

STATE  
♦ OF THE ♦  
PARKS®

june 2005

## THE CALIFORNIA DESERT PARKS

JOSHUA TREE NATIONAL PARK  
DEATH VALLEY NATIONAL PARK  
MOJAVE NATIONAL PRESERVE

A Resource Assessment



National Parks Conservation Association



# STATE ♦ OF THE ♦ PARKS®

## STATE OF THE PARKS® Program

More than a century ago, Congress established Yellowstone as the world's first national park. That single act was the beginning of a remarkable and ongoing effort to protect this nation's natural, historical, and cultural heritage.

Today, Americans are learning that national park designation alone cannot provide full resource protection. Many parks are compromised by development of adjacent lands, air and water pollution, invasive plants and animals, and rapid increases in motorized recreation. Park officials often lack adequate information on the status of and trends in conditions of critical resources. Only 10 percent of the National Park Service's (NPS) budget is earmarked for natural resources management, and less than 6 percent is targeted for cultural resources management. In most years, only about 7 percent of permanent park employees work in jobs directly related to park resource preservation. One consequence of the funding challenges: two-thirds of historic structures across the National Park System are in serious need of repair and maintenance.

The National Parks Conservation Association initiated the State of the Parks® program in 2000 to assess the condition of natural and cultural resources in the parks, and determine how well equipped the National Park Service is to protect the parks—its stewardship capacity. The goal is to provide information that will help policy-makers, the public, and the National Park Service improve conditions in national parks, celebrate successes as models for other parks, and ensure a lasting legacy for future generations.

For more information about the methodology and research used in preparing this report and to learn more about the State of the Parks® program, visit [www.npca.org/stateoftheparks](http://www.npca.org/stateoftheparks) or contact: NPCA, State of the Parks® Program, 230 Cherry Street, Ste. 100, Fort Collins, CO 80521; Phone: 970.493.2545; E-mail: [stateoftheparks@npca.org](mailto:stateoftheparks@npca.org).

Since 1919, the National Parks Conservation Association has been the leading voice of the American people in the fight to safeguard our National Park System. NPCA and its 300,000 members and hundreds of partners work together to protect the park system and preserve our nation's natural, historical, and cultural heritage for generations to come.

- \* Nearly 300,000 members
- \* 8 regional offices
- \* 35,000 activists



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## INTRODUCTION



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Introduction

In southeast California, there is a special place where the Great Basin, Mojave, and Sonoran deserts come together to form a region with varied natural communities and resources. To protect these diverse resources, Death Valley National Monument was established in 1933, followed three years later by Joshua Tree National Monument.

Further protection for the California deserts came in 1994 with passage of the California

Desert Protection Act. This landmark legislation changed Joshua Tree and Death Valley from national monuments to national parks, increasing the size of both. Joshua Tree increased by 234,000 acres to its present size of 794,000 acres, and 585,040 acres (73 percent) became wilderness. Death Valley grew by about 1.3 million acres to its present size of nearly 3.4 million acres, making it the largest national park in the contiguous lower 48



Colorful fields of wildflowers bloom in full force, especially in years of heavy spring rains.

United States, and 95 percent of the park became designated wilderness. The California Desert Protection Act also established the 1.6-million-acre Mojave National Preserve, which lies between Death Valley and Joshua Tree.

The California desert parks are replete with cactus gardens, Joshua tree forests, fields of wildflowers, hidden springs, palm oases, towering sand dunes, rugged mountain ranges, multihued canyons, and some of the lowest and hottest valleys in the western hemisphere. The parks are home to nearly 500 vertebrate species, ranging in size from tiny lungless salamanders to majestic desert bighorn sheep and mountain lions. Federally protected species include the threatened desert tortoise and endangered Devils Hole pupfish. There are between 700 and 900 species of plants in each park, many rare and endangered, and some found nowhere else on the planet. These animals and plants exhibit impressive life adaptations that allow them to survive the desert's extremes.

Springs, seeps, and a few perennial streams are critical resources that provide water to the animals and plants within the California desert parks. Joshua Tree contains 120 known water sources, while Mojave has more than 200, and Death Valley has more than 400.

With precipitation averaging just a few inches each year, groundwater supplies most of these surface water sources.

The California desert's cultural resources are also extensive. Humans have been drawn to this region for thousands of years, and the landscape tells countless stories of survival, hardship, renewal, tenacity, and ingenuity. Ancient stone tools and chipped bones of prehistoric animals tell of the people who lived in the region 4,000 to 8,000 years ago; pottery, beads, and other artifacts were left behind by a variety of American Indian peoples more recently; and mine shafts, ore-processing mills, water troughs, ranch houses, and other evidence remain from ranching and mining activity in the late 19th and 20th centuries.

Although the stark beauty of the parks' landscapes seems ancient and immutable, deserts are fragile ecosystems. Both natural and cultural resources are protected within Joshua Tree, Death Valley, and Mojave, but substantial threats to these resources exist. The parks lie between Los Angeles and Las Vegas, two major metropolitan areas that have grown considerably in recent decades. The population of Clark County, which encompasses Las Vegas, has grown to 1.7 million (nearly 200 times the



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8,532 residents present in 1930) and continues to grow at the rate of 5,000 people each month. With urban growth comes habitat destruction and fragmentation, increased demand on the region's limited water supplies, and air pollution from automobiles and industry.

All three of the California desert parks feel the effects of skyrocketing regional population growth. Adjacent development and transportation corridors have isolated both Joshua Tree and Mojave. The parks are sandwiched between major highways where automobile traffic impedes wildlife movements and results in wildlife mortality. Air pollution from the Los Angeles, San Bernardino, and Riverside metropolitan areas is funneled towards the parks. Groundwater levels are of concern because growing populations are demanding more and more water, and precipitation levels are not sufficient to replace what is being used. Decreases in surface water availability have been noted at some of the parks' springs and watering holes, resulting in less water available to wildlife and riparian plants.

Threats to cultural resources stem primarily from inadequate funding and staffing levels at the three parks. None of the parks have formal ethnography programs that address protection

of resources important to traditionally associated groups of people. A cultural anthropologist that could be shared among the parks would help build relationships with associated groups. Adequate storage and exhibit space for the parks' extensive museum and archival collections is also needed. All three parks would also benefit from a shared historic preservation crew. Currently, none of the California desert parks has a historic preservation specialist or any other staff person with adequate time to maintain deteriorating, and in some cases, newly acquired historic structures.

The following report outlines the results of a rigorous examination of natural and cultural resources in Joshua Tree National Park, Death Valley National Park, and Mojave National Preserve. State of the Parks researchers used a comprehensive, peer-reviewed methodology to assess and rate the condition of these parks' resources.

Mineral deposits color the Furnace Creek Badlands of Death Valley.



NATIONAL PARK SERVICE

# THE CALIFORNIA DESERT PARKS ASSESSMENTS

NATIONAL PARK SERVICE

4

The California Desert Parks Assessments



Death Valley contains examples of all five types of sand dune structures, and the park is home to California's highest dunes.

## RATINGS

Ratings were assigned through an evaluation of park research and monitoring data using NPCA's State of the Parks comprehensive assessment methodology (see Appendix).

### Joshua Tree

Current overall conditions of Joshua Tree's known **natural resources** rated a "fair" score of 65 out of 100. Challenges include air pollu-

tion from nearby urban areas, diminishing water levels in critical springs and wildlife water sources, and non-native annual grasses that have invaded much of the park and altered the natural fire regime.

Overall conditions of the park's known **cultural resources** rated 58 out of a possible 100, indicating "poor" conditions. Perhaps the greatest challenge to cultural resources protection at Joshua Tree is the need for additional staff. A

permanent archaeological technician, historic preservation specialist, cultural anthropologist, librarian/archivist, and museum technician are needed to help accomplish important projects, including a comprehensive archaeological survey of the park; continued stabilization of historic structures; a ranch management plan and increased protection for one of the park's best preserved historic landscapes; increased cooperation with traditionally associated American Indian groups; and care of the park's library and museum materials.

### Death Valley

Current overall conditions of Death Valley's known **natural resources** rated a "fair" score of 67 out of 100. Particular imminent concerns for

Plate tectonics, volcanism, erosion, earthquakes, floods, and other natural forces shaped the landscapes of the California desert parks, which include diverse geological formations, giant boulders, and sand dunes.



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## CALIFORNIA DESERT PARKS AT A GLANCE

- As prime regional tourist destinations, the California desert parks provide significant boosts to local economies. In 2003, visitors to Joshua Tree spent an estimated \$48 million and supported 1,107 jobs. Death Valley's visitors spent an estimated \$40.1 million and supported 1,059 jobs, while visitors to Mojave, the youngest of the California desert parks, spent an estimated \$6.7 million and supported 152 jobs.
- In further recognition of their diverse resources, Death Valley and Joshua Tree were named as parts of the Mojave and Colorado Deserts Biosphere Reserve.
- Visitors to Death Valley can stand 282 feet below sea level at the lowest point in the Western Hemisphere, Badwater Basin, and gaze up at the 11,000-foot summit of Telescope Peak just 15 miles away.
- Plate tectonics, volcanism, erosion, earthquakes, floods, and other natural forces shaped the landscape of the California desert parks. Visitors delight in the parks' diverse geological formations, giant boulders, and sand dunes. Death Valley contains examples of all five types of sand dune structures, and the park is home to California's highest dunes.
- Mojave is home to the world's largest and most dense forest of Joshua trees, slow-growing and uniquely-shaped plants found only in California, Arizona, Nevada, and Utah. In addition, about one-third of the plant species that occur in the California desert parks occur nowhere else in the state.
- Dark night skies, profound natural quiet, and opportunities for solitude draw about 2.5 million visitors to the California desert parks each year.
- Historic resources like trails and old ranches and mines dot the landscape, providing opportunities for visitors from around the world and throughout the United States to learn about the people who came to the desert before them. Teachers use the parks as outdoor classrooms to educate students about a variety of cultural and natural resource topics.
- Prehistoric rock art abounds in the desert parks. At Mojave alone, more than 25,000 individual petroglyphs and pictographs have been recorded at nearly 270 sites.





