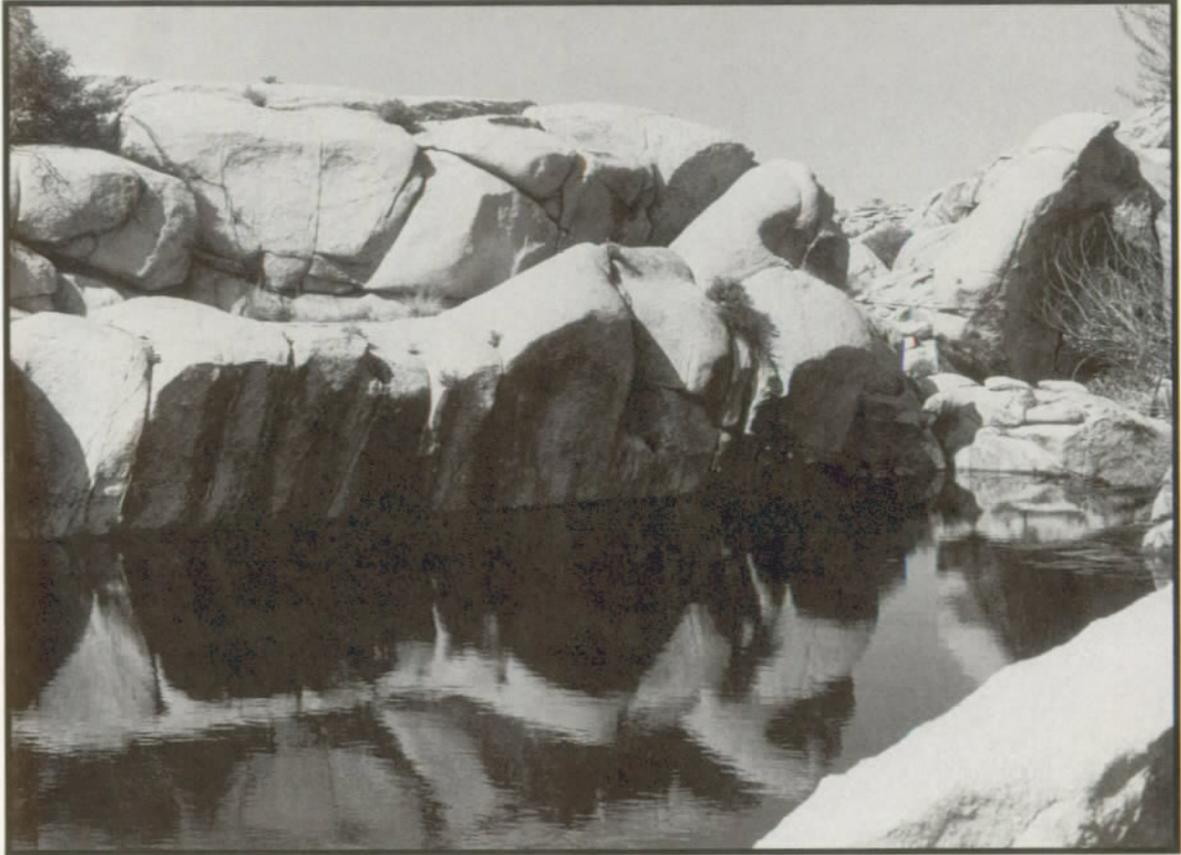


# THE AFFECTED ENVIRONMENT





## THE NATURAL ENVIRONMENT

### CLIMATE

The park has an arid upland desert climate. Annual extreme temperatures are influenced by altitude. Eastern lowlands frequently have temperatures above 115°F in the summer. Western higher elevations have snow in winter and extended periods with nighttime lows well below freezing. The summer months typically have high temperatures, low humidity, and clear sunny days.

Summer storms from July through September can be very dramatic. Thunderstorms from the southwest or southeast bring high winds, lightning, and sometimes heavy rain. Typical summer humidity runs below 20%. When storms approach, humidity can climb to above 40%. Unless a large amount of rain falls, the humidity usually drops to normal within 12 hours. Summer storms tend to be localized. They can cause flash floods, but the majority of the annual precipitation, one to seven inches, is from winter rain.

### GEOLOGY AND SOILS

The picturesque landscape found in Joshua Tree National Park — the mountain ranges and desert basins, the rock piles that seem to float in the desert air — are all part of the mystique of the park. The park has low, generally east-west trending mountains interspersed with valleys, a setting characteristic of much of the western Mojave region. It is dominated by a crystalline rock terrain, although the valleys are largely mantled by unconsolidated or poorly consolidated Quaternary surface deposits. Rocks in the park are metamorphic assemblages that include Paleozoic and Precambrian rocks, widespread Mesozoic plutonic rocks that range from gabbro to quartz monzonite and some local Cenozoic basalt. Some Precambrian rocks are about 800 million years old. In some places aplite and pegmatite dikes are associated with the granitic plutons.

Millions of years ago the landscape had rolling hills covered with a soil mantle that had developed in a hot, semiarid to humid climate, with 80% more precipitation and 30% less evaporation than is typical today. Changes in climate have resulted in present day erosion rates that exceed rates of soil formation, removing the soil and vegetation from steeper hillsides and creating the huge subangular and spheroidal granitic boulders and boulder piles evident at Hidden Valley, Cap Rock, Jumbo Rocks, and along the Geology Tour Road.

A comprehensive mineral survey has yet to be done. Mines in the park have produced approximately 12,000 troy ounces of gold, 16,000 troy ounces of silver, 33,000 troy ounces of by-product lead, and over 20 tons of bismuth ore. Areas near the park with similar geology contain significant deposits of tungsten, manganese, uranium, and thorium-bearing minerals.

Most soils in the park are poorly developed. The eastern half is mostly alluvial with no true soil structure. This granitic fill ranges from boulders to gravel and coarse sand. These are modern deposits consisting of fan gravel and other alluvium being deposited by drainage systems. There are no known rare or unique soils in the park.

The prevailing winds of the Mojave Desert are from the west. Much of the wind-blown sand, picked up in the open expanses, is carried eastward and deposited in a few well-developed dune systems. Pinto Basin has extensive sand deposits but few well-developed dune systems. The only real soil formation is in the valleys of Covington Flats.

The desert soil surface is very sensitive and took hundreds of years to form. A single vehicle crossing can cause damage that can take hundreds of years to heal.

## NATURAL HAZARDS

The high level of seismic activity in the park is because of the many fault zones in the vicinity, including the San Andreas to the west. The trace of this fault zone is clearly visible from Keys View, marked by the Indio Hills and numerous springs and palm oases. The oasis at Cottonwood Springs was formed as a result of fault activity, as was the Oasis of Mara, which marks the Pinto Mountain fault, extending from Twentynine Palms into the Morongo Valley. The Blue Cut fault runs from east to west through the Little San Bernardino Mountains, about 0.5 mile south of Keys View, extending into the park at Pinto Basin. Two large earthquakes (magnitude 6.4 and 7.5) were recorded in 1992 along the Mojave-Landers line, a north-south trending fault perpendicular to the Pinto Mountain fault.

## VEGETATION

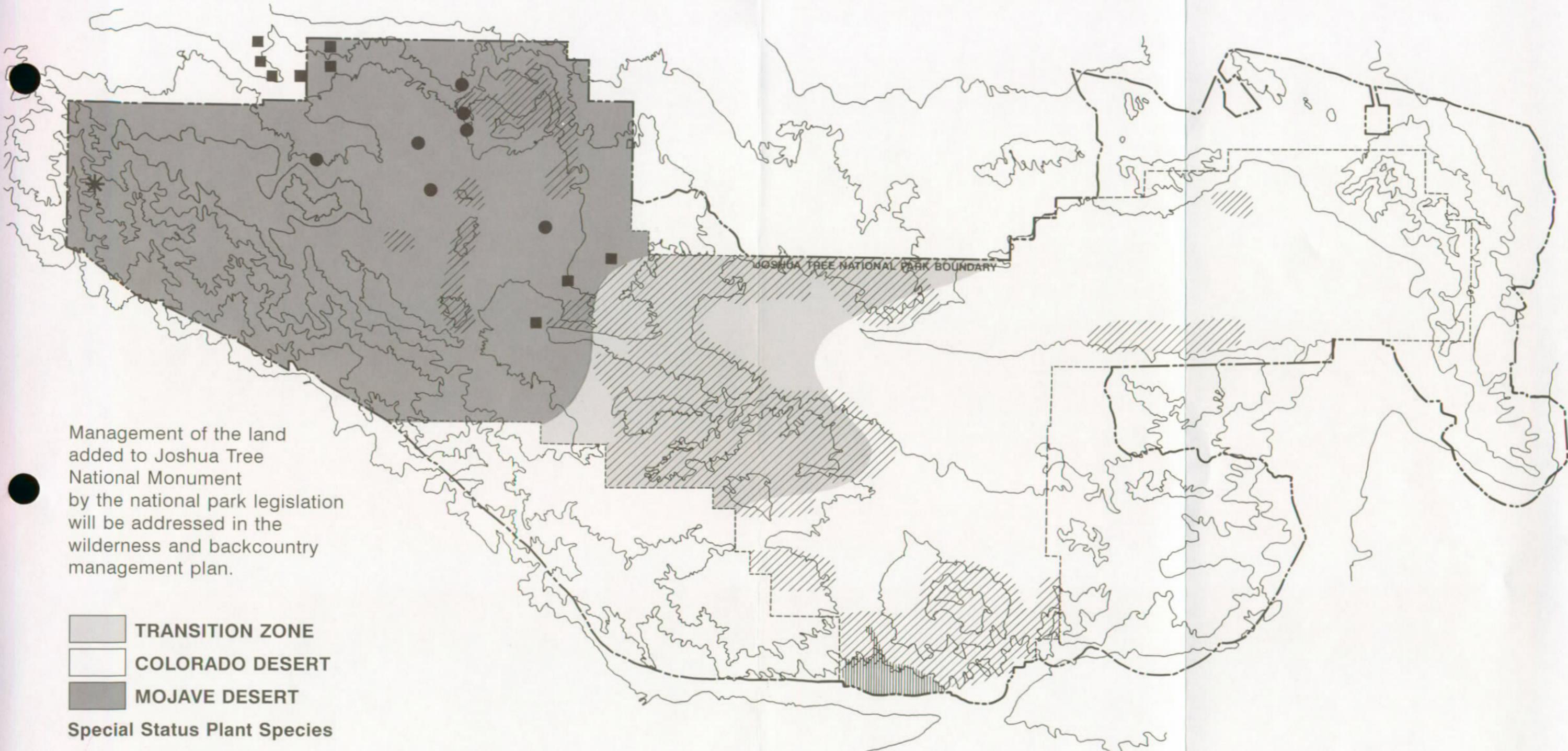
The variety of vegetation in the area is because of the differences in topography, elevation, and gradient. It is estimated that more than 850 plant species live in the park (Adams 1957).

Below 3,000 feet, the Colorado Desert (or low desert as it is sometimes called) is dominated by creosote bush, mesquite, yucca, ocotillo, and other species of cactus. Whenever moisture conditions are favorable, cat's claw, palo verde, and desert willow may also appear. In Pinto Basin, creosote bush, white burroweed, several species of grass, and many species of cactus grow. Occasional sand dunes or basins of loose sand provide a rare habitat in this desert, most often dominated by annual grasses following spring rains.

Above 3,000 feet three basic vegetation associations have been classified (Holland 1986) — *Mojave Mixed Steppe*, Joshua trees, galleta grass, needle grass; *Blackbrush Scrub*, blackbrush, Mojave yucca, Joshua tree, California juniper; and *Mojavean Pinyon/Juniper Woodland*, piñon pine, scrub oak, California juniper.

The Mojave Desert is more biologically diverse than the Colorado Desert, probably due to greater amounts of precipitation. In the Mojave mixed steppe, densities of Joshua trees vary dramatically. The thickest forests are in the Covington Flats, Lost Horse, and Queen Valley planning units.

The transition zones between the two deserts provide for increased biodiversity. They are typically dominated by common shrubs such as desert senna, bladder pod, jojoba, desert mallow, paper bag bush, encelia, vigueria, white ratany, and four-o'clock. Other shrubs found in these areas include jimsonweed and coyote melon. After adequate rainfall the deserts can be transformed by colorful wildflower displays — including extensive areas of Bigelow



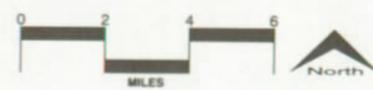
Management of the land added to Joshua Tree National Monument by the national park legislation will be addressed in the wilderness and backcountry management plan.

- TRANSITION ZONE
- COLORADO DESERT
- MOJAVE DESERT

**Special Status Plant Species**

- Gilia maculata*
- Monardella robisonii*
- ✱ *Erigeron parishii*
- Ditaxis californica*
- Escobaria vivipara*  
var. *alversonii*

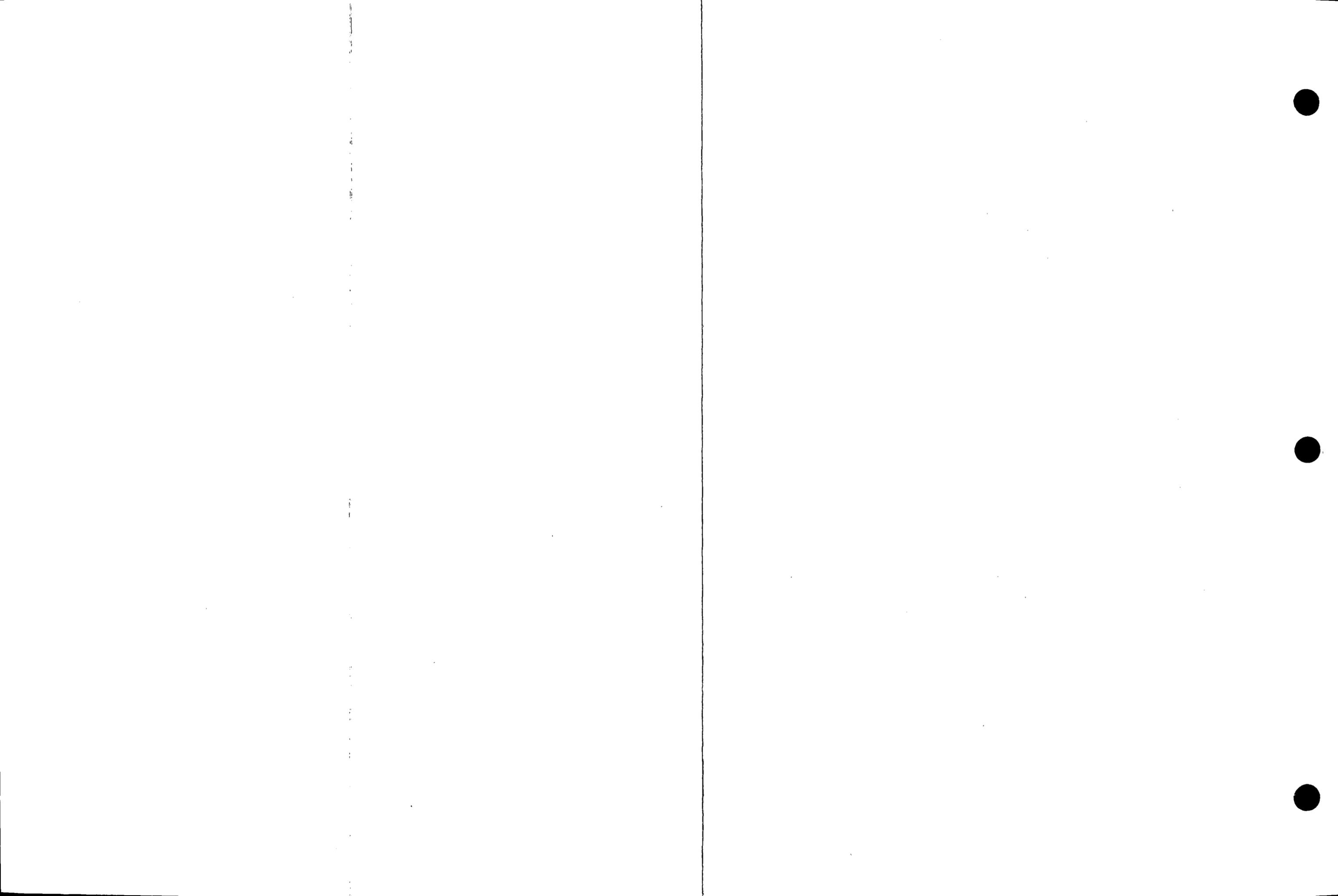
- JOSHUA TREE NATIONAL PARK BOUNDARY
- PREVIOUS JOSHUA TREE NATIONAL MONUMENT BOUNDARY



**DESERT BIOMES**

JOSHUA TREE NATIONAL PARK  
 UNITED STATES DEPARTMENT OF THE INTERIOR  
 NATIONAL PARK SERVICE  
 DSC/May '94/156/20,034B

ON MICROFILM



coreopsis, sand verbena, phacelia, evening primrose, blazing star, pincushion, chia, and others. Fan palm oases also appear in the park, primarily in the Colorado Desert portion in the Cottonwood planning unit. A few groves are in the southwest portion of the Mojave, close to Indian Cove and the headquarters at Twentynine Palms.

