part of the wilderness preservation system. The intent is to protect lands in their primitive condition with little impact by man. These are unroaded areas where no development is permitted, and certain uses, such as motor vehicles, motorized equipment or motorboats, landing of aircraft, any form of mechanical transport, and landing of aircraft, are prohibited.

wilderness stewardship / stock use plan — An implementation plan detailing how the visions in the general management plan would be carried out in backcountry and wilderness areas.

xeric — Characterized by dry conditions.

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Caltrans	California Department of Transportation
NPS	National Park Service, U.S. Department of the Interior
USFS	U.S. Forest Service, U.S. Department of Agriculture
USFWS	United States Fish and Wildlife Service, U.S. Department of the Interior

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