Note: When interpreting the scores for natural resource conditions, recognize that critical information upon which the ratings are based is not always available. This limits data interpretation to some extent. For Joshua Tree, 82 percent of the information requirements associated with the methods were met. For Death Valley and Mojave, respectively, 76 percent and 74 percent of the information requirements associated with the methods were met.

## NATURAL RESOURCES

## CURRENT

### Overall conditions



### Environmental and Biotic Measures



#### Biotic Impacts and Stressors



#### Air



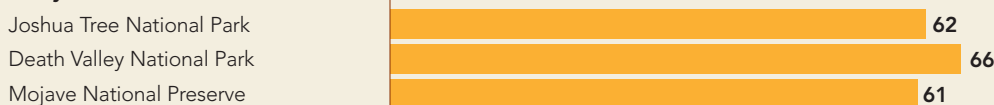
#### Water



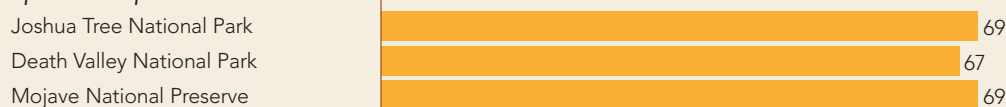
#### Soils



### Ecosystems Measures



#### Species Composition and Condition



#### Ecosystem Extent and Function



### RATINGS SCALE



The findings in this report do not necessarily reflect past or current park management. Many factors that affect resource conditions are a result of both human and natural influences over long periods of time, in many cases before a park was established. The intent of the State of the Parks® program is to document the present status of park resources and determine which actions can be taken to protect them into the future.

## CULTURAL RESOURCES

## CURRENT

### Overall conditions



### Cultural Landscapes



### Ethnography (Peoples and Cultures)



### Historic Structures



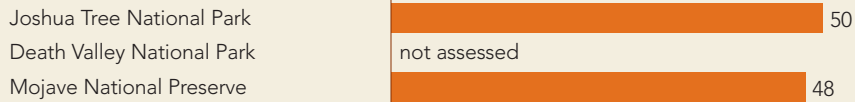
### Archaeology



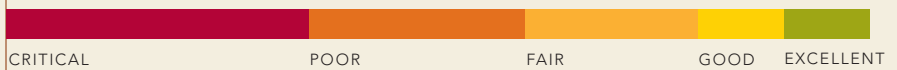
### Archival and Museum Collections



### History



### RATINGS SCALE



The findings in this report do not necessarily reflect past or current park management. Many factors that affect resource conditions are a result of both human and natural influences over long periods of time, in many cases before a park was established. The intent of the State of the Parks® program is to document the present status of park resources and determine which actions can be taken to protect them into the future.

## RESOURCE MANAGEMENT HIGHLIGHTS

### Joshua Tree

- Joshua Tree's Center for Arid Lands Restoration is a nursery where more than 50 species of native plants are grown and used to revegetate parts of the park and provide vegetation for Fort Irwin and the Bureau of Land Management.
- Joshua Tree is conducting a traditional use study to help staff understand the importance of the park's rock art to local American Indians.
- The park has completed or is in the process of completing important cultural resource projects, including a historic overview for the lands added in 1994, a Keys Ranch Management Plan, and numerous cyclic maintenance projects on historic structures.

Vegetation moved during roadwork is replanted. Plants from Joshua Tree's Center for Arid Lands Restoration are also used to revegetate parts of the park.

### Death Valley

- Death Valley's wild burro removal program has reduced numbers of this introduced species from 1,500 animals that were present in the smaller, original Death Valley National Monument in 1938, to an estimated 200 animals in the whole national park in 2005. As burros reproduce readily and their populations can grow at annual rates of 25 percent, this is an impressive population reduction. Mojave has implemented a similar program and has removed about 3,500 animals for adoption to date.
- Death Valley has permanently retired three of the grazing allotments that became part of the park with passage of the California Desert Protection Act.
- The park carefully manages Devils Hole, a unique groundwater-filled limestone cavern in the park, in order to preserve the world's entire population of Devils Hole pupfish.

### Mojave

- Mojave staff have mapped and completed site records for more than 50 of the park's archaeological sites, and Kelso Depot, once a bustling railroad station, has been rehabilitated and will re-open as a visitor information center in fall 2005.
- Mojave staff have been working to inventory and assess the condition of the preserve's seeps and springs. More than 150 sites have been surveyed so far.
- Mojave staff have been working to permanently retire existing grazing permits within the preserve. When the preserve was established in 1994, cattle grazed on 1.3 million acres; now just 220,000 acres are grazed. The remaining ranching infrastructure will form the basis of the soon-to-be-nominated Rock Springs Land and Cattle Company National Historic District.
- With a new airport that will serve the Las Vegas area planned for Roach Lake near Primm, Nevada, Mojave resources staff have undertaken a program of sound monitoring designed to capture baseline data on the preserve's natural and cultural soundscapes.

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## KEY FINDINGS

### Joshua Tree

- The atmospheric deposition of nitrogen at the park from sources in the greater Los Angeles/Long Beach/San Bernardino/Riverside metropolitan areas threatens the ecology of natural lands by contributing to the proliferation of non-native grasses and may be altering the chemistry of soils and waters at the park.
- The proliferation of non-native grasses at the park has resulted in a significant alteration of the natural fire-regime, resulting in increased fire frequency and intensity.
- Major highways surround the park, cutting across natural animal migration routes. The resulting isolation of the park and the animals within may lead to reduced genetic diversity of some wildlife populations such as desert bighorn sheep.
- The proposed Eagle Mountain Landfill, which could be built just outside Joshua

Water usage in growing communities surrounding Death Valley taxes limited groundwater supplies critical to regional wildlife.

Tree's borders, would receive up to 20,000 tons of trash from Los Angeles each day if approved. This landfill is not compatible with resource protection and wilderness values, and would introduce air, light, and noise pollution while attracting scavengers such as ravens that prey on the threatened desert tortoise and other wildlife.

- The park's limited number of cultural resources staff makes completing important research and resource protection projects difficult. The park is in need of several additional cultural resources staff, including an archaeological technician, curatorial technician, historic preservation specialist, and cultural anthropologist, a position that could be shared with Death Valley and Mojave.
- Only 95 of Joshua Tree's more than 245,000 archival and museum objects are on display, and these are in substandard exhibit space. More and improved exhibit space is needed so that visitors can fully appreciate the park's impressive collection.

### Death Valley National Park

- Rapid development in communities surrounding Death Valley results in increased demands on the region's limited water supply and raises concerns about future availability of water for wildlife. Depletion of the carbonate aquifer underlying Death Valley affects the availability of water for the endangered Devils Hole pupfish and other aquatic species. The aquifer also supplies the park's numerous springs and seeps, providing a lifeline for plants and animals. Myriad wells are already approved for withdrawing groundwater



from adjacent lands, and applications continue to be filed.

- All three of the California desert parks, but most notably Death Valley and Mojave, suffer from a lack of baseline data for many resource areas, including waters, soils, and air.
- The presence of 146 inactive patented mining claims within the park casts some uncertainty over the future of lands and associated resources within the park.
- Funds and staff are needed to support a number of cultural resource projects, including: archaeological surveys; historic structure stabilization; identification and nomination of structures to the National Register of Historic Places; museum collection cataloguing; historic structure, furniture, and museum object preservation at Scotty's Castle; and work to preserve mining history at several historic districts. Funds are also needed to repair a leaky roof and update old exhibits at the Furnace Creek Visitor Center.
- A number of non-native species now inhabit the park and compete with native plants and animals for water and food. Chief among these are tamarisk (*Tamarix ramosissima*), Russian thistle (*Salsoa tragus*), mosquitofish (*Gambusia affinis*), wild horses (*Equus spp.*), and burros (*Equus asinus*).
- The potential development of a nuclear waste repository at Yucca Mountain, just 50 miles northeast of the park's border with Nevada, could increase adjacent lands development, threaten soundscapes and dark night skies, further deplete groundwater resources, and introduce a myriad of unknown threats associated with proximity to the disposal site itself.

### **Mojave National Preserve**

- The lack of air quality monitoring specific to the preserve compromises the ability of resource managers to understand the nature and extent of air resource degradation.
- The potential for new and/or expanded mining operations associated with outstanding mining claims in and near the preserve represent an un-quantified threat to groundwater, air, and soils resources.
- Mojave would benefit from the services of a term historian to complete historical research to provide park contexts for mining, structures, and cultural landscapes. Mojave also would benefit, as would the other California desert parks, from a shared historic preservation crew to inspect, monitor, and perform preventive maintenance on park structures.
- None of the objects in Mojave's small museum collection have been catalogued, and a management plan is needed.
- The potential development of the Ivanpah airport just north of the preserve represents significant threats to the soundscape, night skies, and air quality at the preserve.
- Funding is needed for specialists to help update the Cultural Landscape Inventory for the Kelso Depot, and the Mojave Road needs to be surveyed for the Cultural Landscape Inventory and nominated for listing on the National Register of Historic Places.



### NATURAL RESOURCES— BURGEONING REGIONAL POPULATIONS STRAIN DELICATE DESERT SYSTEMS

The assessments rated the overall conditions of natural resources at Joshua Tree, Death Valley, and Mojave as 65, 67, and 59, respectively. These scores indicate that natural resources are in fair condition at Joshua Tree and Death Valley, and that resources are in poor condition at Mojave. Prominent factors influencing the ratings for all three parks are associated with the effects of historic land use and rapidly increasing human populations in southern California.

Habitat fragmentation, air pollution, and increased demands for limited groundwater supplies are key concerns.

### PARK ECOSYSTEMS—DIVERSE DESERT HABITATS PROVIDE SHELTER FOR MANY SPECIES

The impressive biodiversity present in each of the California desert parks is not surprising considering their locations within parts of three of North America's four deserts: the Great Basin, Mojave, and Sonoran. Numerous mountain ranges and elevations from 282 feet below sea level to peaks of more than 11,000 feet also contribute to habitat diversity.

## Joshua Tree

Joshua Tree National Park encompasses parts of both the Sonoran (Colorado portion) and the Mojave deserts, resulting in a diverse assemblage of plants and animals. The Sonoran desert is home to the greatest diversity of plants of any desert in the world, and the park boasts more than 700 vascular plant species. In the eastern part of the park, spiny ocotillo (*Fouquieria splendens*) and teddy bear cholla (*Opuntia bigelovii*) cacti characterize the Colorado desert; Joshua trees (*Yucca brevifolia*) and Mojave yucca (*Yucca schidigera*) are at home in the Mojave desert in the western and northern areas of the park.