## WILDLIFE

Large mammals in the park include the desert bighorn sheep, mule deer, and mountain lion. Bobcats are common in the western portion. Many small mammals also live in the park. It is estimated that approximately 350 vertebrate species inhabit the park. The most common are mouse and wood rat species, white-tailed antelope ground squirrel, chipmunk, coyote, black-tailed rabbit, and two species of fox. Approximately a dozen species of bats inhabit the park. Invertebrates are also common, but little has been done to systematically inventory them. Two poisonous species of invertebrates are found — the black widow and brown recluse spiders. Another common spider is the nonpoisonous tarantula. Scorpions in the park range up to four inches long and are among the less toxic varieties. Various centipedes, millipedes, and ticks can be found along with a multitude of other insects, including ants, dragonflies, beetles, and wasps.

Although several amphibians are known regionally, only the red spotted toad and the California tree frog have been reported. Of many small lizards present, the side-blotched is the most common. Additionally, there are two horned lizards and 12 other species. There are 19 known species of snakes in the park.

Large numbers and varieties of birds (more than 270 different species) live in or fly through the park, which is adjacent to a major migratory flyway in the Coachella Valley. During stormy weather many areas are critical stopover sites for species such as loons, herons, egrets, grebes, and avocets. Birds most commonly seen in the unit are the Gambels quail, black throated sparrow, scrub jay, common raven, road runners, and several wrens. Additionally, the park hosts both summer and winter migratory species. The oases seem to be important stopping places on the western flyway and have semiannual visits of large numbers of turkey vultures.

## SPECIES OF SPECIAL CONCERN

Appendix C includes a list from the U.S. Fish and Wildlife Service of endangered, threatened, and candidate species that may exist in Joshua Tree National Park. The species listed below are known to occur. Additional listed species are included below that are not on the U.S. Fish and Wildlife Service list but are known to exist in the park.

## Vegetation

The Joshua tree (*Yucca brevifolia*) is fairly common at elevations ranging from 2,000 to 5,000 feet in the Mojave Desert. Its distribution is so closely associated with the Mojave that it has been used to define the boundaries of that desert. Although common throughout the Mojave, environmental conditions for the optimum development of Joshua trees seem to be best in

the park, where they reach their greatest size. The largest Joshua trees are estimated to be 500 to 700 years old. There are about 5.5 million Joshua trees in the park. Although not listed, this species is of special concern since the Joshua trees are a major part of the park experience.

One plant species is listed as category 1 and is being considered for listing as a threatened or endangered species by the U.S. Fish and Wildlife Service. One species is proposed as endangered. Two plant species are currently listed as category 2, waiting for more data before a determination is made whether to list them or not. These species are:

- Little San Bernardino Mountain Gilia, *Gilia maculata*, category 1, found in washes (Quail and Panorama Heights washes)
- California ditaxis, *Ditaxis californica*, category 2, found on alluvial fans south of the Eagle and Cottonwood Mountains
- Rock pennyroyal (Robison's monardella), *Monardella robisonii*, category 2, found in quartz monzonite outcrops in Wonderland of Rocks
- Parish's daisy, *Erigeron parishii*, proposed endangered, found on rocky outcrops, often in limestone

There are eight known state-listed plant species and subspecies in the park. None of the plants, federally or state listed, are known to be in any developed areas. Complete surveys for sensitive species would be completed prior to any design or construction.

Oases contain fan palm species unique to the California Desert. Although small, the fan palm oases contain large numbers of plants that are found nowhere else in the park.

## Wildlife

Threatened, endangered, rare, and sensitive species in Joshua Tree National Park are listed below. They are listed with their classifications: FT — federally listed "threatened," FPT — federally proposed threatened; FSS — federal sensitive species; Category 2 — proposed by U.S. Fish and Wildlife Service for listing but needs more information; or CSC — California Species of Special Concern

- Desert tortoise (Mojave Desert population), *Gopherus* (= *Xerobates Scaptochelys*) *agassizii*, FT, FSS, ST
- Chuckwalla, *Sauromalus obesus*, category 2
- Colorado Desert fringe-toed lizard, *Uma notata notata*, category 2, CSC
- Flat-tailed horned lizard (known to exist within 5 miles of the park), *Phrynosoma mcallii*, FPT, FSS
- Prairie falcon, *Falco mexicanus*, CSC
- California horned lark, *Eremophila alpestris actia*, category 2, CSC
- Eagle Mountain scrub jay, *Aphelocoma coerulescens cana*, category 2, CSC
- Loggerhead shrike, *Lanius ludovicianus*, category 2, CSC
- Palm Springs little pocket mouse, *Perognathus longimembris bangsi*, category 2, CSC
- American badger, *Taxidea taxus*, CSC
- California leaf-nosed bat, *Macrotus californicus*, category 2, CSC
- Pallid bat, *Antrozous pallidus*, CSC
- Townsend's western big-eared bat, *Plecotus townsendii townsendii*, category 2, CSC

- Greater western mastiff bat, *Eumops perotis californicus*, category 2, CSC
- Mountain quail, *Oreotyx pictus*, category 2

Of the species listed, the Mojave Desert tortoise is known to be in areas of proposed development. Surveys for all listed species would be completed prior to design or construction.

The Mojave Desert population of the desert tortoise (*Gopherus agassizii*) was federally listed as threatened by the U.S. Fish and Wildlife Service in April 1990. It is estimated that more than 50% of the park is desert tortoise habitat. The park's population is estimated at approximately 12,700 animals (Karl 1988).

Prior to the listing of the tortoise in 1990, two surveys were completed to determine tortoise locations and densities throughout the park. Recent surveys by park staff have found that the tortoise is more widespread and densities in some areas are higher than previously thought.

In 1991 the staff established four permanent trend plots, each one kilometer square. A fifth was established in 1994. Each site is visited at least 10 times per season (one day per week). More than 400 tortoises have been marked and their age, sex, weight, and location have been recorded.

In 1992 a desert tortoise survey along the road corridor from the Quail Springs intersection to the Geology Tour Road intersection was completed. This study entailed tortoise populations that might be affected by road reconstruction and other projects. Results indicated that few tortoises live in the surveyed area. Of the 80 transect lines walked, 62 had no tortoise sign. Very little sign was found in the remaining 18 transects, indicating low densities. Two of the locations showed fresh tortoise sign. The study failed to prove an effect from road use. The study concluded that the area was not very densely populated by tortoises and that road reconstruction could proceed. A more intense study in 1993 of a 500-square-meter area west of Hidden Valley confirmed low tortoise density.

Tortoise densities range from zero in rugged mountain areas to 240 per square mile in the Pinto Basin. Most areas in the park do contain tortoises.

## WATER RESOURCES

Groundwater follows zones of least resistance along deeply fractured rock masses and deep loose gravel. There are very few known water tables near the surface. Rainfall is inadequate to recharge underground water. Surface water flows off without percolating back into the aquifer. By far the largest amount of groundwater is in Pinto Basin, one of the extensively alluvial valleys underlying the eastern portion of the park; it has been estimated by the U.S. Geological Survey that this basin could yield 300,000 acre feet of water from the upper 100 feet of the saturated zone.

Naturally occurring water is rare in the park. There are over 120 known water sources in the park, including springs, wells, seeps, and one short perennial stream. Flows from springs and seeps range from seasonal dampness to about seven gallons per minute. The majority of the springs flow from fractures and joints in the igneous and metamorphic basement complex,

and appear to be supported by local aquifers. Past monitoring indicates that discharge at some springs is decreasing, and compared to historic accounts surface water has decreased significantly from 50 years ago. The cause is uncertain and may be attributable to climate changes, changes in vegetation, sampling error, water pumping and use, or natural variation.

Several oases, encircled by California fan palms, are found in the park and provide a dramatic contrast to their surroundings. They symbolize the importance of water in shaping the landscape and sustaining life in the desert.

Three artificial impoundments — Barker Dam, Cow Camp, and Keys Lake — contain significant amounts of water most years. These are considered historic features that were constructed to supply water for ranching. Barker reservoir is drained periodically in order to get rid of goldfish introduced by visitors. Populations of native and introduced waterfowl and other wildlife have developed around the reservoirs.

### **Floodplains**

Floods and flash floods occur in all of the drainages in the park. Surface flows in most drainages only result from heavy precipitation and last only a few hours or days. Though most visitor facilities (with the exception of headquarters) appear to be outside major floodplains, no formal studies have been conducted. Numerous flood-prone drainages cross park roads. Future road designs must consider the drainages and must not disrupt the natural water and sediment transport capabilities of these channels. Flow is so infrequent that interruptions of traffic are rare.

Headquarters and the Oasis of Mara are on an alluvial floodplain with numerous scattered channels. The flood hazard has not been formally evaluated. It is assumed to be somewhat mitigated by surrounding roads and other development that disrupt surface flow patterns.

### **Wetlands and Riparian Habitats**

The park has very few wetlands. The wetland habitats are associated with the five oases. Lack of defined trails and heavy visitor use around the Cottonwood Oasis have resulted in damage to vegetation, soils, and the spring. There are riparian areas in Smithwater Canyon and near the historic dams at Keys Ranch, Cow Camp and Barker Reservoir. Some springs support prolific vegetation but with little or no surface water.

### **Water Rights**

California recognizes surface rights based on the doctrine of prior appropriation and the riparian doctrine. For groundwater, California recognizes both correlative and appropriative rights. In addition, the federal reserved right doctrine applies to federal reservations. These rights potentially apply to any or all of the 120 known water sources in the park.

Under the doctrine of prior appropriation, the entity that first diverts water for beneficial use has the prior right to use the water. As of December 19, 1914, exclusive means of making an

appropriation was by permit from the California Water Resources Control Board. The requirement for a permit is applied to surface waters of subterranean streams flowing in known or definite channels. Under the riparian doctrine, riparian rights were subject to the doctrine of reasonable use, which limits all rights to that quantity reasonably required for beneficial use. Water must be used on the land bordering the stream and may not be diverted out of the watershed.

The federal government may also hold reserved rights, which arise from the purposes for which the land is withdrawn. When the federal government reserves land for a specific purpose, it also reserves, by implication, enough water unappropriated at the time of the reservation as is necessary to accomplish the purposes for which Congress or the president authorized the land to be reserved, without regard to the limitations of state law.

Percolating groundwater is not under the jurisdiction of the California State Water Control Board. The owner of the land overlying groundwater has the first right to withdraw water for reasonable beneficial use on its overlying land. No permit is required.

The extent of water appropriation in areas adjacent to the park will not be known until the rights in these areas are adjudicated. Water for visitors and administrative use in the headquarters area is supplied by the town of Twentynine Palms. The town of Joshua Tree provides water for administrative uses in the Indian Cove area. Water for Lost Horse ranger station and Cottonwood Springs is provided by NPS-owned wells.

### **Water Quality**

Ground and surface water appears to be unaffected by water use outside the park since the majority of the land is at a higher elevation than its surroundings, and no water flows in from outside sources. There have been documented increases in metal contaminants in ephemeral pools created by seasonal rainfall. This is probably due to an increase in airborne pollutants.

### **AIR QUALITY**

The park has been designated as a class I airshed by the Clean Air Act of 1977. This classification allows the least incremental increase in air pollutants of all classes. The Clean Air Act (section A) also gave the National Park Service substantial responsibility for the prevention of any future damage to air quality and for remedying any existing impairment to visibility in mandatory class I federal areas resulting from human-caused pollution.

Air pollution is detectable on most days. Summer months have the worst levels, and visibility is frequently impaired. During the winter air quality is generally good when the prevailing air flows are not from the Los Angeles basin. The Little San Bernardino Mountains can form a barrier to the air pollution from Los Angeles with pollutants filtering in from southwest to northeast. Very small amounts of air pollutants are generated in the park and are primarily from automobiles and dust. Automobile exhaust and the emissions from diesel generators contribute only minor amounts of pollutants. Vehicle traffic on the dirt roads is very light and does not contribute significantly to reduced visibility.

#### THE AFFECTED ENVIRONMENT

National air quality standards for ozone have been exceeded in the park, especially during summer months, and air pollution damage to plants in the biomonitoring garden have been documented. Besides existing air pollution sources, new sources outside of the park, such as landfills and electrical power plants, have been proposed by private developers.

Joshua Tree National Park contains several critical desert vistas, such as the 360° panorama from Ryan Mountain. Many subtle earth colors are displayed in the desert, and plants have adopted subdued photochemical colorations, exchanging dark greens for grays and browns.

The park has excellent star gazing because of the clear desert air and lack of artificial light.

Standard visual range averages 50 miles and is highest during winter, lower during fall and spring, and lowest during the summer. While natural levels of desert haze associated with fine dust particles is frequently mentioned in historical literature, there is little doubt that most visual degradation has taken place in the past decade.

## THE CULTURAL ENVIRONMENT

### ARCHEOLOGY

The Joshua Tree area has been the focus of sporadic archeological investigations for over 60 years, but the sequence of prehistoric human occupations is still imperfectly understood. Fluted projectile points of the Paleo-Indian period have been found elsewhere in the region. These artifacts are thought to be associated with a tradition of big-game hunting that may date back to 9000 B.C.. Artifacts of a slightly later period, the Early Archaic, which include those of the Dieguito and Lake Mohave complexes, were also found in the region. There may be evidence at Joshua Tree National Park of Paleo-Indian or Early Archaic occupations. Good evidence exists of human occupation in what is now the park during the Middle and Late Archaic periods, which together range from about 3000 B.C. to A.D. 1100. Artifacts of the Pinto complex dating from about 3000 B.C., such as Pinto projectile points, are well known by archeologists. They come from the Pinto Basin type site and from other sites in the park. Type sites are those with distinguishing characteristics of an identified and defined cultural complex. Patayan occupation or influence from the lower Colorado River region, associated with brown and buff ceramics, may have begun as early as A.D. 750 in what is now the park. Fitting the archeology into categories like "Middle Archaic" or "Patayan" assumes significant changes in lifeways, economy, and social organization. A more useful model is the "Desert Culture" or "Desert Archaic," an early, successful, and long-lasting adaptation to desert living. This mode of living is presumed to have been characterized by small, mobile bands and by participation in a mixed hunting and gathering economy. Although milling equipment, the bow, ceramics, and perhaps even horticulture were added to the culture over time, the basic configuration of the culture may have remained relatively stable.

After about A.D. 1000, occupation of the park area increased considerably, judging from the frequency of sites that date within the last thousand years. At the time of European contact, the boundaries of three American Indian groups — the Cahuilla, Chemehuevi, and Serrano — intersected at points now in the park. The descendants of these Indian groups continue to live in the area and have cultural interests in the park.

### HISTORY

Exploration, cattle raising, homesteading, and mining shaped what is now Joshua Tree National Park. The first European to enter the area was a Spanish army officer, Pedro Fages, commander of California's Spanish forces, who described the "date palms," probably Joshua trees, which he saw as he crossed the Mojave Desert in 1772. More Spanish expeditions in the area took place in 1774 and 1776. The southern periphery of the present park was briefly explored from December 1823 through January 1824 by Captain Jose Romero, representing the government of Mexico, who was dispatched to find and evaluate for overland travel the east-west Cocopa-Maricopa Trail from San Bernardino to the Colorado River. This route of the Cocopa-Maricopa Indians was one of the major pre-European contact Indian trails in the area. Another such trail was the Mojave, located farther north, which also extended from San Bernardino to the Colorado River, connecting with north-south trails along both banks of the river.

Jedediah Smith made an overland journey to California in 1826. He was a fur trapper with the Rocky Mountain Fur Company who visited the Mohave Indian villages along the Colorado River and then trekked westward over the Mojave Indian Trail toward the Pacific Ocean. There were a few other early expeditions in the 1830s and 1840s. During the gold strike of 1849 gold seekers from the east passed through on their way to central California.

In 1865 the first mining claim was filed in the present park. It was for the Jeff Davis Mine in Rattlesnake Canyon. Mining, mostly for gold, continued in and near the park into the 1960s. Mining over the years added adits, diggings, shafts, equipment, structures, and roads to the landscape. It also added sources of water — wells were dug or pipelines constructed from water sources to process the ore. Approximately 2,000 shafts or other diggings remain.

The first attempts at cattle raising took place in the area in the early 1860s in the Mojave where stockmen grazed large numbers of cattle in the desert in the winter and along the river or wash bottoms in the summer. The high desert had reliable grazing; the galletta grass and succulent saltbushes provided good browse in the winter and spring. The first stockman to graze his cattle in what is now the park apparently was Oliver Smith, whose Texas longhorns grazed in the vicinity of Quail Spring from about 1870 to 1876.

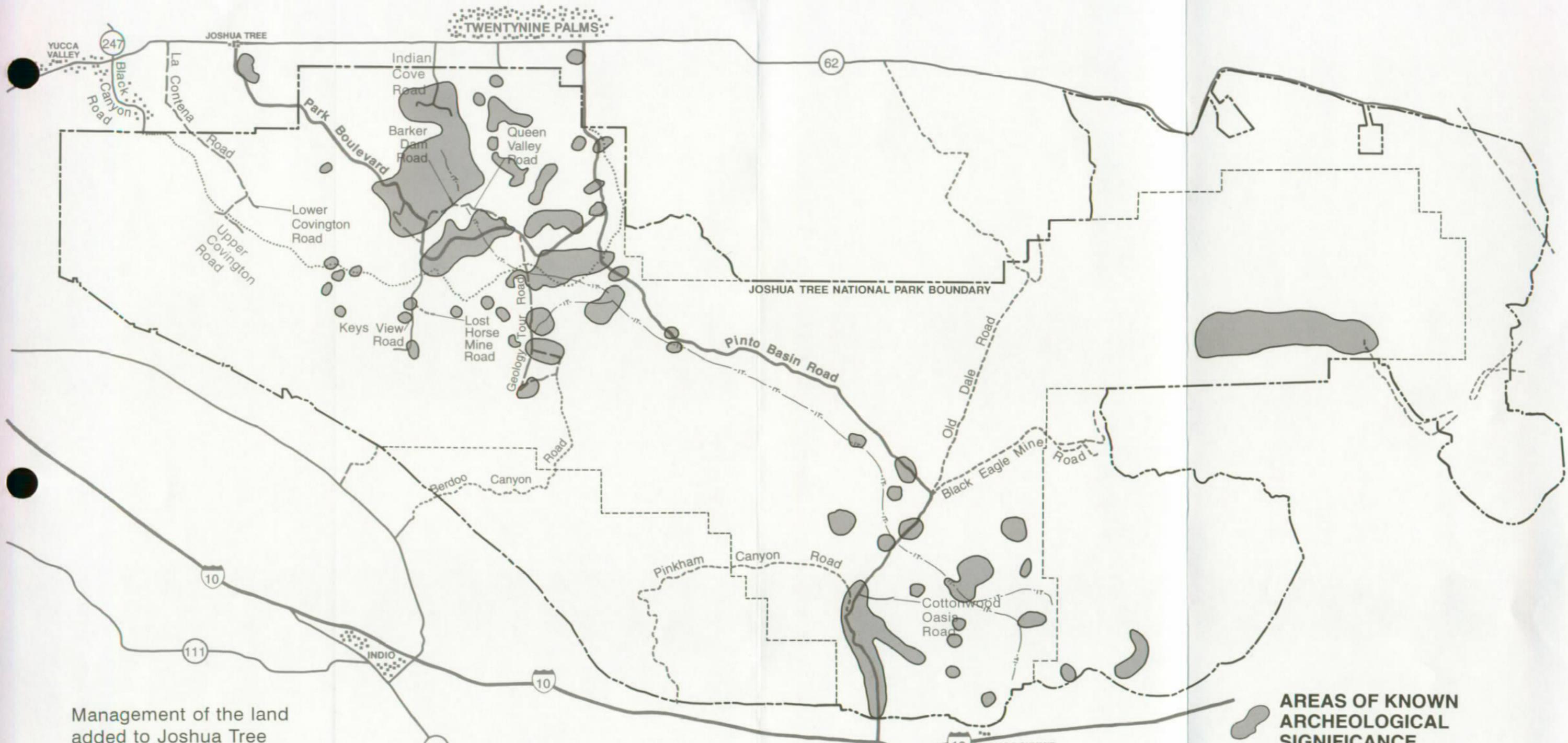
Cattle raising peaked during the 1920s, about the time that homesteading was getting started in the area. It continued at least through the 1940s and may have lasted longer. William F. Keys (1879–1969), who was an entrepreneur, miner, and rancher, lived most of his life on the homestead known as Keys-Desert Queen Ranch. He is known to have maintained a cattle herd of about 100 head into the early 1940s. He stayed on the ranch until his death in 1969 and may have had some cattle into the 1960s.

Cattle raising (which included open-range grazing, ranching with corrals and fences, and even some rustling in the hidden canyons and valleys) brought dams, reservoirs, and wells plus buildings and other structures that often revealed a highly individualistic, entrepreneurial adaptation to the desert. Evidence of ranching remains at several sites, including Keys-Desert Queen Ranch.

## ETHNOGRAPHY

The ethnography and ethnohistory of Joshua Tree National Park involve the traditional life and cultural history of three American Indian groups who lived in the area at the time of European contact. The territories of these groups — the Cahuilla, Chemehuevi, and Serrano — met at a point now in the park. They were mostly hunters and gatherers, although each group also practiced some horticulture. Other groups such as Mohave and Maricopa traders east of the park regularly passed through on treks back and forth to the coast.

The Cahuilla, Chemehuevi, Mojave, and Serrano tribes maintain strong interests in the park. The Agua Caliente Band of Cahuilla Indians, the Cahuilla Tribe of the Morongo Indian Reservation, the Fort Mojave Indian Tribe, the Chemehuevis and Mohaves of the Colorado River Indian Tribes, the Serrano Tribe of the Morongo Indian Reservation, and the Twentynine Palms Band of Mission Indians are in regular contact with the park. They want to gather traditional plants for food, medicine, and personal (not commercial) crafts; meditate and pray in a sacred area; or study the archeological and ethnographic artifacts in the



Management of the land added to Joshua Tree National Monument by the national park legislation will be addressed in the wilderness and backcountry management plan.

 **JOSHUA TREE NATIONAL PARK BOUNDARY**  
 **PREVIOUS JOSHUA TREE NATIONAL MONUMENT BOUNDARY**

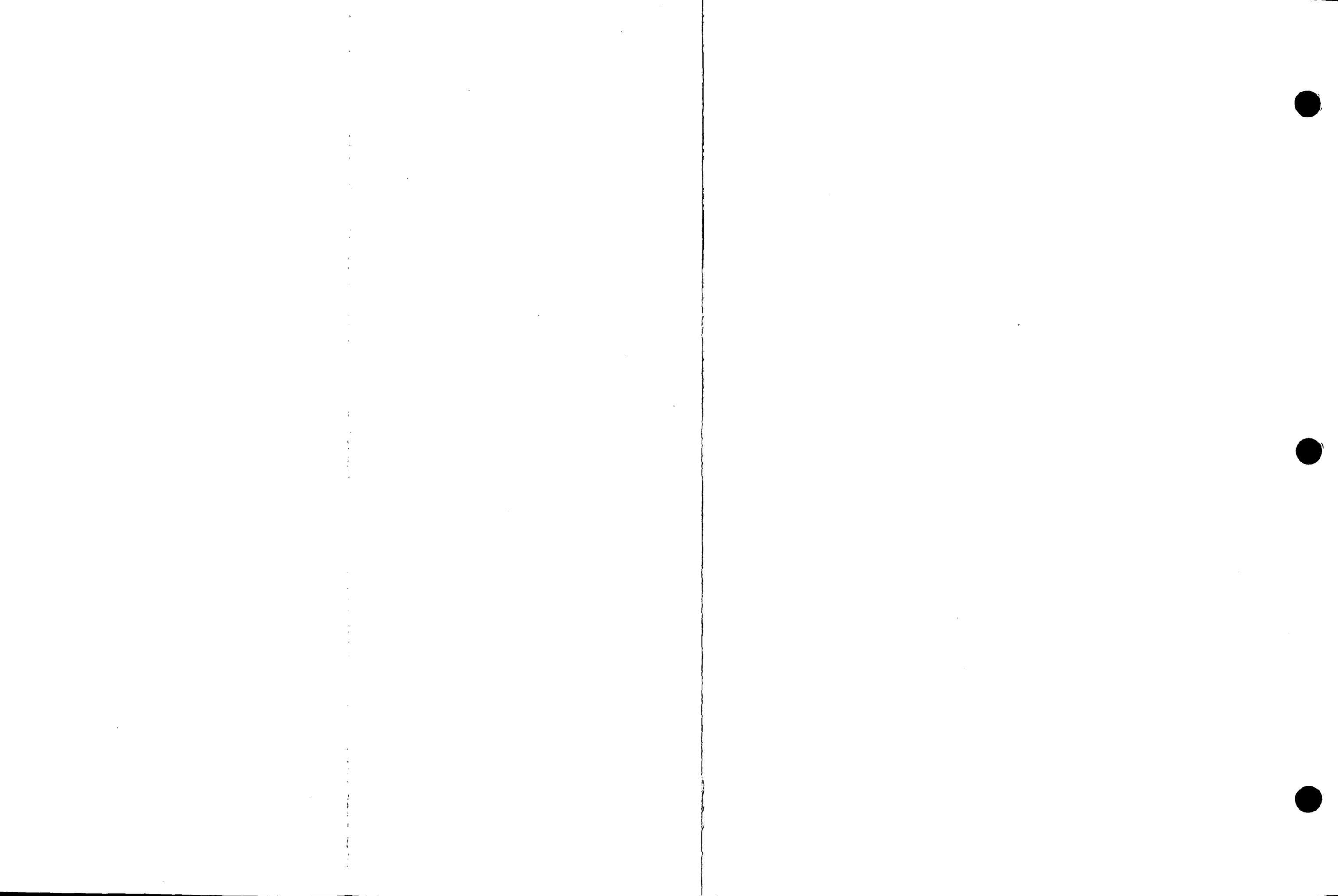
 **AREAS OF KNOWN ARCHEOLOGICAL SIGNIFICANCE**  
 **HISTORIC INDIAN TRAVEL ROUTE**

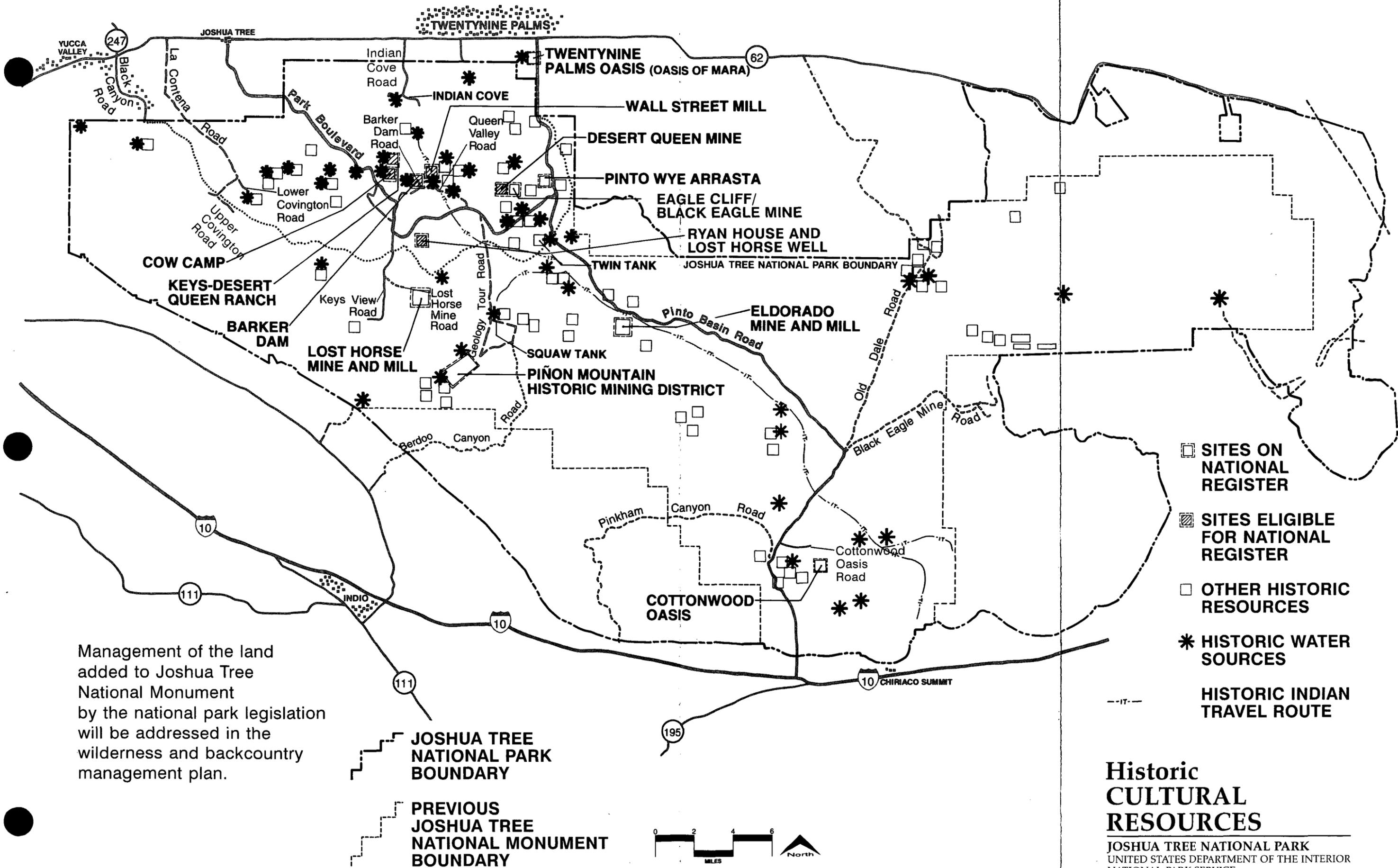
**Prehistoric CULTURAL RESOURCES**

JOSHUA TREE NATIONAL PARK  
 UNITED STATES DEPARTMENT OF THE INTERIOR  
 NATIONAL PARK SERVICE  
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ON MICROFILM