The interesting and unusual plants of this desert region and the tireless efforts of Minerva Hoyt, the “Apostle of the Cacti,” helped win the area federal protection. Hoyt, a Mississippi native who moved to South Pasadena, California, in the late 1890s, fell in love with the desert and worked to acquire federal protection for it. She was especially concerned about the practice of collecting full-grown cacti and other vegetation for use in urban gardens. Hoyt founded the International Deserts Conservation League, and through her advocacy more than 825,000 acres were set aside as Joshua Tree National Monument in 1936.

Some wanted to call the new park “Desert Plants National Park” because of the diversity of plants found there. Instead, it was named after its resident Joshua trees, long-lived and slow-growing plants that are actually members of the lily family. The trees got their name from early Mormon settlers who thought they resembled the biblical figure, Joshua, showing them to their Promised Land.

Wildlife are also abundant at Joshua Tree. Birders are treated to the park’s resident species as well as a host of migrants—more than 250 species in all. Fifty-two mammal species, including an impressive variety of bats and rodents, make their homes in the park, along with 44 reptile species.

## Death Valley

As a result of the park’s location in the Mojave Desert, between the Sonoran Desert to the south and the Great Basin Desert to the north, Death Valley is home to a great variety of plants and animals. Elevations spanning 282 feet below sea level up to more than 11,000 feet above sea level also create conditions suitable for a variety of ecological communities. More than 970 plant species are found in Death Valley, and these can be divided among three general vegetation types: scrub, desert woodland, and coniferous forest.

Scrub habitat is extensive at the park’s lower elevations. Creosote bush (*Larrea tridentata*), sagebrush (*Artemisia tridentata*), and shadscale (*Atriplex confertifolia*) are key species of this habitat type. At elevations of 7,000 to 9,500 feet are desert woodlands of pinyon pine (*Pinus monophylla*) and juniper (*Juniperus osteosperma*). In narrow bands at the highest elevations in Death Valley, bristlecone pine forests (*Pinus aristata*) and subalpine forests containing limber pine (*Pinus flexilis*) survive through punishing temperature extremes.

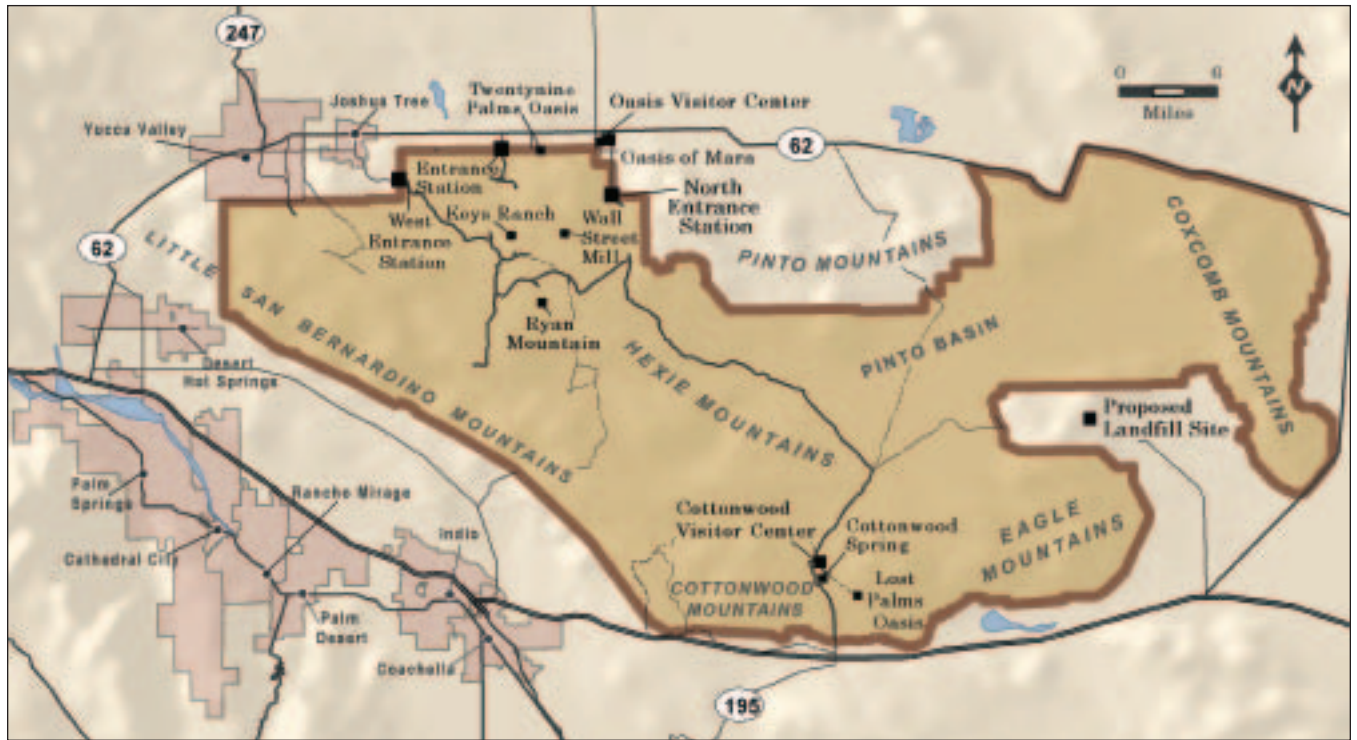
Teddy bear cholla cacti characterize the Colorado desert portion of Joshua Tree. Though they look fuzzy from a distance, the spines of these cacti are painful and difficult to dislodge.



WILLIAM KNIGHT

# JOSHUA TREE NATIONAL PARK

CAROLEE DOUGHTY



# MOJAVE NATIONAL PRESERVE

CAROLEE DOUGHTY





Death Valley is home to 51 species of native mammals, nine of which are bats. The park's abandoned mines provide roosting habitat for many of the bats. More than 300 species of birds, 36 species of reptiles, three species of amphibians, and five species and one subspecies of native fish also inhabit the park. One species, the endangered Devils Hole pupfish (*Cyprinodon diabolis*), is found only in the waters of a limestone cavern in the 40-acre Devils Hole satellite unit of the park, located a few miles away in Nevada.

### Mojave

Mojave is home to more than 900 plant species, ranging from cacti to ferns to horsetails. Sagebrush, creosote bush, various yucca species, and a variety of spring annuals are common at lower elevations, while three different forest types persist at higher elevations: Joshua tree, pinyon-juniper, and white fir. Pinyon-juniper woodlands are the most common of Mojave's forest types and can be found in the Mid Hills, New York Mountains, and Granite Mountains. The preserve contains the largest and most dense forest of Joshua trees, and relict white fir forests are found in the New York and Clark mountains, where a cooler and wetter climate exists.

Two amphibian, 51 mammal, 38 reptile, and two fish species can be found within the preserve. One of the fish species, the federally endangered Mojave tui chub (*Gila bicolor*

*mohavensis*), is found only at three locations in the world. In the preserve, the chub is found only in Lake Tuendae. Dams, diversions, and competition with non-native fish decimated Mojave tui chub populations and led to its endangered listing in 1970. In the future, the preserve's protected population could be used to help repopulate former habitat in the Mojave River.

### NATIONAL PRESERVE OR NATIONAL PARK: WHAT IS THE DIFFERENCE?

Within the National Park System there are numerous designations that can lead to confusion. For example, there are national parks, national monuments, national historic sites, national preserves, and national recreation areas, to name a few of the various designations. Depending on each unit's designation and establishing legislation, certain activities may or may not be allowed. Hunting, mining, and other consumptive uses are not allowed in national parks, but they may be allowed in national preserves.

At Death Valley National Park and Joshua Tree National Park, hunting is not allowed, but at Mojave National Preserve some hunting is permitted. Mojave's establishing legislation also allows for grazing, mining, and utility rights-of-way. The preserve manages these activities so that resources are protected, and the National Park Foundation has been working to retire existing grazing permits. Apart from these exceptions to normal practices within the National Park System, Mojave National Preserve is managed in the same manner as all other national parks.

### SURROUNDING LAND USE—PARK RESOURCES AT RISK

Parks are not islands unto themselves. The developments and activities adjacent to parks often affect them. Not far from the California desert parks are the burgeoning metropolitan areas of Los Angeles and Las Vegas. With popu-

Mojave is home to 38 reptile species, including the leopard lizard.



JIM ANDRE

SOME FORMERLY OPEN LANDS NEAR THE PARK ARE NOW SUBDIVIDED INTO RESIDENTIAL DEVELOPMENTS, AND MORE NEW HOMES ARE BUILT EACH WEEK.

lation growth in these cities come increased transportation corridors that fragment the landscape and disturb wildlife habitat; increased demands for water that stress the arid desert system; increased air pollution that affects ground-level ozone and visibility; increased light pollution that affects night skies; and increased development that mars scenic vistas.

### Joshua Tree

Though Joshua Tree is primarily bordered by undeveloped land, much of which is administered by the Bureau of Land Management, nearby are the fast growing cities of the Coachella Valley (including Indio, Palm Desert, Palm Springs, and Desert Hot Springs) on the southwest and towns of the Morongo Basin (Yucca Valley, Joshua Tree, and Twentynine Palms) on the northwest. The park is also within 150 miles of the Los Angeles and San Diego metropolitan areas and, as such, it is within a day's drive of more than 18 million people.

Populations in Riverside and San Bernardino counties, which encompass the park, have increased 32 and 20 percent, respectively, from 1990 to 2000. Some formerly open lands near the park are now subdivided into residential developments, and more new homes are built each week. With growth come concerns about water availability and wildlife habitat fragmentation.