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**JOSHUA TREE NATIONAL PARK BOUNDARY**

**PREVIOUS JOSHUA TREE NATIONAL MONUMENT BOUNDARY**

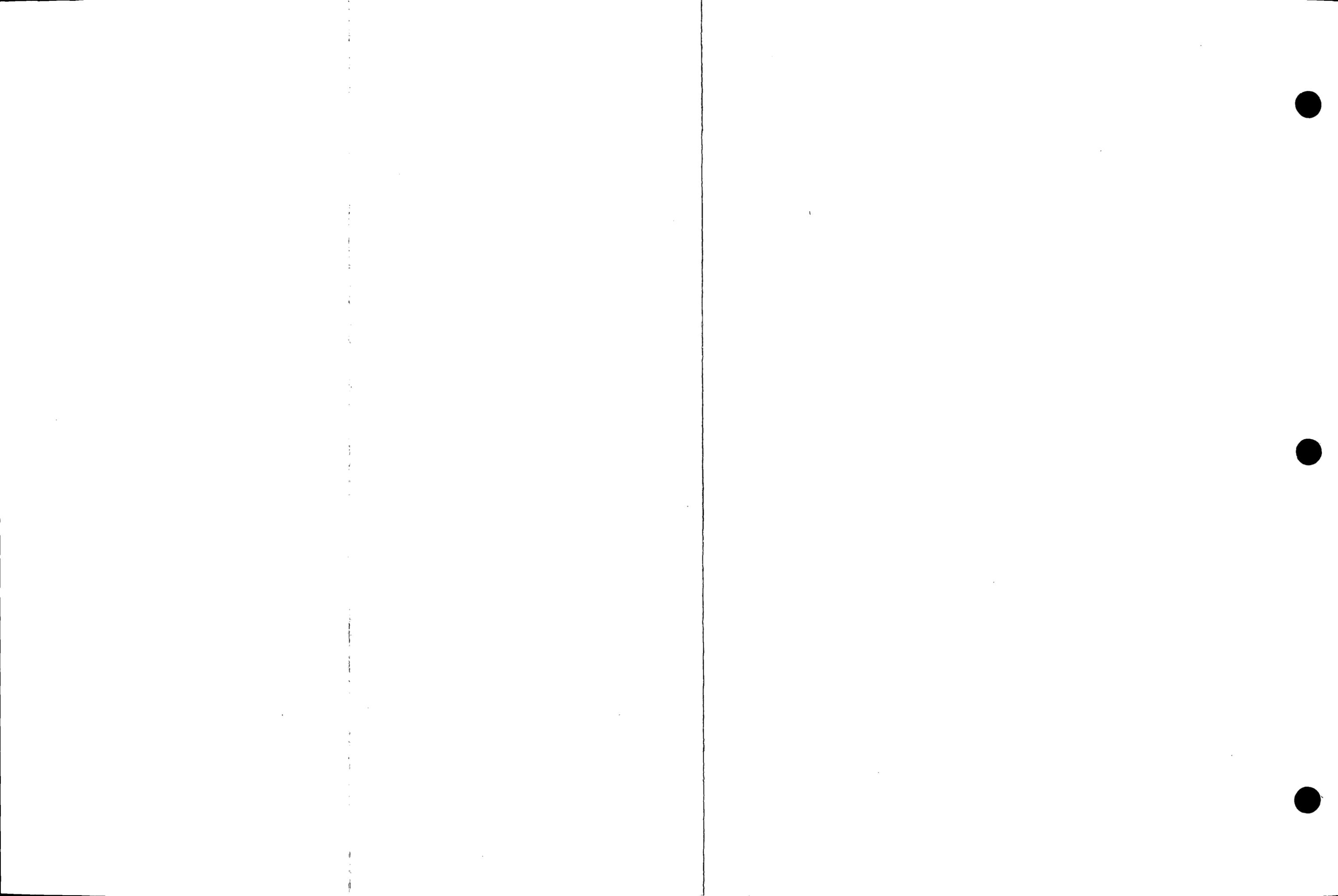


- ☐ SITES ON NATIONAL REGISTER
- ▨ SITES ELIGIBLE FOR NATIONAL REGISTER
- OTHER HISTORIC RESOURCES
- \* HISTORIC WATER SOURCES
- HISTORIC INDIAN TRAVEL ROUTE

## Historic CULTURAL RESOURCES

JOSHUA TREE NATIONAL PARK  
 UNITED STATES DEPARTMENT OF THE INTERIOR  
 NATIONAL PARK SERVICE  
 DSC/May '94/156/20,046

ON MICROFILM



Campbell Collection and other park collections to confirm more of their heritage and to pass it on to young people.

## **ARCHEOLOGICAL SURVEYS AND HISTORICAL STUDIES**

There have been about two dozen archeological surveys conducted in the park, ranging from the early exploratory work in the 1920s and 1930s to more recent small scale, development-oriented surveys. A recent survey of 75 miles of road corridor provided a lengthy transect of the various environmental zones of the park (Ervin 1985). Still, less than 10% of the park has been surveyed systematically to modern standards. As of 1989 about 250 archeological sites had been recorded.

Numerous historical studies have been completed.

### **Types of Sites**

Archeological sites of all periods tend to be small and usually are not obvious. Most frequent are the remains of small campsites. These are found often as eroded open sites, more rarely as buried open sites — such as the remains at the Oasis of Mara — and occasionally as rock shelter sites. Sites are marked by scatters of chipped stone, ground stone, and infrequent ceramic sherds. There may also be small rock rings, rock alignments, cairns, bedrock mortars, and grinding slicks. The presence of "midden" or dark, organic, and artifact rich deposits has been noted. A considerable amount of rock art has been recorded in the park. Artifact caches, remnant trails, and quarries of chippable stone are occasionally found.

In addition to prehistoric sites, historic Euro-American sites, including ranches, homesteads, and mines, probably have archeological components. These are likely to include trash dumps, buried structures, unrecorded features, and other aspects needing archeological investigation.

### **National Register Status**

Six historic period sites have been placed on the National Register of Historic Places: Barker Dam, Cow Camp, Desert Queen Mine, Keys-Desert Queen Ranch, Ryan House and Lost Horse Well, and Wall Street Mill. Twentynine Palms Oasis (the Oasis of Mara) as an archeological and historical site and six additional historical sites have been formally determined eligible for the national register: Cottonwood Oasis, Eagle Cliff (Black Eagle) Mine, Eldorado Mine and Mill, Lost Horse Mine and Mill, Pinyon Mountain Historic Mining District, and Pinto Wye Arrastra.

Barker Dam is a stone and concrete dam built across a natural tank of water to impound rainwater for cattle. It was begun in the early 20th century and expanded later. It became part of the homestead holdings of William F. Keys (1879–1969) and was "a vitally important permanent water hole in [what became] Joshua Tree National Monument" (Greene 1983).

Cow Camp consists of ruins of buildings and a curved concrete dam built by William F. Keys in the late 1940s as a water source for cattle. A well was dug earlier by others in the late 19th century. The site is important as part of a theme of agriculture in relation to livestock raising.

The Desert Queen Mine is a late 19th century gold mine that was owned by William F. Keys in the early 20th century. Remains include tunnels, shafts, and adits plus a stone building and some foundations of structures. The mine "is said to have produced several million dollars. The first production was reported in 1895 and the last in 1941" (Greene 1983).

Keys-Desert Queen Ranch was the 20th century homestead of William F. and Frances Lawton Keys. The ranch house — including the house itself and several related structures as well as a "concrete dam northeast of the ranch house [that] stored water from seepage and rainfall" (Greene 1983) — was the headquarters of horticultural, livestock, and mining operations. This property epitomized the Euro-American subsistence and entrepreneurial way of life in the California Desert during the late 19th century and the early and middle 20th century in what became Joshua Tree National Park (Greene 1983). Many artifacts remain from Keys-Desert Queen Ranch. They are part of the park's collections and could be used for onsite display, consistent with the concept of preservation for interpretation. Volunteers have been identified for equipment demonstrations.

Ryan House and Lost Horse Well reflect a cattle raising and mining complex of the late 19th and early 20th centuries. It is typical of the subsistence and entrepreneurial ranching and mining operations of the California desert. Jepp and Tom Ryan built the adobe ranch house, whose walls are still standing, about 1896. The site is also important in the administrative history of the park because it served as the residence and headquarters of District Ranger Matt Ryan during the late 1930s and early 1940s.

Wall Street Mill is a cattle-watering and ore-milling site that was active from 1896 to the 1960s. It was bought by William F. Keys in 1930. In 1933 he moved a two-stamp mill there. The two-stamp mill "was first made in Los Angeles for E. Holland and Company by the Baker Iron Works about 1891" (Greene 1983); it is still in place.

Cottonwood Oasis is an important natural water source that apparently has been known to Euro-Americans since the mid 1880s. It served mines on the north and east side of the Pinto Basin as well as cattlemen in the area and freighters and travelers passing by.

Eagle Cliff (Black Eagle) Mine is a gold mine with stone ruins, a roofed rock-sheltered cabin, and other associated rock shelters used for mining activities plus a blacksmith site. Its peak period was from the late 19th century to the first third of the 20th century. It was owned by William F. Keys, and ore was processed at his Wall Street Mill.

Eldorado Mine and Mill is an early 20th century gold mine that produced silver and molybdenite up until World War II. Remains include shafts, mine workings, cast iron and concrete vats, machinery remnants, mill and mining campsites, some stone foundations, and the ruins of three buildings.

Lost Horse Mine and Mill had to do with gold mining from the 1890s through the 1930s. A "ten-stamp mill was erected at the Lost Horse Mine by the Lost Horse Mining Company soon after 1897. Water to run the plant was piped in from Lost Horse Spring and from several wells near the spring site" (Greene 1983). Much of the mill is intact.

Pinto Wye Arrastra is an outstanding example of a relatively large engine-powered, wagon-wheel arrastra that is important in the region "as the only wagon wheel arrastra yet found possessing integrity of location and construction" (Greene 1983). It is in excellent condition, and its period of activity seems to have been the early to mid 20th century.

Pinyon Mountain Historic Mining District consists of several mines and mills that operated from the late 19th to mid 20th centuries. Distinctive features include the shafts of the Pinyon Mine, which are lined with piñon logs representative of "a type of early shaft construction prior to the time milled planks and beams became accessible" (Greene 1983).

Twentynine Palms Oasis (Oasis of Mara) has been an important natural water source and area of settlement, known traditionally to indigenous tribes such as the Serranos and Chemehuevis. They shared a reservation there through the early 20th century. Reservation land remains in the area that belongs to the Twentynine Palms Band of Mission Indians, although they do not reside there but in the greater park area. Euro-American habitation in the oasis vicinity began in the 1870s.

No sites or districts that are solely archeological have been formally determined eligible for the national register. It has been suggested that all known sites should be considered eligible, but that formal determination and nomination should wait until further information becomes available. The data gathering is underway.

Nearly all sites recorded since 1970 have been assessed as eligible by project archeologists. For example, five out of the seven cremation sites excavated in the early part of this century have been evaluated as potentially eligible. These sites are associated with the repatriation of American Indian human remains that took place in the park.

A site in the general vicinity of Cottonwood Canyon and Cottonwood Springs is in pristine condition because of its isolation. It has circular earthen depressions for dwellings and storage structures as well as a host of surface artifacts. Apparently this habitation site functioned as a village or extended encampment during the protohistoric or historic period. The site possesses a great depth of time, and excavation has the potential of yielding much additional archeological information. This site is an outstanding example of the archeological potential of the park and should be considered for the national register. All archeological sites in the absence of evaluation must be treated as if eligible for the National Register of Historic Places.

Preliminary ethnographic evidence suggests that one particular location in the park may be a sacred site. Chemehuevi use of the site for prayer and meditation was observed in 1991 (Schneider 1992). The spur of the Mojave Desert and Colorado Desert Indian Trail leads directly to the site, as indicated on the cultural resource maps. All such sites are possible traditional cultural properties. In the absence of evaluation they must be treated as if eligible for the national register.

Park Boulevard, Keys View Road, Indian Cove Road, and Pinto Basin Road are all considered ineligible for the national register because of integrity problems. These roads generally follow the corridors and in some cases parallel or overlay historic mining, cattle-related, or stage and freighting transportation routes. They also may represent road segments adapted for vehicle use during the early 1940s. However, they have been paved, realigned, widened, and otherwise converted for use as circulation roads. The principal paved roads lack historic significance and integrity (Schneider and Warren 1992).

There are other roads that have not been examined, such as the route from Indio through Pushawalla Canyon to mines in the Hexie Mountains and the road to Pinto Wells from the Chuckwalla Valley. As part of the resources management plan, preliminary historical examination will consider nominations for listing on the National Register of Historic Places.

The roads generally accessible to the public have been preliminarily examined for potential eligibility. Eight of the 13 roads examined are potentially eligible (Schneider and Warren 1992). Nomination is appropriate because a formal determination is needed on the historical significance and integrity of the narrow dirt road known as Route 100, or Queen Valley Road, from Park Boulevard to Hidden Valley as an original access route for cattle or mining operations. The other seven represent the numerous dirt, four-wheel-drive roads in the park and should be nominated as follows: (1) Berdoo Road from the Geology Tour Road to the southern boundary, (2) Black Eagle Mine Road, (3) both branches of the Eureka Peaks-Covington Flats Road, (4) the Geology Tour Road, (5) Lost Horse Mine Road, (6) Old Dale Road, and (7) Pinkham Road. These roads are associated with the historic mining, cattle, and stage and freighting operations that took place in what is now the park. They retain much of their integrity as historic transportation routes.

Indigenous subsistence patterns, trails for seasonal migrations, and regional trade are important aspects of the history of the area prior to European contact. The Indian Trail, connecting the Mojave and Colorado Deserts, indicated on two cultural resource maps, is worthy of detailed archeological investigation for national register consideration.

Samuelson's Rocks, in the general vicinity of Quail Spring, should be evaluated for national register eligibility. Around 1927 John Samuelson, a miner and homesteader, chiseled his own sayings on the flat, smooth surfaces of eight rocks in a boulder field. He included comments on economics, evolution, government, nature, and politics. Samuelson's messages are remarkably well preserved and could be significant as historic folk art.

## REGIONAL AND ADJACENT LAND USE

The proximity of Joshua Tree National Park to the Los Angeles metropolitan area and to a large military base generates a steady flow of visitors. The recreational demands of the population of the Los Angeles region are enormous. For people who are subjected to increasing automobile congestion, air pollution, and disappearing open space, the desert offers much in the form of rest and relaxation, fresh air, clear skies, outdoor recreation, solitude, and contemplation. Many return frequently for specific recreational activities. California desert environments have traditionally been viewed as wastelands, and the park has been damaged and abused because many of the visitors are not aware of the fragile nature of the resources.

Counties within a 100-mile radius of Joshua Tree National Park are Los Angeles, Orange, Riverside, San Bernardino, Imperial, and San Diego. These counties contain the major population centers of southern California. According to the 1990 census, the population totalled more than 18 million people and the population is still growing. Over 10 million acres of public land in these counties are available for recreation. The majority are managed by the Bureau of Land Management.

Some land adjacent to the park has been subdivided into small desert communities for homesites. Morongo Valley, which parallels most of the north boundary, is almost completely subdivided into homesteads or desert homesites. Other desert homesites extend along the southwestern boundary along the foot of the Little San Bernardino Mountains. Farther to the south lies the sea level Coachella Valley, an irrigated agricultural area of date palms, vineyards, and citrus groves. The mountainous portions along the boundary are largely in the public domain, where the primary use is vehicle-oriented recreation. Along the eastern boundary in the Eagle, Coxcomb, and Sheephole mountains, there are numerous gold and silver mining claims. The largest group of active mining claims is the Eagle Mountain Mine, owned and operated by the Kaiser Steel Company, which mined iron ore at the southeast corner. The buildings and clearings of small homesteads belonging to mine employees along the northern boundary of the area affect the natural scene, and there is trespass from prospecting and mining activity.

The world's largest landfill is proposed within 1 mile of the boundary. The landfill would use abandoned open mining pits in the Eagle Mountains. Its proximity poses some obvious threats to the adjacent wilderness. Blowing trash, dust, noise, and odors could destroy the fragile setting, and the proximity of this operation presents many less obvious threats to the natural ecosystem. The landfill would accommodate 20,000 tons of refuse each day for more than 100 years. Household trash attracts scavengers such as ravens and coyotes, which can flourish in such a setting. Ravens are known to eat young tortoises; the largest known population of tortoises in the park is within 6 miles of the proposed landfill.

If the landfill is not constructed, the abandoned open pits would continue to attract other development proposals. There is at least one current proposal to fill the pits with water for use in a hydroelectric operation. This type of development could have serious effects on adjacent natural systems by introducing a wide range of nonnative plant and animal species.

#### THE AFFECTED ENVIRONMENT

The world's largest Marine Corps base is nearby. Military overflights from a number of bases already impact the wilderness. Overflights, noise from military training, and night sky light pollution affect the park.

Urbanization and incompatible land uses along the boundary can cause profound deterioration of resources. Examples of these threats include air pollution, groundwater pumping, noise and light pollution, alteration of natural systems along the boundary, and visual pollution of scenic vistas.

## VISITOR USE

### ACCESS AND CIRCULATION

Access to Joshua Tree National Park is from two major east-west transcontinental arteries. Visitors enter directly from Interstate 10 through the Cottonwood entrance by using the freeway interchange 26 miles east of Indio and travel north 1 mile to reach the south boundary.

Travelers from the west on Interstate 10 leave the freeway at the State Route 62 interchange, 16 miles east of Banning, and travel north and east to Joshua Tree, Indian Cove, and Twentynine Palms. Travel is over four-lane paved highways.

The park is linked to Interstate 40 through Amboy, 50 miles to the north, by paved highway from Twentynine Palms. Travel from the metropolitan Los Angeles area, 150 miles to the west, is over Interstate 10 and State Route 62. This latter route extends eastward to Parker, Arizona, on the Colorado River.

Visitors occasionally enter the park through one of several dirt road entrances, some of which connect with the paved roads in the park. The four paved road entrances account for over 90% of the total visitation, with about 70% using the Joshua Tree and Twentynine Palms entrances.

There are approximately 80 miles of unimproved former wagon trails in the park. Many of these trails have had little or no use in the past 20 years. Washouts from summer storms have obliterated some of the former roads. Management actions in the 1970s closed over 70 miles of roads.

Nearly all transcontinental bus lines provide services to Indio, Palm Springs, and Banning. There is local bus service between Palm Springs, Banning, and Twentynine Palms. Palm Springs Airport has the nearest commercial passenger service. Private and charter planes can land at the Yucca Valley, Twentynine Palms, or Chiriaco Summit airports.

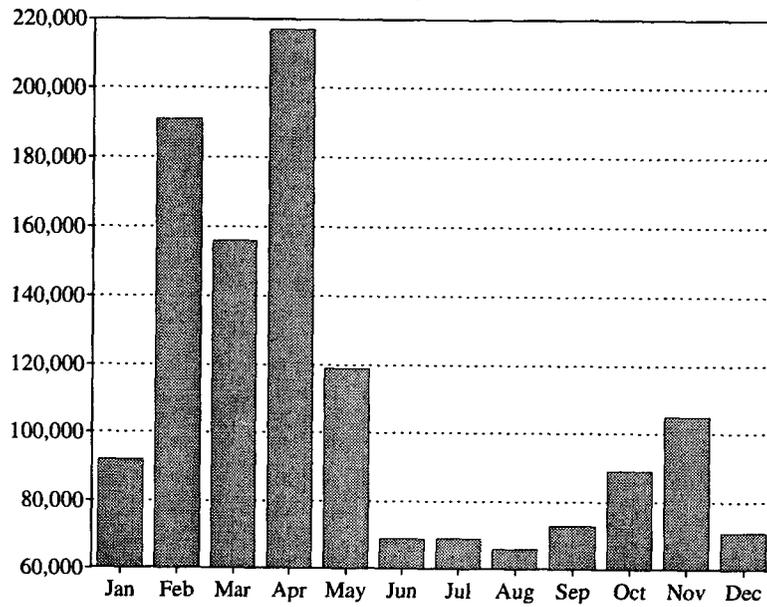
Circulation through the park for public use is over 252 miles of roads; 80 miles of paved and 172 miles of unimproved dirt roads lead the visitor away from the developed areas into the desert. With the exception of about five miles in the Indian Cove, Black Rock Canyon, and Twentynine Palms area on the north edge of the park, all paved roads in the park are connected.

### VISITATION

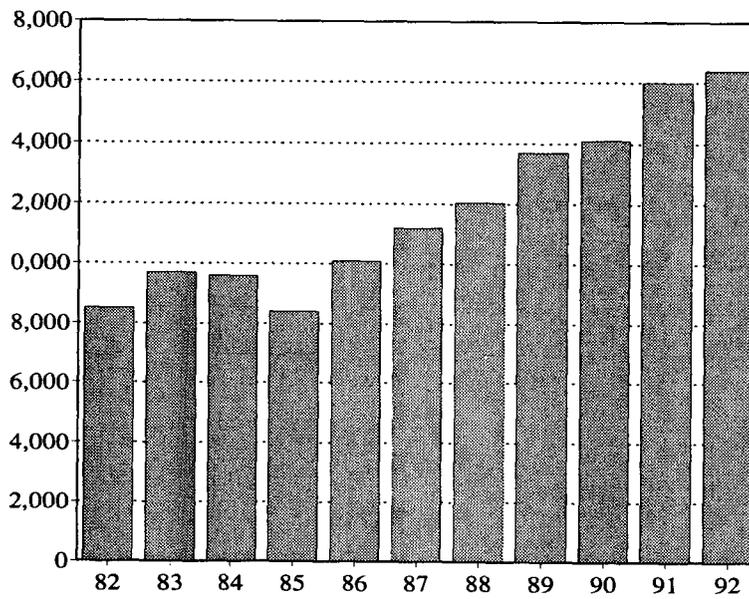
The deserts of California have incurred dramatic human development in the last fifty years. Increased populations have meant increased visitation. The park is about 120 miles east of Los Angeles. Over 18 million people live in the greater Los Angeles/San Diego area and the population is expanding rapidly. The most recent visitor survey (April 1991) found that 76% of those polled lived in southern California. Approximately half of the Californians are repeat users and the majority of visits are for less than one day.

### Joshua Tree Visitation

Monthly for 1992



1982-1992



Annual visitation passed the 1 million (1,026,430) mark in 1990. About half the annual visitation takes place between February and May.

Increased visitation and inadequate visitor control has had a number of consequences. Roadside damage has resulted from illegal parking, desert vegetation has been destroyed at campgrounds, around parking areas, and along social trails, and the visitor experience has been compromised by conflicting use and overcrowding.

Parking in designated parking areas and along road shoulders in the heavily used areas (see Parking and Pullouts graphic) far exceeds capacity during heavy use periods. Peak season parking demand in these areas has been estimated to be: Wonderland of Rocks area — 430 cars/37 RVs, Cap Rock — 25 cars/2 RVs, Ryan Mountain — 100 cars/10 RVs. Geology Tour Road, Split Rock and Live Oak, and Keys View use far exceeds present capacity.

If visitation continues to increase at near the same rate, the total could reach 3–4 million over the next 10–15 years. However, this growth rate could be heavily influenced by changing economics and the related populations trends in southern California.

## **VISITOR ACTIVITIES**

Viewing and studying scenery, plants, and wildlife are the primary visitor activities, followed by general recreational activities (hiking, camping, picnicking, rock scrambling), and viewing and studying cultural sites. Joshua Tree is popular with technical rock climbers because of the quality of the climbing and ready access to the rocks and camps. A number of visitors are technical rock climbers, and many other visitors watch the climbers.

The sites visited by the majority of visitors to Joshua Tree are Jumbo Rocks, Cholla Cactus Garden, Hidden Valley, Cottonwood Springs, Oasis Visitor Center and Keys View.

## **Frontcountry Experiences**

The visitor experience is currently focused on the Mojave Desert section of the park, with the Lost Horse and Pinto Wye planning units most heavily used. The Indian Cove and Covington Flats units are very heavily used by local and repeat visitors. The major paved road (either northwest to south or south to northwest) traverses a cross section of the park's resources. From the northwest (Joshua Tree) entrance, visitors travel through the most scenic portion of the high desert with magnificent stands of Joshua trees. From there visitors move on to the Hidden Valley area to hike, camp, climb, and learn about people from both ancient and recent times who have adapted to this harsh environment. The main tour route has one spur road that takes visitors to Keys View. It has the most outstanding views of valley, mountains, and desert from an elevation of 5,200 feet. From Pinto Wye visitors have the choice of traveling north to the Oasis of Mara to explore the oasis and get information at the visitor center, a side trip that requires backtracking on the route, or south through the transition zone. The Pinto Basin provides a stark contrast with its vast spaces and parched landscape. Visitors may then choose to stop at a palm oasis.

The Oasis Visitor Center is the only place that offers a full range of information and interpretation. Both the facility and the interpretive media are inadequate to meet the current needs of visitors. Visitors entering from the south (Cottonwood entrance) must travel long distances to reach this facility, usually with little awareness or understanding of the resources they have passed along the way. If they wish to experience both the Mojave and Colorado Deserts, a side trip is necessary. The west entrance (Joshua Tree entrance) is a basic fee collection station with only a few orientation wayside exhibits and a minimum of information and orientation.

There are 14 developed frontcountry trails less than 2 miles in length. Twelve have self-guiding interpretive media. This trail network provides varying levels of discovery opportunities for visitors.

The park has 10 developed campgrounds: Belle has 17 sites, White Tank has 15 sites, Jumbo Rocks has 130 sites, Ryan has 31 sites, Hidden Valley has 39 sites, Indian Cove has 101 sites, Indian Cove has 13 sites, Sheep Pass has 6 sites, Cottonwood has 62 individual sites and 3 group sites, and Black Rock Canyon has 100 sites. Both Ryan and Black Rock campgrounds provide facilities for campers with horses. Ryan, Hidden Valley and other interior campgrounds fill first during heavy use periods. Cottonwood and Black Rock campgrounds are the last to fill.

### **Threshold Experiences**

A variety of unsurfaced roads (both 2- and 4-wheel drive) provide a totally different experience for those visitors who like to get off the main road. The Queen Valley loop and Covington Flats provide the main 2-wheel-drive experiences. The Geology Tour Road and Old Dale Road presently provide the main 4-wheel-drive experiences.

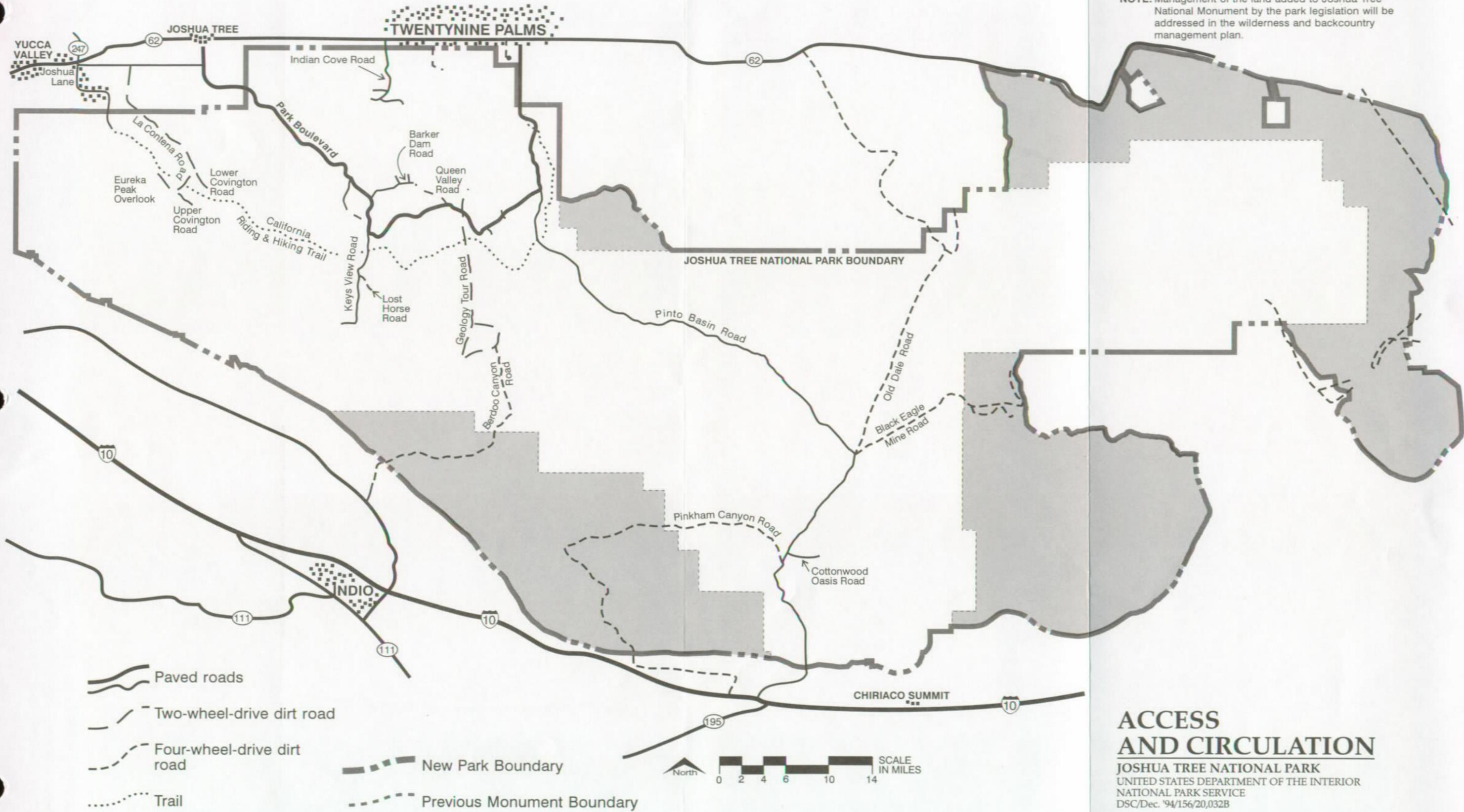
Fifteen hiking trails between 2 and 10 miles in length provide opportunities for exploring resources of the threshold areas.