In addition to challenges associated with urban growth, the park faces the possibility of becoming a neighbor to the world's largest landfill. Mine Reclamation Corporation, a subsidiary of Kaiser Ventures (a successor of Kaiser Steel), wants to build a landfill to store 708 million tons of southern California's waste on nearly 4,000 acres of land within one mile of Joshua Tree. The proposed dump would be located on land that was once part of Joshua Tree National Monument. Some of this land was given to Kaiser Steel in 1952 for iron mining, while the remaining portion would be acreage composed of intact desert habitat transferred from the

Bureau of Land Management to Kaiser in the 1990s under a federal land exchange. NPCA and other plaintiffs have challenged this land exchange in court and are currently awaiting the judge's decision. The site is surrounded on three sides by current national parkland, most of which is designated wilderness.

Railroad cars and trucks would deliver 20,000 tons of garbage each day to the site for 117 years, if approved. Garbage would be dumped into canyons and onto hillsides in piles that could rise 700 to 2,200 feet above current ground surfaces. The waste would attract scavengers such as ravens that prey on lizards, snakes, rodents, invertebrates, birds, and desert tortoises. Raven populations have increased up to 1,000 percent in recent decades throughout the California desert; habitat alteration and human-provided food sources such as landfills have facilitated this increase.

Park Service staff, local citizens, and conservation groups believe that the landfill would harm park resources. Air and water quality, as well as the health of federally threatened desert tortoises, are key concerns. They are also concerned that the landfill could pollute precious underground water sources, in addition to contributing to light and noise pollution.

Nearly three-quarters of Joshua Tree's 794,000 acres is designated wilderness, lands that are managed to preserve natural conditions, where humans are visitors who do not remain. Building the nation's largest landfill directly adjacent to Joshua Tree threatens to compromise the values that the park was created to protect.

### Death Valley

Though the park is within a three-hour drive of Las Vegas, Death Valley is buffered from nearby metropolitan development by the expansive Nevada Test Site just to its east, the Inyo National Forest to the north and west, and Department of Defense lands to its south. In spite of this relative isolation, nearby mining



Dark night skies treat visitors to spectacular views of the Milky Way, but development near the parks threatens to pollute the skies with light.

development could affect park resources. Canyon Resources has been operating a gold mine in the Panamint Mountains just outside of Death Valley since 1996, and the company would like to open a new mine nearby. The new mine would be located higher in the Panamint Mountains and would be visible from within the park. There are concerns that the new mine and associated development would impinge on bighorn sheep habitat, contaminate groundwater, mar scenic vistas, and affect traditional homelands of the Timbisha Shoshone Tribe.

New regulations passed by the California State Mining and Geology Board that require mining companies to fill in open pit mines once mining is completed could prevent Canyon Resources from opening a new mine in the Panamint Mountains. The cost of filling in the mine could be too great when compared to the profit to be gained by the mine. Although plans for the mine are currently on hold as a result of the new backfill regulations, mining proponents are trying to get the regulations reversed.

#### Mojave

Mojave National Preserve is located just an hour's drive from Las Vegas, one of this country's fastest-growing cities. The population of Las Vegas has increased 84 percent from 1990 to 2000, and Clark County, which encompasses the city, has grown to nearly 200 times the size it was in the 1930s, thanks largely to the advent of air conditioning.

With population and economic growth come increased visitation and airport traffic. If traffic at Las Vegas's McCarran International Airport increases as projected, the airport will reach its annual passenger capacity of 55 million by 2015. An additional airport has been proposed for the Ivanpah Valley of Nevada, along Interstate 15 and just north of Mojave.

The new airport could increase industrial and commercial development next to the park, as well as noise from air traffic. The park's soundscapes and dark night skies would likely be affected, in addition to visitors' ability to experience solitude. Mojave is currently bor-

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dered by interstate highways to the north and south, which compromise wildlife habitat and disrupt wildlife movement. Additional development that would occur surrounding the new airport would exacerbate these issues.

#### WATER RESOURCES—INCREASING DEMANDS OVERBURDEN LIMITED GROUNDWATER SUPPLIES

Water is a precious commodity in the California desert parks, with annual precipitation varying according to elevation. At Death Valley—the driest location in the United States—annual precipitation averages just 1.84 inches, while Joshua Tree gets about four inches each year. Mojave receives between three and nine inches of precipitation, with higher elevation areas receiving the most. This scant precipitation, in addition to water that flows along underground faults and fissures until it is forced to the surface, supplies the springs, seeps, and streams upon which wildlife and plants depend. Joshua Tree contains 120 known water sources, while Mojave has more than 200, and Death Valley has more than 400. Most of these are simply small springs or seeps where water flow is generally less than five gallons per minute.

Since precipitation levels are low and vary greatly during the year, groundwater is the most consistent supply of water for regional needs. In spite of the critical importance of groundwater, little is known about how much there is and how it is distributed. What is known is that precipitation levels are not sufficient to replenish the amount of groundwater that is demanded by growing human populations in the region. As a result, less and less water is available for wildlife and riparian

Very little surface water is now present at the magnificent Lost Palms Oasis, where more than 110 desert fan palms inhabit the deep canyon, but several freestanding pools of water were once found under the palms.

plants, and staff at Joshua Tree, Death Valley, and Mojave are concerned about what this could mean for park resources.

### Joshua Tree

Joshua Tree's more than 120 water sources provide a lifeline for Gambel's quail (*Lophortyx gambelii*), coyotes (*Canis latrans*), mule deer (*Odocoileus hemionus*), mountain lions (*Felis concolor*), bighorn sheep (*Ovis Canadensis nelsoni*), and the park's two indigenous amphibians, the red-spotted toad (*Bufo punctatus*) and the California tree frog (*Hyla cadaveria*), whose lifecycles begin in water. Bighorn sheep must drink water about every three days in the summer months, so their populations tend to concentrate during these hot months near perennial water sources.

Park staff have noticed declining trends in the number and levels of many of Joshua Tree's natural surface waters. A recent study suggests that groundwater levels have been dropping by an average of one foot per year for at least the past 30 years. For example, although very little surface water is now present at the magnificent Lost Palms Oasis, where more than 110 desert fan palms inhabit the deep canyon, several free-standing pools of water were once found under the palms. Also, at nearby Cottonwood Spring, flow was as high as 3,000 gallons per day at the turn of the 20th century, but decreased to just a few gallons per day prior to the 1971 San Fernando earthquake. Presently, flow at the spring is somewhat improved, and can be as high as 30 gallons per hour.

Declining surface water in the park likely explains the relatively recent loss of several populations of the California tree frog. Joshua Tree used to be home to seven populations of the tree frog, but today only three populations remain.

It is not only the loss of surface water that is of concern, but also the compromised quality of the waters at springs and seeps that may pose a threat to dependent species. Joshua Tree staff have reported algae growing at many springs,



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Water usage in growing communities surrounding Death Valley taxes limited groundwater supplies critical to regional wildlife.

indicating an influx of nutrients. This process of nutrient influx and enhanced plant growth is called eutrophication. Waste eliminated by animals drinking at the springs could be part of the source of additional nutrients, although focused studies have not been done. Atmospheric deposition of nitrogen might also be responsible for increased algal growth. The park is just over the San Bernardino Mountains from and immediately adjacent to California's South Coast Air Basin, which includes the greater Los Angeles/Long Beach/Riverside/San Bernardino metropolitan areas, where more than 900 tons of nitrogen oxides are released into the air per day from mobile sources alone.

Abundant algal and plant growth can lead to lowered dissolved oxygen, a condition detrimental to aquatic life. In 2001, the Park Service Water Resources Division reported that 68 percent of the dissolved oxygen measurements cited for 17 spring stations in Joshua Tree from 1985 through 1997 failed to meet the Environmental Protection Agency criterion for

## FAN PALM OASES PROVIDE SHELTER FOR WILDLIFE AND HUMANS ALIKE

WILLIAM KNIGHT



The sun and heat are intense at Joshua Tree, particularly during the summer months. Water and shade are hard to come by, making the park's fan palm oases popular areas for both humans and wildlife. The oases are conspicuous and welcome indicators of perennial water from belowground sources as the desert fan palm (*Washingtonia filifera*), also known as the California fan palm, requires a constant supply for growth. Only 158 desert fan palm oases exist in North America, and five are found in Joshua Tree.

At the oases, wildlife drink the water and use the palms and other vegetation for food and shelter. Human use of the oases probably dates back thousands of years up to historic times. American Indians ate palm fruit, built shelters with the fronds, and made clothing with the fibers. Early homesteaders camped at the oases, and ranchers sometimes used them as watering holes for their cattle.

the protection of freshwater aquatic life. Shrinking water quantity will likely compound the problem.

The park's water quality has not been monitored continuously or consistently over the years, and the park does not have an established monitoring program or plan. Although Joshua Tree does have water quality testing equipment, no personnel are available to routinely sample and test park surface or ground waters. Overall, the park water budget, groundwater flows, directions, and water quality are poorly understood.

One area of heightened awareness is the Pinto Basin groundwater aquifer. The Pinto Basin is home to the largest groundwater aquifer within the park's boundary. The water within the basin was exploited for years by mining activities related to the Kaiser Steel Corporation. Future development in the basin to the east of the park boundary (Chuckwalla Basin) would affect the groundwater level in the Pinto Basin.

Park staff recognize that it is essential for the future management and protection of the park's precious freshwater sources and dependent species that a comprehensive hydrologic budget and baseline water quality program be formulated and implemented, and they are attempting to secure funds to proceed with water quality research.

### Death Valley

Death Valley is the ultimate discharge area of groundwater derived from mountain regions that encompass a 15,800-square-mile area to the east and northeast of the park. This groundwater is virtually the only source of water in the region.

The park's wildlife, which includes endemic and federally listed species, depends on groundwater discharged at springs and seeps for survival. The best-known water-dependent species is the endangered Devils Hole pupfish (*Cyprinodon diabolis*), found only in a limestone cavern in the 40-acre Devils Hole unit of the

park. Park staff monitor water levels at Devils Hole to make sure that there is enough water to sustain the endangered pupfish, but increasing population growth is straining the region's limited water supply.

Industries also use significant amounts of water. Activities at a nuclear weapons test site in Nevada require about 1,000 acre-feet of water each year, and a planned radioactive waste depository at Yucca Mountain will require additional water for site needs and nearby bedroom communities for an expanding workforce. As more and more demands are made on the Death Valley groundwater system—which is already over-appropriated according to existing data—flows to the park and dependent wildlife will decrease. In addition to stresses from increased demand, Death Valley's groundwater flow system faces concerns about potential contamination from the proposed Yucca Mountain storage facility, which will house some of the nation's high-level radioactive waste.