Rock climbing is increasingly popular throughout the Mojave Desert portion of the park. The Wonderland of Rocks, Hidden Valley, Quail Springs, and Indian Cove areas are the most popular rock climbing locations. There are some 4,000 climbing routes recorded in the park. These include a wide spectrum (faces, overhangs, cracks, etc.) encompassing all levels of difficulty. A few areas of significant historical or geological interest such as Skull Rock, Split Rock, Arch Rock, and the area around Keys Ranch are closed to rock climbing.

### **Backcountry Experiences**

Approximately 593,490 of designated wilderness provide the hardy, adventurous visitor with an opportunity to hike and explore a vast desert landscape.

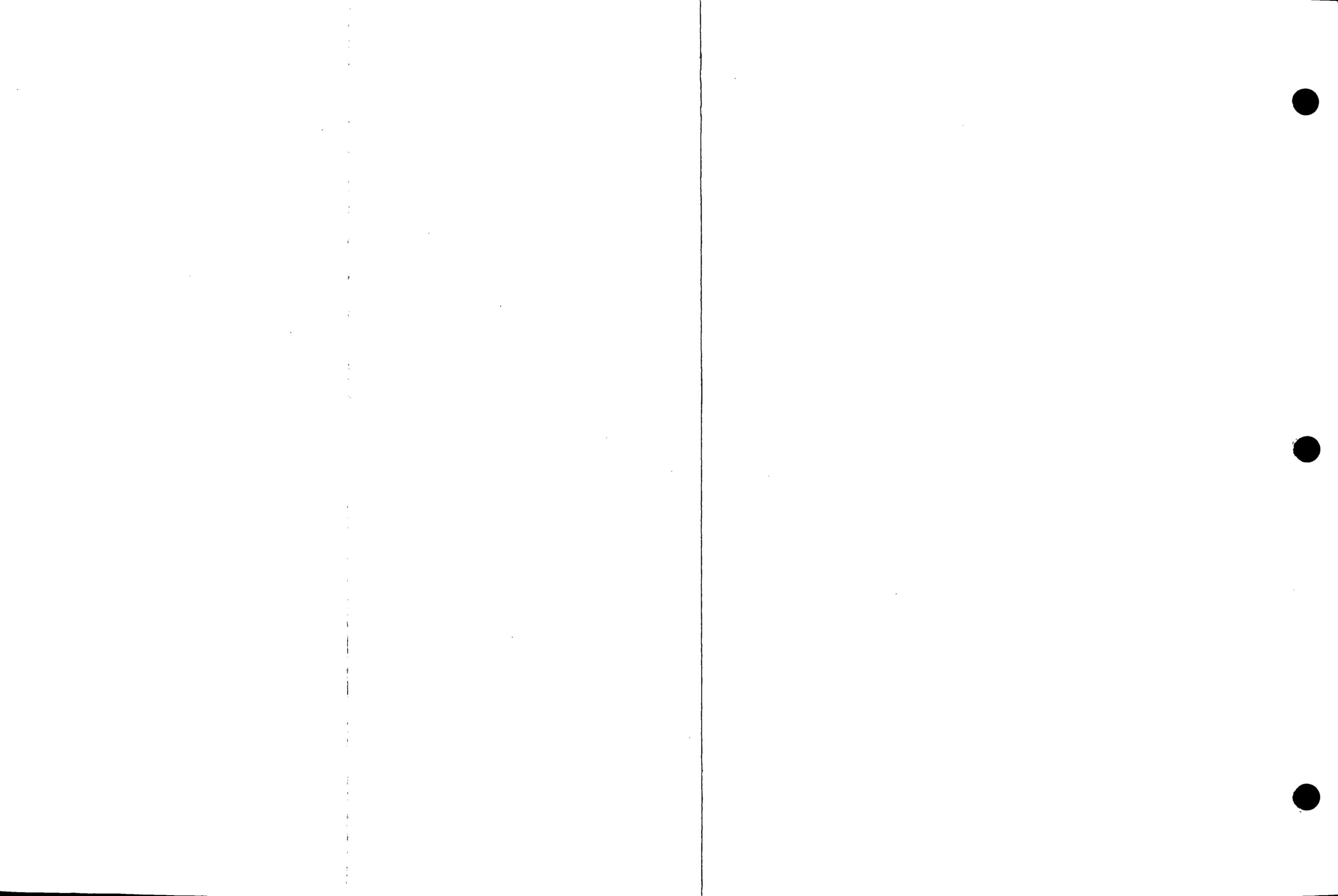
Placement of expansion bolts used in technical rock climbing is presently banned in designated wilderness units. About 33% of the routes in the park are in wilderness units. Of these, about 37% have at least one bolt. Many routes can be climbed using alternative means and can be top roped. Placement of expansion bolts in nonwilderness is allowed.



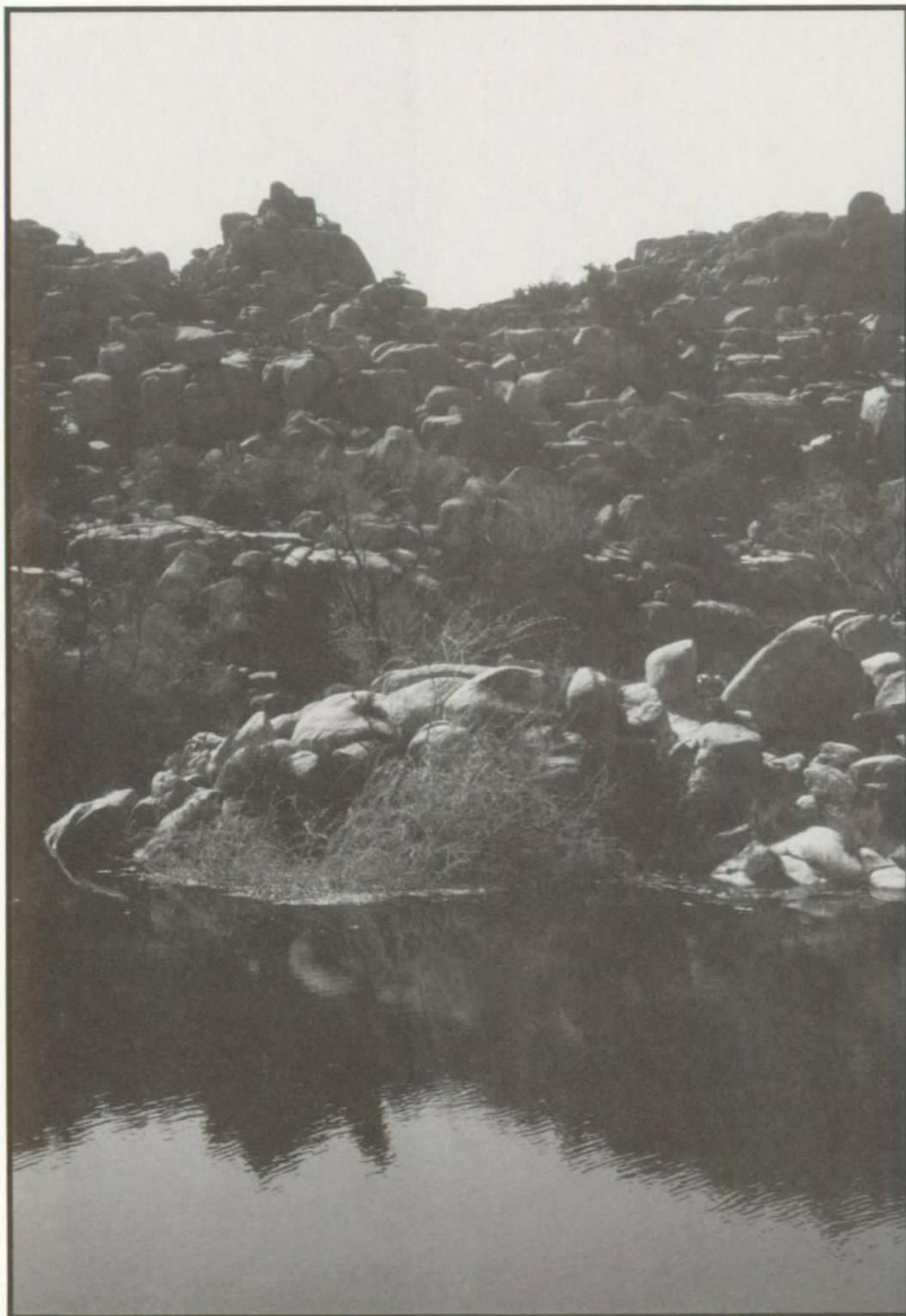
## ACCESS AND CIRCULATION

JOSHUA TREE NATIONAL PARK  
 UNITED STATES DEPARTMENT OF THE INTERIOR  
 NATIONAL PARK SERVICE  
 DSC/Dec. '94/156/20,032B

ON MICROFILM



# ENVIRONMENTAL CONSEQUENCES





## INTRODUCTION

### DERIVATION OF IMPACT TOPICS

To focus on the most significant impact topics, the issues, alternatives, and impacts were evaluated throughout the planning process. All impact topics, including those raised by the public, were evaluated by the planning team and narrowed to specific topics that include only those of significant environmental concern.

### IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

Topics not to be analyzed further include climate, natural hazards, biosphere reserve, wilderness, potential wilderness additions, off-road vehicle use, or external land use. These topics were considered, but there would be no impacts or effects on any of them.

The water resource topics of floodplains, water rights, and water quality will not be analyzed further since there would be no impacts or effects from the alternatives.

Air quality problems in Joshua Tree are associated with the regional airshed, which contains major population centers and power plants. Dust from dirt roads is not significant in comparison to the regional problems. Although visitation is projected to increase, no proposals under any alternative would significantly alter air quality.

Impacts to the surrounding communities from proposed actions in this plan would be minimal and are not further analyzed.

### IMPACT TOPICS ANALYZED

#### Native Vegetation and Soils

There is no parkwide information on soils. Most soils are unconsolidated alluvial material lacking soil profiles. Because soils cannot be identified and because the general analysis of impacts on soils would also reflect the disturbance to native vegetation, these impact topics have been combined in this document.

#### Species of Special Concern

Most vegetation types are regionally common. Species of special concern and desert spring ecological communities are the most sensitive to development. Since listed species (as provided by the U.S. Fish and Wildlife Service and known by the staff) are in areas unaffected by the proposal and alternatives, only Joshua trees affected by road construction are analyzed fully.

Most park wildlife species are regionally common. A total of 14 species of animals are listed by the federal government and the state of California as endangered, threatened, or otherwise

in need of special consideration and protection. Of the listed species, the majority would continue to benefit from management activities because they would be protected from illegal hunting and collection, and their habitat would be preserved. They would be relatively unaffected by the proposal or either alternative. The only species affected might be the desert tortoise, which could be potentially affected by the road construction.

Prior to design or construction, surveys will be complete for any listed plant or animal species.

### **Wetlands and Riparian Habitats**

Desert spring communities and riparian areas are critical wetlands habitat. The only habitat of this type that could be affected by the alternatives is Cottonwood Oasis.

### **Cultural Resources**

Some significant cultural resources have been identified. Some of these would be affected by development and visitor use proposals.

### **Visual Resources**

Visual quality is one of the most significant resource values. Effects on visual resources would result from development, road construction, and possible development on adjacent land.

### **Visitor Use and Experience**

Development and visitor use levels under the alternatives would directly affect the visitor experience. Visitor facilities, roads and trails systems, and availability of information, orientation, and interpretation would all be affected.

## IMPACTS ON NATURAL RESOURCES

### IMPACTS ON NATIVE VEGETATION AND SOIL

Acreeage that could be disturbed by development is described below.

Revegetation of disturbed sites and return to more natural conditions could require anywhere from 50 to 100 years. Slow growth is a result of low annual precipitation, which is generally less than 3 inches at low elevations and from 3 to 12 inches at higher elevations.

#### Alternative A — Proposed Action

**Analysis.** This alternative would reduce the impacts of social trails and roadside parking by providing more and better designed parking areas. There would be impacts as a result of development, road reconstruction, and parking area construction. Most borrow pits would be closed and restored.

**Conclusion.** Approximately 104 acres of new disturbance to natural vegetation and soil would be required. A total of 91 acres adjacent to the roads would be associated with the road reconstruction project. The majority of the new disturbance would be along the roads and would be distributed throughout the park. The total disturbance would not be significant.

Work in previously disturbed areas would affect approximately 25 acres. An additional 5.6 acres of previously disturbed land would be returned to natural conditions through rehabilitation. More area would be rehabilitated as the wilderness and backcountry plan determines which dirt roads would be closed.

TABLE 18: SUMMARY OF IMPACTS UNDER ALTERNATIVE A — THE PROPOSED ACTION

| Planning Unit                               | Disturbance in Previously Disturbed Areas | New Disturbance | Restored Area |
|---|---|-----------------|---------------|
| <b>Covington Flats</b>                      |   |                 |               |
| Parking for Calif. Riding and Hiking Trail  | 0.3                                       |                 |               |
| Vault toilets in Covington Flats            |   | 0.4             |               |
| Expanded picnic facilities                  | 1.0                                       | 1.5             |               |
| <b>Indian Cove</b>                          |   |                 |               |
| Day use parking                             | 2.0                                       | 2.0             |               |
| Additional picnic facilities                |   | 1.5             |               |
| Vault toilets                               | 0.8                                       |                 |               |
| <b>Headquarters</b>                         |   |                 |               |
| Construction of new administration facility | 1.2                                       |                 |               |

ENVIRONMENTAL CONSEQUENCES

| Planning Unit                    | Disturbance in Previously Disturbed Areas | New Disturbance | Restored Area |
|----------------------------------|---|-----------------|---------------|
| <b>Lost Horse</b>                |   |                 |               |
| Parking project                  | 7.9                                       | 2.3             |               |
| Lost Horse ranger station        | 0.5                                       |                 | 0.3           |
| Campsite improvements            | 10.5                                      |                 |               |
| New west entrance visitor center | 0.5                                       | 1.0             |               |
| <b>Pinto Wye</b>                 |   |                 |               |
| Additional parking and pullouts  |   | 0.8             |               |
| <b>Transition</b>                |   |                 |               |
| Additional parking and pullouts  |   | 0.2             |               |
| Rehabilitation of borrow pits    |   |                 | 5.4           |
| <b>Pinto Basin</b>               |   |                 |               |
| <b>Cottonwood</b>                |   |                 |               |
| Additional duplex                |   | 0.2             |               |
| Entrance station                 | 0.3                                       | 0.3             |               |
| New visitor contact center       |   | 0.2             |               |
| New picnic facilities            |   | 0.4             |               |
| Additional parking               |   | 0.2             |               |
| <b>Parkwide</b>                  |   |                 |               |
| Road reconstruction              |   | 92.7            |               |
| <b>Total</b>                     | 25.0                                      | 103.7           | 5.7           |

**Alternative B — No Action**

Under this alternative there would be no additional impacts on native vegetation and soils due to development. However, the road improvement projects would continue to upgrade park roads. The impacts from the planned road reconstruction would affect approximately 91 acres adjacent to the roads. Impacts from social trails and roadside parking would continue because of inadequate parking and campgrounds and would result in additional loss of natural habitat.

**Alternative C — Minimum Requirements**

**Analysis.** Like the proposed action the minimum requirements alternative would reduce impacts of social trails and roadside parking. By defining and paving the pullouts and parking areas and providing access to the rocks piles, the social trails would be minimized.

The impacts of the road and parking projects would be less than under the proposed action since there would be no construction of parking areas.

**Conclusion.** Approximately 94 acres of disturbance would be required on previously undisturbed land for development; 93 would be adjacent to current roads. As in the proposed action, the majority of impacts to vegetation would be along the existing roads and would not be significant.