### Mojave

Mojave contains more than 200 seeps and springs, several ephemeral streams, and at least one perennial stream, Piute Creek. These water sources, which are fed largely by groundwater, are critical to the survival of desert wildlife and vegetation.

Ranchers and miners who settled the region also needed reliable water sources for themselves, their livestock, and their pack animals. They altered many of the region's natural water sources during the past century by drilling wells and constructing retention dams, pipelines, and troughs. Wildlife use some of these enhanced water sources, but many scientists believe man-made watering structures do not belong in the preserve. Guzzlers, water catchments that capture rainwater or pump groundwater, are under particular scrutiny.

Mojave has 139 guzzlers that were constructed mainly to supply water to hunted wildlife species. Six are large game guzzlers designed to

serve bighorn sheep, while the remaining 133 guzzlers were built for smaller wildlife, including upland birds. Many wildlife managers, scientists, and conservationists oppose installation of new guzzlers, and also favor removal of artificial waters associated with livestock operations as grazing allotments are retired. They feel these water structures are not needed, pointing to the recovery of wildlife habitat, revitalization of natural springs, and increased deer harvest as grazing allotments are retired and wild burro numbers are reduced. The unnatural water sources attract non-native bees and subsidize predators such as ravens that prey on the threatened desert tortoise and other wildlife. The guzzlers also represent a direct threat to tortoises that can become trapped in them. A recent study found tortoise remains in 27 percent of guzzlers located in tortoise habitat. Many of Mojave's guzzlers are in a state of disrepair and not used by wildlife, but hunters oppose their removal fearing wildlife populations will suffer.

Non-native tamarisk and burros threaten both water quality and quantity at Mojave. Tamarisk taps into deep groundwater supplies and competes with native vegetation for available water. It provides little value to wildlife and is difficult to eradicate.

Burros were brought to the region by miners who used them as pack animals. Wild burros that roam the park today drink more water than native wildlife such as bighorn sheep, contaminate water sources with excrement, and over browse native vegetation. The park has mounted an intensive burro removal program that has taken more than 3,800 animals out of the park, but burros still inhabit adjacent land and can move back into the park. Mojave is continuing removal efforts and has hired a park wrangler to manage the program. A fence that will completely surround the preserve will prevent burros from moving into Mojave, and is scheduled for installation starting in fiscal year 2008, with advance compliance work beginning in fiscal year 2006.

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#### AIR QUALITY—ADDITIONAL MONITORING NEEDED

Not far from the California desert parks are the major metropolitan areas of the Los Angeles Basin (Los Angeles, San Bernardino, and Riverside) and California's Central Valley (Bakersfield and Fresno), regions with some of the worst air quality in the nation. Air quality in Joshua Tree, Death Valley, and Mojave is largely a function of proximity to these metropolitan areas, prevailing wind direction, and mountain range configurations that serve as barriers in some cases, or funnels in others, between the parks and these highly urbanized regions.

Monitoring air quality in these parks is challenging. Current funding levels are insufficient to adequately monitor air quality in large parks such as Death Valley, and in some years funding is nonexistent for air quality monitoring. As a result, there are large gaps in data that make deciphering trends difficult. To capture a complete picture of air quality at Joshua Tree, Death Valley, and Mojave, additional monitoring stations are needed, and data must be collected consistently through time.

#### Joshua Tree

Joshua Tree has the worst air quality of the California desert parks, and it has some of the worst air quality of any park in the National Park System. This park is located next to the California's South Coast Air Basin, and prevailing westerly winds funnel pollution from the greater Los Angeles/Long Beach/Riverside/San Bernardino areas directly to the park. A 2002 report by the American Lung Association named San Bernardino County as the smoggiest in the nation, closely followed by Riverside; Joshua Tree straddles these two counties.

Ozone pollution that occurs when nitrogen oxides react with sunlight and volatile organic compounds in the atmosphere is Joshua Tree's largest air quality concern. Although ozone blocks harmful ultraviolet radiation in the upper atmosphere, when it forms at ground

level it acts as a corrosive compound that damages sensitive vegetation and rock art and threatens human health. The park is home to a number of ozone-sensitive plants and lichen species, including Nevada catseye (*Cryptantha nevadensis*), Parish's goldenpoppy (*Eschscholzia parishii*), smooth desert dandelion (*Malacothrix glabrata*), whitestem blazingstar (*Mentzelia albicaulis*), chuckwalla combseed (*Pectocarya heterocarpa*), skunkbush sumac (*Rhus trilobata* var. *anisophylla*), and blue elder (*Sambucus mexicana*). Studies are needed to determine the extent to which elevated ozone levels are affecting sensitive plants.

Ozone is also a major ingredient in visibility-obscuring haze. Joshua Tree has some of the worst ozone pollution of any of the 42 monitored national parks, and levels regularly exceed Environmental Protection Agency standards. Scenic vistas are blurred by ozone and particulates from human and natural sources. On clear days, visitors can see 100 miles, while on the worst hazy days, visibility can decrease to just 17 miles.

Nitrogen oxide emissions from motor vehicles and industrial sources are also of concern. More than 1,000 tons of nitrogen oxides (NO<sub>x</sub>) are released each day from primarily mobile (motor vehicles) and to a much lesser extent stationary (fuel combustion, industrial processes) sources in the South Coast Air Basin, which encompasses much of the urban area west of the park. In addition to contributing to the formation of ground-level ozone, nitrogen compounds add to particulate pollution that affects visibility, and nitrogen deposited on the landscape can alter soil and water chemistry, affect nutrient dynamics, and potentially lead to changes in plant composition. Nitrogen deposition and concentration of atmospheric nitrogen compounds at Joshua Tree are the highest of any western national park.

Joshua Tree's vegetation is adapted to generally nitrogen-limited soils, and an influx of nitrogen may be favoring non-native plants such as red brome (*Bromus rubens*) and cheat-





Scenic vistas are blurred by ozone and particulates from human and natural sources.

grass (*Bromus tectorum*) that are now well established in the the park. To find out how nitrogen deposition affects native and non-native plants in the park, Joshua Tree is partnering with researchers from the University of California and the Forest Service, and studies are now under way.

### Death Valley

Death Valley's relative remoteness from population centers, coupled with the shielding effects of the tall Sierra Nevada mountain range to its west, likely serve to partly insulate the park from the major pollution sources affecting Joshua Tree. As a result, air quality is much better than at Joshua Tree, though it is still affected by pollution sources such as nearby commercial and military facilities.

Monitoring sites at Cow Creek near the center of the park collect visibility, particulate, dry and wet nitrogen and sulfur deposition, ozone, and meteorological data. Death Valley consistently falls within national ambient air quality

standards for ozone, although the park ranks as the 16th worst among the 42 Park Service stations actively monitoring ozone. Average maximum ozone levels at Death Valley were about double the levels reported at Olympic National Park, the park with the lowest reported ozone levels within the Park Service's network.

In 2002, visibility at Death Valley ranged from an average of 44 miles on the worst days to 157 miles on the best days. Nitrogen and sulfur deposition are also considerably lower than levels measured for Joshua Tree.

Death Valley would benefit from air quality monitoring stations at other locations in the park. A single location is not sufficient to capture the full picture of air quality in a nearly 3.4-million-acre park with the elevation extremes and complex topography found at Death Valley.

### Mojave

There are no air quality monitoring stations at Mojave. Data collected at regional monitoring stations indicate that ozone and particulate

matter levels at the park exceed national ambient air quality standards, resulting in the park being classified by the Environmental Protection Agency as a non-attainment area for these pollutants. However, data used to extrapolate air quality at Mojave is collected at monitoring stations miles from the park, principally from the stations located at Joshua Tree and Death Valley, and this data may not provide an accurate assessment of the park's actual air quality. To establish a complete and accurate picture of air quality at Mojave, the park needs several monitoring stations to collect data on ozone, visibility, and nitrogen deposition.

#### NON-NATIVE SPECIES—BOTH PLANTS AND ANIMALS POSE CHALLENGES

Non-native plants and animals are of concern to land managers throughout the country, especially when those species disrupt relationships among native species and alter natural ecosystems and communities. In the California desert parks, non-native invasive plants are widespread, competing with native species for nutrients and water, changing vegetation community composition, and altering the area's fire regime. Annual grasses, tamarisk, and Russian thistle are of primary concern. Non-native animals such as burros and chukars compete with native wildlife.

Although the California desert parks are actively working to combat the establishment and proliferation of non-native plants, they do

not have sufficient funds to implement comprehensive non-native plant management programs or conduct park-wide surveys to determine distribution of non-native plants. The parks largely rely on casual observations by volunteers and employees to locate non-natives, and project funds, when available, are used to support the people and supplies needed to deal with them. Non-native animal control programs exist at Death Valley and Mojave, though it can take years to remove non-natives from the parks. In addition, some species, such as burros, can enter and repopulate the park from adjacent public lands where they are not controlled as rigorously.

#### Joshua Tree

Cheatgrass and red brome carpet the desert floor throughout much of Joshua Tree, filling the spaces between Joshua trees, creosote bushes, cholla cactus, and other native plants. These grasses do not provide good forage for animals, and they promote fire where it might not otherwise occur.

Fires are thought to occur infrequently in the Mojave and Sonoran deserts. Wide spaces between shrubs and grasses historically prevented fires from spreading, limiting burns to small areas. When non-native grasses fill the spaces between native plants, fires are able to spread more readily. These grasses also provide a more continuous source of fuel, in part, because they stay upright and rooted after they die.

Because the Mojave and Sonoran desert systems evolved in the absence of frequent fires, much of the native wildlife and vegetation such as the desert tortoise and relict populations of Rocky Mountain white fir (*Abies concolor concolor*) from the late Pleistocene period cannot survive them. Slow-growing, long-lived Joshua trees are particularly susceptible to fires. These trees can live for hundreds of years, and because they may grow only one inch per year, it takes decades or more to replace those lost in fires. In 1999, Joshua Tree National Park suffered its

Non-native grasses allow fires to spread, damaging native plants.

WILLIAM KNIGHT



## DESERT TORTOISE

California's state reptile, the desert tortoise, needs help. This long-lived, icon species—tortoises can live 50 to 100 years—is found in the Mojave and Sonoran deserts of California, Nevada, Arizona, Utah, and parts of Mexico. Because of severe population declines, the Mojave population of tortoises (those living north and west of the Colorado River) was listed as federally threatened in 1990. Habitat destruction and fragmentation resulting from urbanization, agricultural development, livestock grazing, mining, and roads are blamed for their decline. Illegal collecting for food or pets, off-highway vehicle use that crushes animals and their burrows and compacts soil, increasing raven populations that prey on young tortoises, and upper respiratory tract disease are also problems.

With human populations in southeastern California counties growing at record speeds, threats to desert tortoises and their habitat are increasing. As more and more tortoise habitat is developed or otherwise affected by urban growth, protected areas such as Joshua Tree, Death Valley, and Mojave become even more important for the continued survival of the species.

In 1994, the U.S. Fish and Wildlife Service published a recovery plan for the Mojave population of desert tortoises. Joshua Tree was designated as a Desert Wildlife Management Area—a place where tortoises and their habitat are highly protected from all threats. About half of Mojave has also been designated as critical tortoise habitat.

Though Joshua Tree has participated in sampling studies, maintains a permanent study plot in the Pinto Basin, and has done some research on home ranges and burrow use, staff do not know how many tortoises live in the park. Determining population size and monitoring any changes over time



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would help park staff better understand the health of Joshua Tree's tortoises. Similar work is needed at Mojave as well.

Mojave's General Management Plan outlines a number of tortoise protection measures the park is taking or will take to ensure the tortoise's survival. For example, off-road driving that can crush tortoises and their burrows is not allowed in the preserve, and raven-proof trash containers are being installed throughout Mojave. The preserve is also participating in an interagency effort to conduct line distance sampling and establish permanent study plots.

Although Death Valley is not included in the tortoise recovery area or plan, the park conducts tortoise surveys in areas of potential development or roadwork, and enforces tortoise education, slower driving speeds, and other restrictions in areas of known tortoise habitat.

SINCE LIVE-TRAPPING BEGAN IN 1997, MORE THAN 3,800 BURROS HAVE BEEN REMOVED FROM MOJAVE AND TRANSFERRED TO PLACEMENT PROGRAMS AND ANIMAL PROTECTION GROUPS.

largest fire on record—14,000 acres of Joshua trees, junipers, black brush, and pinyon pines burned. Non-native grasses quickly recolonize burned areas because many native plants are slow to recover, perpetuating the cycle of increased fire frequency.

Cheatgrass has become a major problem in the western United States since its introduction in the late 1800s, spreading to an estimated 98.84 million acres. Once cheatgrass is widely established, it is very difficult to control. Some researchers believe that large infestations are impossible to eradicate. A complicating factor is the deposition of artificially high levels of nitrogen, caused in part by automobile exhaust, which tends to favor the growth and proliferation of non-natives over natives.

Joshua Tree National Park has had success controlling other non-native species such as tamarisk (*Tamarix spp.*), which is a major problem along waterways throughout the West. Tamarisk promotes high intensity crown fires that can significantly harm native plants and soils. Extensive tamarisk surveys and treatments were conducted throughout the park in 1998, but sites need to be revisited and retreated to ensure tamarisk does not return. However, the park has not received any additional project funds for non-native plant control.

#### Death Valley

Tamarisk is a problem in riparian areas at Death Valley, and Russian thistle is common in disturbed areas throughout the park. Annual grasses and hornwort (*Ceratophyllum demersum*), an invasive aquatic plant, are also of concern. Park staff have been working to remove hornwort from Saratoga Springs, but funds are limited.

Prospectors first brought burros to the region more than a century ago to carry their supplies. Well adapted to the climate, many burros were turned loose after the mining work was finished. Burros are voracious and eat most anything, often picking an area clean of all but the

woodiest of shrubs. They can devour vegetation vital to the desert tortoise and other wildlife, and they are known to contaminate water sources with their waste. Burros live up to 40 years and can increase their numbers by as much as 25 percent each year, making control efforts a challenge.

Staff at Death Valley have been working to remove all burros from the park. Most animals are captured and then transferred to the Bureau of Land Management or private burro advocacy groups for placement and adoption. The park has successfully removed hundreds of burros in recent years, but animals living on adjacent lands can repopulate parklands. When funding is made available, the Park Service will work with other land management agencies to conduct feasibility studies for boundary fences in some areas to discourage this movement of burros.

The chukar (*Alectoris chukar*), a bird native to India, was first brought to California in 1932. It was popular with hunters, and during the next two decades, about 52,000 birds were released by the California Department of Fish and Game. The birds are now abundant in every valley and mountain range in Death Valley National Park. The park does not have any information on how chukars affect native wildlife and does not have the staff to manage chukar populations. Death Valley currently has just one wildlife technician but plans to hire a natural resources specialist.

#### Mojave

Mojave staff have identified 60 non-native plants within the preserve, with tamarisk, Saharan mustard (*Brassica tournefortii*), Russian thistle, and annual grasses being the most problematic. Issues associated with these invaders are similar to those described for Joshua Tree and Death Valley.

Mojave also has wild burro and chukar populations. The park has implemented a burro removal program similar to the one at Death Valley. Since live-trapping began in 1997, more

than 3,800 animals have been removed from the park and transferred to placement programs and animal protection groups. Funds are needed to continue removal efforts and construct fences along parts of the preserve's border to prevent other burros from entering Mojave.

Chukars, which compete with native quail, have been spotted throughout Mojave. The park hopes to reduce chukar populations by increasing the number of birds that hunters can take.

### HISTORIC LAND USE—RESTORING THE BALANCE

Although humans have lived in the California desert region for thousands of years, Euro-American settlement of the region did not begin in earnest until the last half of the 19th century. Ranchers and miners claimed lands and began to graze cattle and search for minerals, including gold. While most grazing and mining has been discontinued within Joshua Tree, Death Valley, and Mojave, evidence of these activities remains.

Hundreds of abandoned mines are scattered throughout the three parks. Homesteads, mills, and other structures are valued for their ability to teach today's visitors about the region's past, but several hundred old mines pose safety risks to visitors. Deep shafts and other mine entrances are often unstable, and hazardous waste from mineral extraction is present at many sites. Park staff are working to make the abandoned mines safe for visitors and wildlife. Plugging deep shafts with foam or installing gates protects visitors and leaves the mines accessible to wildlife like bats and owls that roost within them.

Even though the California desert parks are part of the National Park System, there are still existing grazing rights and numerous mining claims in parts of these parks. For example, in Death Valley there are about 146 patented mining claims, and grazing occurs in the Hunter Mountain allotment within the park. In Mojave, there are about 500 mining claims (patented and unpatented). Cattle grazing in Mojave has

## DESERT BIGHORN SHEEP

Desert bighorn sheep (*Ovis canadensis nelsoni*) are one of the California desert parks' few large mammal species. These majestic and shy creatures are able to survive in this arid landscape, in part, because they possess nine-stage digestive systems that allow them to extract a maximum of nutrients from marginal vegetation.

Once extensive settlement of the West began in the 19th century, desert bighorn sheep populations were decimated through excessive hunting, introduced diseases, competition with non-native animals, and habitat loss. Today's desert bighorn sheep populations are just 10 percent of what they once were.

Bighorn sheep live in all three of the California desert parks. About 250 reside in Joshua Tree, between 500 and 1,000 live in Death Valley, and between 700 and 1,000 are thought to live in Mojave. Because these animals prefer areas that are isolated from human activities, increasing urban development limits the amount of suitable bighorn habitat. Transportation corridors that accompany development impede bighorn migration, isolating populations and reducing populations' genetic diversity. Desert bighorn sheep also must continue to contend with diseases introduced by livestock; non-native plants that make poor forage; non-native animals such as burros that compete for resources; poaching; and declining water levels at springs.

In 1988, the State of California authorized bighorn sheep hunting for the first time in 114 years. Limited hunting is allowed in Mojave National Preserve with between four and nine permits issued on a lottery basis. An additional permit is sold at auction, often for more than \$150,000.



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Hundreds of abandoned mines are scattered throughout the California desert parks, and many pose hazards for visitors. Park staff are working to make them safe for visitors and wildlife by plugging deep shafts with foam or installing gates.



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been reduced from 1.3 million grazed acres to 220,000 grazed acres, as ranchers sold their allotments to intermediaries, who retired and donated them to the park.

#### R.S. 2477—ANTIQUATED LAW THREATENS PARKS

San Bernardino County has asserted claim to more than 2,300 miles of rights-of-way in the Mojave National Preserve using an antiquated 19th century mining law known as R.S. 2477. Several years ago, the county also asserted a claim on 4.5 miles of road at the Rainbow Talc Mine in Death Valley, located in designated wilderness. That claim was dropped when the

mine was purchased, and no other claims have been filed. Most of Joshua Tree lies within Riverside County, which has filed no claims.

Many of these routes are located along wash bottoms, abandoned dirt roads, and old cow paths. If San Bernardino County were to secure these rights-of-way and maintain them as roads, it would degrade wildlife habitat, fragment the world's largest Joshua tree forest, cause further spreading of non-native species, and lead to increased resource damage. Lack of resolution regarding these claims has cast a shadow of uncertainty on many Mojave resource decisions, including those affecting wilderness and road management.

## CULTURAL RESOURCES— VALUABLE PREHISTORIC AND HISTORIC TREASURES AT RISK

State of the Parks researchers assessed and assigned scores to cultural resource conditions at Joshua Tree, Death Valley, and Mojave. Categories included history, ethnography (peoples and cultures), historic structures, archaeology, and archive and museum collections. The scores for cultural resources are based on the results of indicator questions that reflect the National Park Service's own Cultural Resource Management Guideline and other policies related to cultural and historical resources.

The assessments rated the overall conditions of **cultural resources** at Joshua Tree, Death Valley, and Mojave as 58, 71, and 50, respectively. These scores indicate that cultural resources are in fair condition at Death Valley, and that resources are in poor condition at Joshua Tree and Mojave. Prominent factors influencing the ratings are funding and staffing shortfalls that limit cultural resource protection activities.