TABLE 19: SUMMARY OF IMPACTS UNDER ALTERNATIVE C — MINIMUM REQUIREMENTS

| Planning Unit                               | Disturbance in Previously Disturbed Areas | New Disturbance | Restored Area |
|---|---|-----------------|---------------|
| <b>Covington Flats</b>                      |   |                 |               |
| <b>Indian Cove</b>                          |   |                 |               |
| Day use parking                             | 2.0                                       |                 |               |
| <b>Headquarters</b>                         |   |                 |               |
| Construction of new administration facility | 1.2                                       |                 |               |
| <b>Lost Horse</b>                           |   |                 |               |
| Parking project                             | 11.0                                      |                 |               |
| Lost Horse ranger station                   | 0.5                                       |                 | 0.2           |
| <b>Pinto Wye</b>                            |   |                 |               |
| Additional parking and pullouts             |   | 0.2             |               |
| <b>Transition</b>                           |   |                 |               |
| Additional parking and pullouts             |   | 0.2             |               |
| Rehabilitation of borrow pits               |   |                 | 5.4           |
| <b>Pinto Basin</b>                          |   |                 |               |
| <b>Cottonwood</b>                           |   |                 |               |
| Additional duplex                           |   | 0.2             |               |
| Entrance station                            | 0.3                                       | 0.3             |               |
| <b>Parkwide</b>                             |   |                 |               |
| Road reconstruction projects                | 7.6                                       | 92.7            |               |
| <b>Total</b>                                | 22.6                                      | 94.2            | 5.6           |

## IMPACTS ON SPECIES OF SPECIAL CONCERN

The park contains a number of threatened, endangered, and sensitive species as well as species of concern, including Joshua trees. There would be no known impact to any known federally or state-listed plant or animal populations except for the desert tortoise. All areas that would be developed would be surveyed for listed plant or animal species. Any impact would be mitigated with consultation with federal and state agencies.

## IMPACTS ON JOSHUA TREES

### Alternative A — Proposed Action

**Analysis.** The actions that would affect Joshua trees are the road reconstruction project (including parking areas) and other development in the Lost Horse planning unit. Road design would minimize the impacts primarily by staying within the existing alignment, minimizing widening. Clear delineation of parking lots and roads and increased enforcement of parking restrictions would greatly reduce the impacts from vehicles driven onto adjacent areas, compacting soil surrounding nearby Joshua trees.

The actual number of trees that would be removed cannot be determined until preliminary road and parking designs are completed. Approximately 250–300 Joshua trees could be removed. This number would be reduced through adjustment of road alignments and by salvage of as many trees for replanting as possible. As other proposed developments were constructed there would be a need to disturb a small number of Joshua trees (less than twenty per proposed development), but every attempt would be made to salvage the trees for revegetation.

**Conclusion.** About 250–300 Joshua trees would be impacted. After the road design was determined, an impact assessment would be completed that would address the total number impacted. The biological impact to the Joshua tree would be insignificant since there are over 5.5 million in the park. However, special efforts would be made to mitigate impacts by avoiding large trees during the design and transplanting trees during construction.

### Alternative B — No Action

Joshua trees along the road corridors would be affected, because the road projects would continue. The impact is estimated at 100–200 Joshua trees. Many of these would be salvaged for replanting. As in the proposed action, this number could be reduced through adjustments of road alignments. An impact assessment will be completed after the road design is determined. The impact biologically to the Joshua tree would not be significant

### **Alternative C — Minimum Requirements**

**Analysis.** The road project would be the same as in the proposed action, except there would be no expansion or construction of parking areas.

**Conclusion.** The impacts on Joshua trees would be similar to the no-action alternative, except there would be a number of trees affected as a result of increased development. Estimates of the number of trees impacted would be 150–200 as a result of the road project and development. An attempt to salvage trees for replanting would be required.

### **IMPACTS ON THE DESERT TORTOISE**

The U.S. Fish and Wildlife Service has been contacted in reference to the proposed action in the Lost Horse planning unit and the first two phases of the road reconstruction project. With their guidance, the park conducted a desert tortoise survey in 1992 and 1993. The survey sought to determine if the road project and other actions would impact the tortoise in the surveyed areas and whether the current road affects the tortoise.

The survey determined that evidence of tortoise was low in the area of phases I and II of proposed road reconstruction, except for a section west of Hidden Valley campground. The Fish and Wildlife Service concluded that the area was examined with appropriate detail for a clearance, including the zone of influence (area affected by the project), and that the road projects could proceed without further surveys with the exception of the Hidden Valley.

The survey was unable to determine whether the present road has been a contributing factor to the low tortoise population in the surveyed area.

### **Alternative A — Proposed Action**

**Analysis.** The road reconstruction and increase in the number of designated parking spaces would decrease the need for offroad parking. This would decrease impacts to tortoise habitat. The area of phases I and II of road reconstruction were surveyed in the spring of 1991 and one tortoise burrow was found near Queen Valley Road in the Hidden Valley area. The additional development and phases III–V road reconstruction would require additional surveys in areas of tortoise habitation before construction. During preliminary design for all construction projection, the Park Service would again consult with the Fish and Wildlife Service to ensure compliance with the requirements of the Endangered Species Act.

**Conclusion.** The first two phases of road construction will be in areas of low tortoise habitation (0–7/sq. km) and with the implementation of mitigation techniques approved by the U.S. Fish and Wildlife Service, the first two phases of the road reconstruction project are unlikely to have an adverse effect on the species. The paving of Barker Dam Road and the upgrading of the Geology Tour Road and increasing traffic loads or speed could lead to additional tortoise roadkills. Based on current experience, such roadkills could be expected to average less than one per year. However, tortoise numbers and roadkills in the Hidden Valley and Barker Dam area are likely to be inflated because visitors have used this area to

release tortoises. Education of visitors about the desert tortoise, its endangered status, and the impacts of unauthorized tortoise releases would reduce impacts to the tortoise.

The National Park Service will be preparing additional environmental compliance documents, probably environmental assessments, for all future construction projects, including all phases of road reconstruction as they are funded and designed. The National Park Service will have adequate details for the proposals and any impacts they may have, as well as alternative evaluation to develop mitigation measures. Surveys will be completed in areas of tortoise habitat that may be affected by construction, and there will be further consultation with the U.S. Fish and Wildlife Service to ensure compliance with the Endangered Species Act. To establish baseline data, the National Park Service would continue to survey areas of tortoise habitat and monitor road mortality, especially in areas of high tortoise density.

### **Alternative B — No Action**

There would be no impacts as a result of new development. However, the road reconstruction project would disturb approximately 91 acres adjacent to the roads. The area for phases I and II of the road reconstruction project in the Lost Horse planning unit has been surveyed and these phases would probably not have an adverse effect on the tortoise. As future phases of the road project are planned and designed in the Transition, Cottonwood, and Indian Cove planning units where there are higher tortoise densities, tortoise surveys would be completed to ensure compliance with the Endangered Species Act.

### **Alternative C — Minimum Requirements**

**Analysis.** The road design would be similar to that in the proposed action, except that no parking areas would be built or expanded. Clear delineation of the edges of parking areas and trails would add greater control of parking and would decrease social trails. The additional development planned under this alternative and phases III-V of the road reconstruction would require additional tortoise surveys in areas of tortoise habitat prior to construction. The Fish and Wildlife Service would be consulted during preliminary design for all construction.

**Conclusion.** There would probably be no adverse effects on the desert tortoise as a result of phases I and II of the road project since planning would be identical to the proposed action. Future phases of the road project would require tortoise surveys to ensure compliance with the Endangered Species Act.

## **IMPACTS ON WETLANDS AND RIPARIAN HABITAT**

### **Alternative A — Proposed Action**

**Analysis.** There would be no adverse impacts on wetlands or riparian habitats from development or changes in visitor use. Impacts to vegetation and soils at Cottonwood Oasis would be reduced. Visitors would be more likely to stay on the designated trails, which would be clearly signed. Braided trail sections would be revegetated. Trampling effects would

be reduced by directing visitors along a boardwalk through the oasis. An interpretive exhibit would be used to inform visitors of the nature of the oasis community, its susceptibility to impacts from foot traffic, and the need to stay on designated trails.

**Conclusion.** The proposed action would not adversely impact wetlands and riparian habitat. It would reduce the current impacts on Cottonwood Oasis. The wetlands habitat would be protected by having visitors limited to a platform.

#### **Alternative B — No Action**

There would be no adverse impacts on wetlands or riparian habitats. There would be continued degradation of the Cottonwood Oasis spring and surrounding vegetation and soils due to the extensive foot traffic off the designated trails. The braided trails through the oasis would remain.

#### **Alternative C — Minimum Requirements**

**Analysis.** There would be no adverse impacts on wetlands or riparian habitats from development or changes in visitor use under this alternative. Impacts on vegetation and soil at Cottonwood Oasis would be reduced by keeping visitors on the designated trails, which would be clearly signed. Braided trail sections would be revegetated. An interpretive exhibit would be used to inform visitors of the nature of the oasis community, its susceptibility to impacts from foot traffic, and the need to stay on designated trails.

**Conclusion.** There would be no adverse impacts to wetlands or riparian habitat. Impacts from visitor use of the Cottonwood Oasis would be reduced.

## IMPACTS ON CULTURAL RESOURCES

### ALTERNATIVE A — PROPOSED ACTION

#### Analysis

The proposed action would bring about a more systematic treatment of cultural resources. Programs would be expanded in archeology, cultural ecology, curation, ethnography, and historic preservation. This alternative provides for two new positions — a full-time cultural resources specialist and a cultural anthropologist to implement these programs through direct involvement or contract administration. Their work would benefit both cultural and natural resources.

According to the resources management plan, collection of needed baseline data would be done through studies and monitoring. The priorities for historic preservation would be applied systematically and consistently under the proposed action. Properties considered for national register eligibility would also be approached systematically and consistently.

Public use could affect nearby cultural resources that would be vulnerable to vandalism or inadvertent damage. Actions to reduce these impacts would include increased patrols, monitoring to detect vandalism and illegal collection, education of visitors about the significance of the cultural resources and the need to protect them, and an extensive public outreach program to educate the public about the importance of leaving natural and cultural resources undisturbed for present and future generations.

To ensure protection of any unknown cultural resources, archeological surveys would be conducted for all land that could be affected by specific road construction or development proposals well before those proposals were implemented. Any potentially adverse effects to cultural resources, if unavoidable, would be mitigated by actions developed in consultation with neighboring American Indian groups, the State Historic Preservation Office, and the Advisory Council on Historic Preservation as stipulated in 36 CFR 800 (see appendix B on compliance with sections 106 and 110 of the National Historic Preservation Act of 1966, as amended).

#### Conclusion

The management, protection, and preservation of important cultural resources would be significantly improved. All aspects of inventorying, protecting, and preserving important cultural resources would be ranked by establishing ongoing programs that would be systematically implemented. There would be sufficient personnel. Educational programs would help in protecting resources, and the chances of random or destructive vandalism would be markedly reduced.

## **ALTERNATIVE B — NO ACTION**

### **Analysis**

Cultural resources management, which includes archeology, cultural ecology, curation, ethnography, and historic preservation, would continue to be opportunistic. Implementation of cultural resource projects would remain unranked and unsystematic. The lack of baseline data would hamper management decisions. Staffing would remain at current levels with no full-time cultural resources specialist, cultural anthropologist, or archeological ranger.

Historic preservation at the current level would allow the natural deterioration of the historic structures to continue. Historic national register structures would be stabilized one at a time, as funds became available.

There would be no proactive outreach to help preserve local American Indian cultures. Avoiding development of possible traditional use areas would be handled on a case-by-case basis.

Random damage or vandalism to cultural resources would not be reduced. The levels of patrols, monitoring, education of visitors about the importance of the resources, and public outreach programs would continue at current levels.

To ensure protection of any unknown cultural resources, archeological surveys would be conducted for all land that could be affected by specific road construction or development proposals well before implementation. Any potentially adverse effects to cultural resources, if unavoidable, would be mitigated by actions developed in consultation with neighboring American Indian groups, the State Historic Preservation Office, and the Advisory Council on Historic Preservation as stipulated in 36 CFR 800 (see appendix B on compliance with sections 106 and 110 of the National Historic Preservation Act of 1966, as amended).

### **Conclusion**

Under the no-action alternative the management, protection, and preservation of important cultural resources would remain limited, opportunistic, and unsystematic throughout the park. Cultural resources would be more subject to vandalism, chance damage, and loss of historic fabric.

## **ALTERNATIVE C — MINIMUM REQUIREMENTS**

### **Analysis**

Cultural resources management under the minimum requirements alternative would rank projects. Projects in archeology, cultural ecology, curation, ethnography, and historic preservation would be ranked in priority order to better meet park needs. More baseline data would be acquired to aid in informed management decisions. Staffing would be increased by at least one full-time cultural resources specialist and one full-time ranger. Where appropriate,

the concept of cultural ecology would have increased influence over the coordination of cultural and natural resource projects.

Historic preservation at the minimum requirements level would establish priorities for national register properties for stabilization. Matching materials would be sought for replacement, but there would be no interpretation of these properties.

Ethnographic knowledge would increase somewhat because ranked projects would meet park needs more effectively. There would be some proactive outreach to help preserve American Indian cultures. Avoiding development of possible traditional use areas would be better handled under this alternative than under no action.

Chances of random damage or vandalism to cultural resources would be reduced by increasing patrols and monitoring to detect damage. Interpretation and public outreach programs to educate the public about the significance of the resources and the importance of leaving natural and cultural resources undisturbed would increase somewhat, although not to the same extent as under the proposal.

### **Conclusion**

The management, protection, and preservation of important cultural resources would improve under the minimum requirements alternative. Cultural resources management would be more systematic. Ranking projects by order of importance would improve conditions. Even without ongoing programs, better information for decisions would be produced by setting priorities. The chances of random or destructive vandalism and the loss of fabric of other historic properties would be reduced.

## IMPACTS ON VISUAL RESOURCES

### ALTERNATIVE A — PROPOSED ACTION

#### Analysis

Maintaining visual quality in Joshua Tree National Park has become increasingly important. Most proposed actions would upgrade developments in disturbed areas to minimize the creation of visually intrusive scars. Intrusions of development on scenic vistas would not appreciably change. Campgrounds, picnic areas, and restroom facilities would be redesigned to reduce impacts to vegetation and soils. The primary new visitor facility, the west entrance visitor center, would be sited to take advantage of dramatic views to the south across the Mojave Desert, which would enhance interpretation of this environment, but it would be visible from inside the park. It would be designed to minimize its impact on park vistas. Design guidelines would be developed to ensure that all new or modified facilities would visually harmonize with the surrounding environment.

Attempts would be made to reduce visual impacts in the backcountry by revegetating redundant trails and old road scars identified in the trails plan and wilderness and backcountry management plan. Acquisition of inholdings would reduce the potential for new development that would intrude on the natural scene. The Park Service would work with adjacent property owners and review development proposals to minimize the visual impacts from urban encroachments near the boundary.

Road guidelines that emphasize resource sensitive design standards would address maintaining curves and a low profile and would limit the number of Joshua trees removed to reduce visual impacts on all main roads.

Paving and striping of large parking areas at Barker Dam and Wall Street Mill trailhead, Wonderland of Rocks backcountry staging area, Intersection Rock, and Hall of Horrors would be visually obtrusive. These lots would be sited to minimize their visibility and would use previously disturbed areas to the extent possible.

#### Conclusion

This alternative would minimize visual intrusions from new development by using disturbed land. It would protect the scenic quality of the park. The purchase of inholdings would decrease the threat of possible intrusive development and minimize visual impacts.