### HISTORY—RICH REGIONAL HISTORY MERITS ADDITIONAL RESEARCH

The California desert region has a rich human history that dates back to prehistoric peoples who occupied the region when the climate was much more moist, all the way up to the historic period when miners staked claims and ranchers raised livestock. An understanding of these people and the times in which they lived is important to help enrich visitors' experiences and guide management decisions.

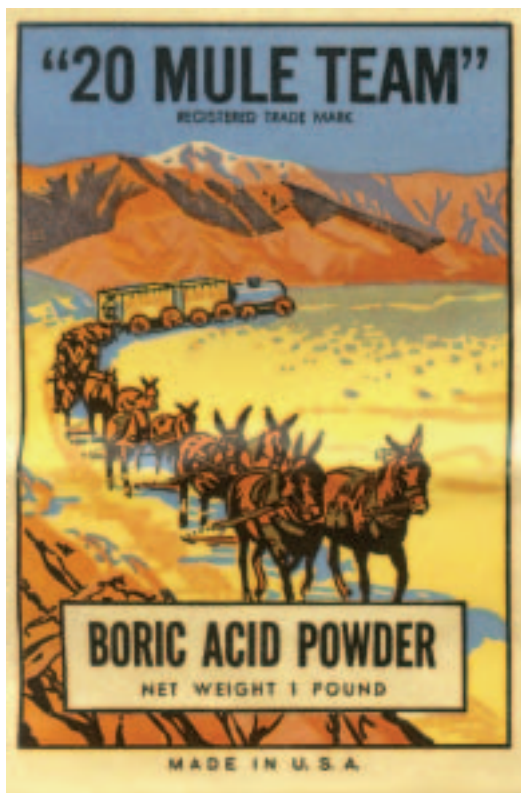
A comprehensive understanding of the history at these parks is limited because none of the parks have full-time staff historians to devote time to conducting research. Instead, regional Park Service historians and consultants are hired on a project-by-project basis when funds are available.

### Joshua Tree

Funding has been secured and work is under way to complete a historic resources study for the lands added in 1994 under the California Desert Protection Act through cooperation with the University of Nevada, Reno. Joshua Tree needs additional funding to inventory and research homesteads, roads, and trail systems and to complete an administrative history. Nearly all of the park's administrative records are cataloged, which will simplify the administrative history research process.

### Death Valley

State of the Parks staff did not formally assess the condition of Death Valley's history. However, it is known that much research has been compiled on topics such as mining and Scotty's Castle, and that new research that covers topics such as roads, trails, exploration, and park development was recently commenced. At Scotty's Castle, historic structure reports, a historic resource study, and a



NATIONAL PARK SERVICE

The mining history of Death Valley includes the extraction of borate, which had to be transported by 20-mule teams over the Panamint Mountains to the nearest railroad 165 miles away. These hardy animals pulled wagon trains that weighed more than 30 tons.

# DEATH VALLEY NATIONAL PARK



CAROLEE DOUGHTY



cultural landscape report are under way. An administrative history of the park will be concluded in 2005. The park does not have a historian on staff, but has access to a historian from the regional Park Service office when funds allow.

### Mojave

Completed or ongoing historical research at Mojave includes a transportation study, town site study, historic resource studies on the region's ranching history, and a railroad history that is part of a historic structure report on the Kelso Depot. The preserve also has an administrative history that was completed in March 2003, and an overview of the preserve's mining history will commence in 2005. Regional Park Service historians and consultants complete most of this research.

Local citizens hold a wealth of information on the region's history. Productive collaboration with these people benefits the preserve and strengthens ties with the local community. Additional historical research would help park staff understand Mojave's historic context and help them develop more interpretive tools to teach visitors about the preserve's history. Mining, military, and historic landscape studies would contribute to evaluations of historic and cultural resources for inclusion in the National Register of Historic Places.

### ETHNOGRAPHY (PEOPLES AND CULTURES)—CULTURAL ANTHROPOLOGIST NEEDED TO EXPAND PROGRAMS

Long before the creation of Joshua Tree National Park, Death Valley National Park, and Mojave National Preserve a variety of American Indian groups made homes in the region. Today park managers are responsible for protecting the places and objects within the parks' borders that are important to these traditionally associated groups.



The American Indian tribal groups that have known traditional affiliations with these parks' resources are the Cahuilla, Mojave, Serrano, Chemeheuvi, Colorado River, Fort Mojave, Timbisha Shoshone, and Southern Piute Indian tribes. Each group may have sacred sites or other resources within the parks that are important to their heritage and traditions that need to be preserved.

Ethnographic research, relationship building, site identification, and monitoring are needed at each of the California desert parks to ensure that ethnographic resources are being protected. However, these activities are severely underfunded, making it difficult for park staff to develop comprehensive and successful ethnography programs. A cultural anthropologist to serve Mojave, Death Valley, and Joshua Tree would help these parks form relationships with traditionally associated groups, help staff care for important resources, and help visitors gain a deeper understanding of the region's history. Joshua Tree's 1995 General Management Plan called for a cultural anthropologist to be hired, but this has not been done.

Prehistoric rock art abounds in the desert parks. At Mojave alone, more than 25,000 individual petroglyphs and pictographs have been recorded at nearly 270 sites.

DEATH VALLEY  
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### Joshua Tree

Because of staff and funding shortages, the park has been unable to implement a comprehensive ethnography program. However, some work has been done to facilitate relationships between the park and associated peoples. For example, the park recently completed an ethnobotanical study and a literature review and background study of traditionally associated cultures of the Joshua Tree region. A traditional cultural property study and ethnozoology study are needed to follow through with this initial research, but funds have not been secured.

Joshua Tree's superintendent and a Park Service regional anthropologist currently manage all communication with traditionally associated groups, but the superintendent has many other responsibilities and the regional anthropologist is based hundreds of miles away in Seattle. In spite of these challenges, the superintendent, cultural resources manager, and regional anthropologist have made efforts to develop the park's ethnography program. They all attended the first annual Sacred Lands conference in May 2004. This conference brought together regional tribes and land managers in an effort to open up regular communication among these groups. In addition, the superintendent works with local tribal groups to resolve concerns when issues arise, and the cultural resources manager and the regional anthropologist are assisting with a contracted traditional use study concerning the park's rock art.

### Death Valley

Death Valley is the only California desert park that has conducted an ethnographic overview and assessment. It was completed in 1995. The park also has a 1987 inventory of ethnographic resources that includes maps and site locations. More recently, staff conducted surveys of specific sites in the park, including Indian Camp, the Grapevine housing area, and Mesquite Spring Campground near Scotty's Castle. There are plans in place to inventory, evaluate, and enter

five sites in the Park Service's ethnographic database by the end of 2005 if staff are available.

The park enjoys a good relationship with the Timbisha Shoshone Tribe, many of whose members live within the park's boundaries. Park staff and tribal members meet on a quarterly basis to discuss cultural resources protection and other issues of mutual interest. The tribe plans to develop a cultural center, a project with which the park is eager to assist. Death Valley staff are also interested in supporting the development of ethnographic oral and life histories. Some have been completed already and are under the jurisdiction of the Timbisha Shoshone Tribe.

### Mojave

Preserve staff have identified several groups that are traditionally associated with Mojave, including the Mojave and Chemehuevi tribes, as well as the Colorado River Indian Peoples and the Southern Piutes. Mojave staff have worked to develop a good relationship with the Mojave and Chemehuevi tribes, but have communicated less with the Southern Piute and Colorado River Indian peoples.

Ideally, each park unit in the National Park System should have the capacity to meet regularly with associated peoples to develop long-term relationships and collaborations upon which rich interpretation could be built. This happens at Olympic National Park near Seattle, Washington, but few other parks have adequate funds to hire cultural anthropologists to develop and nurture such relationships. Because of funding and staffing limitations, Mojave National Preserve currently is not able to fulfill all Park Service ethnographic standards. But Mojave will initiate a Native American Graves and Repatriation Act (NAGPRA) Cultural Affiliation Study in 2005 through a contract with a local ethnographer that will guide specifically how the preserve will handle inadvertent discoveries of human remains and associated grave goods and ritual items.



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### CULTURAL LANDSCAPES—FUNDS NEEDED TO SUPPORT ADDITIONAL DOCUMENTATION AND PRESERVATION

The people who lived in the California desert region learned how to sustain themselves with the resources that the desert provided. The Serrano, Chemehuevi, Cahuilla, and Mojave people collected pinyon nuts, cactus fruits, and mesquite pods to provide nourishment, palm fronds were used for shelter, and plant fibers could be woven into baskets. Ranchers built dams and impoundments to catch precious water to sustain their livestock, and miners dug deep into the earth to extract gold, iron, and other precious materials. Cultural landscapes illustrate these and other ways in which people have interacted with their environments.

The Park Service has identified 35 cultural landscapes in Death Valley, ten in Joshua Tree,

and three in Mojave. There may be other important landscapes that have not yet been identified, particularly because Mojave has not been systematically surveyed. Severe funding constraints limit the amount of work that park staff can do to protect the important historical and cultural characteristics of these landscapes.

#### Joshua Tree

According to the Park System-wide Cultural Landscape Inventory database, Joshua Tree contains ten sites that need assessments to determine whether their landscape features contribute to their eligibility for listing in the National Register of Historic Places. It is likely that there are additional cultural landscapes that have not yet been identified.

One landscape, the Keys Ranch Historic District, has already been inventoried. William

Kelso Depot, once a bustling railroad station, has been rehabilitated and will reopen as a visitor information center in fall 2005.



The Desert Queen Ranch, where William Keys and his family lived, is in dire need of a comprehensive landscape management plan.

Keys and his family lived at the ranch from 1917 to 1969, and today it is one of Joshua Tree's best-preserved landscapes. The landscape also includes Cow Camp and Barker Dam. The Keys family homesteaded on 160 acres where they built a ranch house, schoolhouse for the children and the children of neighbors, mills for processing ore, and other buildings associated with ranching and mining. The ranch is in fair condition, but it is in dire need of a comprehensive landscape management plan. The ranch contains a wide range of objects associated with 20th century settlement in the desert, including a variety of historic structures, and equipment and tools related to ranching and mining. The site has also become important habitat for the federally threatened desert tortoise. A museum collection survey, tortoise management strategies, and other stewardship activities have been put on hold until the comprehensive landscape management plan is complete.