### ALTERNATIVE B — NO ACTION

#### Analysis

Visual resources would remain unimpaired as long as maintenance is adequate. As visitation increases, an equivalent increase in maintenance would be critical, or visitor use would cause

more social trails, detrimental impacts on vegetation, and increased wear and tear on constructed facilities.

Many undesirable trends affecting the visual resources would continue in this alternative. Overused facilities would continue to be uninviting, braided trails would detract from the natural scene, and undefined parking would continue to impact more terrain than necessary.

Use of road traces is likely to continue or increase without actions proposed to limit or close access. Continued use would prevent natural revegetation and possibly widen the road, making it more visually intrusive.

### **Conclusion**

Undefined, random parking areas, campgrounds, and encroaching development near the park boundary would continue to cause visual intrusions, reducing scenic quality and contributing to a poor first impression of the park. Without improvements to current facilities, the overall visual appearance would continue to deteriorate.

## **ALTERNATIVE C — MINIMUM REQUIREMENTS**

### **Analysis**

Visual intrusions caused by foot and vehicle disturbance to vegetation and soil would be generally reduced by clearly delineating the boundaries of designating parking areas, campsites, and picnic sites. Vegetative screening around sites would help provide a visually appealing atmosphere. The general improvement of trails, trail surfaces, walks, signs, fee collection, housing, and utilities would have a minimal increase on visual impacts. The appearance of the facilities would be improved. Most facilities would be remodeled following design guidelines to blend the appearance of structures with their surroundings. No expansion of facilities would affect visual resources.

Some previously disturbed access roads, illegal access roads and redundant trails would be evaluated in the trails and backcountry management plans. Revegetation of some of these roads and trails would reduce visual impacts.

### **Conclusion**

Impacts on scenic quality would remain minimal. Improvements to facilities without expansion would minimize visual intrusions.

## IMPACTS ON VISITOR USE AND EXPERIENCES

Under each category the effects of the proposed action and alternatives on visitor use and experiences can be divided into those relating to visitor understanding and enjoyment of the resources, those impacting visitor distribution throughout the park, and those impacting visitor participation in recreational activities. Many of the impacts are difficult to quantify, as they would result in qualitative changes to the visitors' experiences or activities rather than a quantitative change. For example, improving a road or upgrading a campground would improve the visitor experience, but neither would necessarily affect the number of visitors accommodated.

### ALTERNATIVE A — PROPOSED ACTION

#### Analysis

The proposed action would expand and improve information, orientation, and interpretive media and services. The development of adequate visitor contact facilities at the three main park entrances along with a completely redesigned wayside exhibit system would orient visitors and provide information about resource features, visitor activity options, locations and scope of interpretive services, road conditions, and safety information.

There would be three entry point reception centers where visitors would be introduced to the park. Visitors would have access to information and orientation for the entire park and would be able to better plan their visit and maximize their desired experience. Each of these three visitor facilities would introduce the overall interpretive themes, but also provide a different interpretive focus. The west and south entrances would focus on the Mojave and Colorado Desert environments respectively, with in-depth interpretation of the cultural resources at headquarters. Visitor understanding and appreciation of the natural and cultural resources would be greatly improved by these facilities as well as by the updating and expansion of wayside exhibits, publications, and interpretive trails. Improvement of the Black Rock Canyon nature center would enhance not only the experience of visitors to that area but would provide a facility for educating school and other groups.

Improvements in the roads, parking, and the trails, along with road and trail guides, would help to distribute visitors more evenly throughout the area and reduce congestion. The proposed shuttle system to the core use area with onboard interpretation would increase opportunities for visitor education and would reduce traffic congestion. Designated parking capacity in the most heavily used areas of the park, primarily the Lost Horse unit, would be greatest under this alternative.

The paving of Barker Dam Road and the parking areas along the primary park roads in Lost Horse planning area would assist in delineating these facilities and would help control roadside and shoulder parking in nondesignated parking areas. Paving of Barker Dam Road would also allow a variety of vehicle types, but not more vehicles, to access parking for the Barker Dam interpretive trail and other trailheads in this area. The parking lot capacities in this area would be limited to parking levels that already occur on some of the busiest days of the year. To reduce competition for limited parking in this area, the plan proposes a

connected network of roads, trails, parking areas, and shuttle routes to serve various visitor destinations in this area of the park. Visitors who could not find a parking space in a lot closest to their destination could park at a lot farther away, but have the option to bike, hike, or take the shuttle. Improving visitor awareness of the wide variety of opportunities available throughout the park is intended to better distribute visitors and encourage use in other areas.

There would probably be an increased use of Wall Street Mill because of increased awareness and emphasis on interpretation of the historic resource and easier access to the combined Wall Street Mill and Barker Dam parking area. Delineation of trails around the mill and interpretive and resource protection signs and brochures would aid understanding and enjoyment. There would also be an increased need for protection of this valuable historic resource.

The proposal would improve opportunities to explore more remote areas and to experience a cross section of environments and features. The Geology Tour Road and Lost Horse Mine Road would be upgraded to two-wheel drive. Some other dirt roads in the backcountry would be designated and marked to direct visitors. Better signs for designated trails, revegetation of braided trail sections, added interpretation along trails, and development of a trails guide would also greatly improve visitor awareness and enjoyment of the trail system.

The ban on the placement of expansion bolts in designated wilderness would continue until recommended studies are completed. The temporary prohibition on further bolting in wilderness would prevent physical alteration of natural resources while further studies and planning related to the appropriate balance of resource use and protection proceeded. This would result in a short-term inconvenience to some climbers in wilderness. It would preclude use of some climbing routes. The ban does not preclude climbing with bolts in nonwilderness areas of the park. The National Park Service does not recommend reliance on existing bolts. Climbers must be aware that they participate in the sport at their own risk. The park allows the activity but cannot guarantee the safety of climbers.

The quality of the visitor experience would improve with the redesign of campground and picnic area layouts and better definition of individual sites. Conflicting uses would be separated. Appearance of the areas would improve with the rehabilitation of impacted soils and vegetation and replacement of the portable toilets. The overall number of picnic sites would increase, including the addition of a small picnic area in the Pinto Basin. The number of campsites would not appreciably change. The improved registration system and time limits would allow more access to campsites. However, the demand for campsites would probably continue to exceed the number available during peak use times, typically the spring months.

The new administrative facilities would provide the infrastructure for improving all park operations. Increased efficiency and expanded facilities would improve management of resources and visitor experiences.

## **Conclusion**

Visitor experience and use would significantly improve throughout the park under the proposed action. Information distribution programs would be expanded, thus improving the visitors' ability to have a safe and enjoyable experience. Broadening the interpretive programs

and improving media about the resources and activities would serve more people and more interests and enhance understanding of the park's significance.

The proposed action would encourage a greater distribution of visitors throughout the park, thereby helping to reduce congestion and enhance visitor enjoyment of the varied resources and recreational activities.

The quality of the recreational experience would be enhanced by the improvement of the roads and trails systems, campgrounds and picnic areas, and by separating conflicting uses.

## **ALTERNATIVE B — NO ACTION**

### **Analysis**

No major changes would occur under the no-action alternative. Consequently, visitor use and experience would not improve. Visitor understanding and appreciation as well as distribution and participation in quality recreational activities would remain unchanged. There would be confusion due to inadequate information, orientation, and direction of visitors to designated areas for different activities.

Only basic information and orientation would be provided at the west entrance. There would continue to be a lack of adequate information, orientation, and resource interpretation for the majority of visitors that use this entrance. The south entrance visitor contact and fee station would continue to be confusing and undersized to present necessary information, orientation, and interpretation materials on both a parkwide basis and for the Colorado Desert. Confusion and inconvenience would exist throughout the park because roads, parking areas, trails, and visitor facilities are poorly signed and delineated, and there is no comprehensive trail or road publication to guide visitors.

The wayside exhibit system would remain. The limited ability to upgrade the exhibits and their insufficient numbers and locations would continue to preclude full visitor education and understanding of the resources.

Because the road, parking, and trail network would not be changed, use patterns would continue. Inadequate parking and congestion at heavily used areas would continue. A plan for evaluation of dirt roads and upgrading of some for two-wheel use would not be done. Visitors with standard vehicles would be limited to the developed areas.

The ban on the placement of expansion bolts in designated wilderness would continue until recommended studies are completed. The temporary prohibition on further bolting in wilderness would prevent physical alteration of natural resources while further studies and planning related to the appropriate balance of resource use and protection proceeded. This would result in a short-term inconvenience to some climbers in wilderness. It would preclude use of some climbing routes. The ban does not preclude climbing with bolts in nonwilderness areas of the park. The National Park Service does not recommend reliance on existing bolts. Climbers must be aware that they participate in the sport at their own risk. The park allows the activity but cannot guarantee the safety of climbers.

Camping and picnicking and the quality of these experiences would remain unchanged. The quality of the visitor experience at these facilities would continue to be diminished by the unattractive surrounding sites, the confusing array of social trails, and the portable toilets. Conflicts between user groups such as campers, climbers, picnickers, and trail users would continue. The demand for campsites would probably continue to exceed the number available during peak use times, typically the spring months.

## **Conclusion**

Under the no-action alternative there would be no new development or services and no corresponding improvement in either the quality or quantity of visitor experiences. Orientation, information, and interpretation would continue to be limited and insufficient to adequately direct visitors to designated areas for different activities and convey the interpretive and educational themes. It would continue to be difficult for visitors to learn about the resources and available activities or to plan for a safe and enjoyable experience. The quality of visitor facilities would remain low in most areas. Conflicts between recreational users would continue.

## **ALTERNATIVE C — MINIMUM REQUIREMENTS**

### **Analysis**

The goal of increasing visitor understanding and appreciation of the natural and cultural resources would be somewhat improved, primarily for visitors entering from the north. The visitor center at headquarters would be improved through rehabilitation of the exhibits and adding parkwide orientation materials in the lobby. Some additional information and orientation material would be available for visitors entering from the south through rehabilitation of the contact station. The heavily used west entrance would still only provide some basic information and orientation materials. Visitors would be better oriented to the resources and available activities as they enter the park, although much less so than under the proposal.

Visitor understanding and appreciation would be increased through onsite interpretive signs and exhibits. Updating of the wayside exhibits would better inform visitors about the nature of the resources. However, the present system and location of waysides would not adequately address all the interpretive and educational themes. Visitors' opportunities for interpretive contacts with staff would be increased, primarily in the Keys Ranch area.

There would be some redirection of visitors to designated areas for different activities under the minimum requirements alternative. A trails and road handbook would help to distribute visitors. In the most heavily used areas, primarily in the Lost Horse unit, a better and clearer system of trails between parking areas and visitor destinations would allow improved access to these destinations. Designated parking in these areas would be approximately the same as presently exists. However, restriction of parking to clearly designated parking areas would reduce the number of day users that could be accommodated.

As under the proposal, opportunities to explore more remote areas and to experience a cross section of environments and features would improve. The Geology Tour Road and the Lost Horse Mine Road would be upgraded to two-wheel drive. Some other dirt roads in the backcountry would be designated and marked to direct visitors on these corridors. Better signs for designated trails, revegetation of braided trail sections, added interpretation along trails, and development of a trails guide would also greatly improve visitor awareness and enjoyment of the trail system.

The ban on the placement of expansion bolts in designated wilderness would continue until recommended studies are completed. The temporary prohibition on further bolting in wilderness would prevent physical alteration of natural resources while further studies and planning related to the appropriate balance of resource use and protection proceeded. This would result in a short-term inconvenience to some climbers in wilderness. It would preclude use of some climbing routes. The ban does not preclude climbing with bolts in nonwilderness areas.

The quality of the visitor experience would be improved by better defining the limits of individual sites, thus limiting the extent of impacts to surrounding soils and vegetation. Visually intrusive portable toilets would be replaced. Conflicting uses would also be separated. The number of camp and picnic sites would not change. The improved registration system and time limits would allow more visitors access to campsites. However, the demand for campsites would probably continue to exceed the number available during peak use times.

Improved park support facilities would improve management of all aspects of operations and improve resource protection and visitor experience.

### **Conclusion**

Visitor experiences and uses would be somewhat improved. Visitors would have better interpretive facilities. There would be some improvement in the quality of recreational activities, and there would be little change in visitor distribution.

## CUMULATIVE IMPACTS

### NATURAL RESOURCES

Under the proposal there would be an impact to the Joshua trees because some would be removed for roads, parking areas, or buildings. The number of trees affected would be reduced by adjusting road alignments, planting new trees, and salvaging and replanting trees when possible. The Joshua tree is protected in four federal units and various state and local parks in southern California. Due to widespread distribution of the Joshua tree throughout the Mojave Desert and its protected status, the cumulative impact to the Joshua tree community under the proposed action would be negligible.

The Mojave population of the desert tortoise has been affected by activities and development throughout California and Nevada. Any action would be closely monitored by the National Park Service and the U.S. Fish and Wildlife Service and would comply with the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* prepared by the U.S. Fish and Wildlife Service. Actions that could affect the tortoise would result primarily from the road reconstruction. Road reconstruction would be designed to have the least possible effect on the tortoise. Development of the proposed Eagle Mountain landfill could have a significant effect on the desert tortoise as well as on other wildlife, air and water quality, and wilderness values. The cumulative impacts on the tortoise and other park resources from actions proposed in this plan would be a minor additional impact relative to the potential adverse effects from the proposed landfill.

Protection of the resources from external threats as well as preservation of the scenic vistas that extend beyond the park boundary would depend on NPS review and recommendations concerning development outside the park. Such actions may have only limited success on land use decisions that could be detrimental. It is probable that resources and scenic vistas could be adversely affected by incompatible land use and development outside the park.

### CULTURAL RESOURCES

Ground disturbance would be part of construction, road widening and paving, and the redesign of visitor use areas. These would require archeological surveys and mitigation. The number of impacted archeological sites would be small compared to the vast amount of undiscovered archeological material estimated to remain in the park.

Through design changes and visitor education, the proposed action would have the positive effect of directing visitors to designated areas for specific types of activities. That would reduce the number of visitors chancing upon cultural resources and disturbing or vandalizing them. Thus the management, protection, and preservation of important cultural resources would be significantly improved.

There would be no cumulative adverse impacts; cumulative effects would be beneficial because of the proposed systematic approach to cultural resources management through the concept of cultural ecology.

## **VISITOR EXPERIENCE**

Traffic congestion on state routes and at intersections that access the park is not a problem at this time. Traffic would probably increase as visitation to the park and recreation visits to public land in the southern California desert region and the population of surrounding communities grow. The cumulative growth in traffic could lead to increased congestion and decreased highway safety on roads leading into the park.

## **UNAVOIDABLE ADVERSE IMPACTS IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY**

The area proposed for development and road construction under each of the alternatives would be permanently lost as natural habitat and the larger Joshua trees that would have to be removed cannot effectively be replaced in kind.

While most developed areas can be restored over time to original conditions, the use of land and financial resources to affect the proposed development would be irreversible and irretrievable. The commitment would be greater under the proposal than under alternative C, which is primarily confined to disturbed areas. The development under both alternatives would be centered in developed areas so that the new land committed to development would be minimal. There would be no irreversible or irretrievable commitment of resources under the no-action alternative.

Over the short term, the implementation of the proposal would disrupt visitor services, some historic features, and a small portion of the natural environment during construction. Over the long term, visitors would be able to better experience camping in the park since reservations would be confirmed in advance. The new development would be designed to blend with the historic structures and the surroundings and the intrusion into previously undeveloped area would be minimized. Camping would remain at or near existing levels in any of the development alternatives.

Under the proposal and alternative C, the short-term effects would be negligible. Camping would remain intact and overnight visitation would remain static. Over the long term, day use from accommodations outside the park would increase, adding congestion and increasing competition for the limited visitor services.