The cultural landscape at the Oasis of Mara was also assessed but did not have sufficient extant features to merit documentation beyond its current status as an archaeological district. This site was an important cultural center for several American Indian groups as well as later settlers. A study is needed to determine whether the oasis still possesses ethnographic values. It retains its National Register

status as a significant archaeological site and should be preserved as such.

Since 2002 the park has used fee demonstration money to study the Silver Bell and Golden Bell mines, and a complete cultural landscape study is forthcoming, but funding and staffing constraints have made consistent cultural landscape work at other areas impossible. Funds are needed to support a comprehensive landscape identification study and to conduct additional condition assessments.

### Death Valley

Only eight of Death Valley's 35 identified landscapes have been researched beyond initial identification. At Cow Creek Historic District, Park Service staff have compiled a regional context, completed a site inventory, and mapped the site, and this landscape is in fair condition. Research at Wildrose, a former Civilian Conservation Corps camp, and at Hungry Bill's Ranch led to mapping and documentation of those landscapes. Scotty's Castle is the park's most highly visited and best-interpreted historic landscape. Costumed rangers give site tours that transport visitors back in time to 1939, when the castle bustled with activity.

Death Valley Scotty Historic District is listed in the National Register of Historic Places, and Cow Creek, Camp Wildrose, and Hungry Bill's Ranch historic districts are all eligible for the National Register, though none has been officially listed. In addition, the Timbisha Shoshone Tribe has completed draft National Register nomination forms for Mushroom Rock, Ubehebe Crater, Navel Spring, and "Tumpisa" District in the Furnace Creek area. Several more of the park's cultural landscapes also could be eligible for inclusion in the National Register of Historic Places, but they have not yet been formally evaluated.

Death Valley staff partnered with staff at the Park Service Intermountain Regional Support Office in Santa Fe, New Mexico, to study the park's abandoned mines. They identified,

researched, and documented resources associated with the mines according to National Register of Historic Places criteria, with the goal of nominating sites and their landscape features to the register.

### Mojave

Zzyzx, Kelso Depot, Rock Springs Land and Cattle Company, and the Mojave Road are the park's four identified landscapes. Other cultural landscapes likely exist, but staff have not had the time or the resources to systematically identify or evaluate potentially important landscapes throughout the preserve.

The Kelso Depot, the only landscape in the preserve that is listed in the National Register of Historic Places, was once a major railroad depot. Completed in 1924, the depot included a restaurant and employee boardinghouse. The depot closed in 1985, but it has recently been restored to its 1920s heyday and now houses a visitor information center that will re-open to the public in the fall of 2005.

Zzyzx was once a health resort and mineral springs built by self-proclaimed minister and doctor Curtis Springer and his wife, Mary Loise Berkebile. The two operated the resort from 1944 to 1974, when it was closed for food and drug violations and unauthorized use of federal land. The site has been officially evaluated for its significance and eligibility for listing in the National Register, but the California State Historic Preservation Office is not reviewing new National Register nominations because of a budget crisis. California State University, Fullerton, leases the buildings and land at Zzyzx to host its Desert Studies Center, and is actively involved in rehabilitation of the landscape.

The Mojave Road is the name given to a corridor that travelers used for centuries to cross the harsh desert. Springs and watering holes along the way provided critical water. American Indians traveled the corridor on trading expeditions, and the route was once a major thoroughfare that served military out-

posts, miners, settlers, and trappers. After the advent of steamships and trains, the Mojave Road became obsolete. However, it retains importance today because it teaches contemporary visitors about the history of transportation in the region. This landscape has not had a condition assessment and has not been formally recorded and evaluated.

As grazing leases have been retired, Mojave has assumed responsibility for remaining ranching infrastructure, which is scattered over nearly 1 million acres. The Rock Springs Land and Cattle Company was the primary ranching company in the region between 1894 and 1927. With the onset of the Depression, the company was sold and its holdings divided into the OX, Kessler Springs, and Valley View ranches within the current preserve and the Walking Box Ranch just across the border in Nevada. Park Service regional staff recently completed a Cultural Landscape Inventory of the former Rock Springs territory, and this will be submitted with a nomination for National Register of Historic Places listing for the Rock Springs Land and Cattle Company National Historic District in 2005.

Mojave's staff do not have enough time or resources to work on stewardship of the preserve's historic and cultural landscapes. Park Service landscape specialists are available at the regional level, but Mojave cannot afford to pay

Zzyzx was once a health resort and mineral springs. California State University, Fullerton, leases the buildings and land at Zzyzx to host its Desert Studies Center, and is actively involved in rehabilitation of the landscape.



The California desert parks contain nearly 400 structures that have been identified and are on the Park Service's official List of Classified Structures. Funds for preservation and stabilization projects are limited, and not all structures are eligible to receive project money.



for their services. These specialists are also in demand in many other parks, and regional funding for their services is dwindling.

#### HISTORIC STRUCTURES—A DESERT REGION PRESERVATION CREW NEEDED FOR ADEQUATE STEWARDSHIP

Mine shafts, homesteads, livestock water troughs, ranch buildings, wells, mills, and other structures tell the stories of the people who came to the California desert seeking mineral wealth, a place to raise livestock, or a place to stake claim to cheap public land. World War I veterans who suffered from respiratory problems associated with poison gas came to the region to reap the benefits of the dry desert climate. Joshua Tree, Death Valley, and Mojave are charged with preserving the most significant structures left behind by these desert inhabitants so that visitors today and decades in the future can appreciate them.

Together, the California desert parks contain nearly 400 structures that have been identified

and are on the Park Service's official List of Classified Structures. Additional structures are eligible for listing, but the parks lack the necessary evaluations because of staffing and funding constraints, and in some cases, they lack necessary State Historic Preservation Office feedback.

Support for some stabilization and preservation projects comes from the Park Service Cultural Cyclic Maintenance and Cultural Resources Preservation Program funding sources, which are managed on a regional basis and awarded competitively to parks annually. These funds are limited, and in the case of the Cultural Cyclic Maintenance Program, can be used only to preserve structures on the List of Classified Structures that have been formally determined to be eligible for the National Register. Many other eligible structures have not been nominated (a lengthy and expensive process) and hence do not qualify for funding from this source.

Some assistance is also given by the Park Service's Vanishing Treasures Program, which

provides funds to help protect prehistoric and historic resources in 44 parks throughout the Southwest, including Death Valley, Joshua Tree, and Mojave. Joshua Tree recently received \$41,000 to stabilize and partially restore the 1891 Wall Street Mill, a gold ore-crushing stamp mill operated by William Keys. The mill is the only complete and virtually operable stamp mill left in the Joshua Tree region. Vanishing Treasures money also funded stabilization of the 15-stamp Skidoo Mill in Death Valley, and it supported a project to map outlying ranching features at the Kessler Springs and OX ranches in Mojave and prepare a long-term treatment plan for their preservation.

Unfortunately, the Vanishing Treasures Program, arguably the most successful cultural resources program within the Park Service, could be discontinued. Funds allocated by Congress to support the program have been used to fill operational needs at parks, rather than support cultural resource preservation, casting some doubt on the program's future. The management of the Vanishing Treasures Program has also just been reorganized and it is not clear what effect this will have on its future success.

### Joshua Tree

Eighty-five percent of Joshua Tree's 95 structures are in fair or good condition. However, some structures in the park have not been documented or listed on the park's List of Classified Structures. For example, about 20 mine sites, some with multiple structures, have not been evaluated for historical significance and so they do not receive preservation attention. Until a structure is listed in the List of Classified Structures it does not qualify for cultural cyclic maintenance funds.

Joshua Tree has six sites, all with multiple structures, listed in the National Register of Historic Places. They include: Barker Dam (structure), Desert Queen Mine (district), Ryan House and Lost Horse Well (district), Cow Camp (district), Keys Desert Queen Ranch (dis-



Funds from the Vanishing Treasures program were used to stabilize and partially restore the 1891 Wall Street Mill.

trict), and the Wall Street Mill (buildings). Five other sites with historic structures have been determined eligible for listing, which means that they are managed as historic.

Threats to historic structures include fire, vandalism, weathering, and looting. To protect one of Joshua Tree's best-preserved historic landscapes, the Keys Ranch, park staff lead guided tours for visitors. Unsupervised access to the ranch is not permitted. To further protect the site, the park needs a historic preservation specialist to live there and manage the historic structures program.

### Death Valley

Death Valley contains more than 200 historic structures, many of which are associated with the region's long and varied mining history. Only 37 percent of these are in good condition, while 42 percent are in fair condition. However, these ratings could be outdated because 86 percent of the structures on the List of Classified Structures have not had condition assessments

## SCOTTY'S CASTLE—UNEXPECTED DESERT OPULENCE

The middle of the desert is an unlikely place to build an 8,000-square-foot castle, complete with turrets, cupolas, bell towers, balconies, Medieval ceilings, Islamic arches, and hand painted sheep-skin draperies. Yet that is what one wealthy Chicago couple did in the 1930s. Walter Scott, for whom the palatial dwelling is named, convinced Albert and Bessie Johnson to pursue a life in the healthful desert climate of Death Valley, and to invest in Scott's failing Death Valley gold mine.

Although Frank Lloyd Wright originally drew the plans for the house, the Johnsons eventually decided to work with Los Angeles architect Charles Alexander MacNeilledge to build an eclectic Mediterranean-style home. The house employed state of the art technology, including a water wheel in the basement that generated electricity. Though Scott never spent a dime on the home, he told reporters it cost him \$3 million. Scott lived with the Johnsons at what became known as Scotty's Castle from 1926 to 1931. He outlived the Johnsons and continued to reside at the castle until his death in 1954. He also spent much time in his own home, the Lower Vine Ranch.

Today costumed interpreters lead visitors on tours of the historic house and grounds. They teach visitors about the architecture and technology employed in the home, and they describe the lives of the castle's former inhabitants.



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since 1997. Condition assessments should be done at least once every five years, but Death Valley does not have the resources to accomplish this or the staff needed to implement a systematic monitoring program.

Six of Death Valley's properties are listed in the National Register of Historic Places: Death Valley Scotty Historic District, Skidoo Historic District, Eagle Borax Works, Harmony Borax Works, Saline Valley Salt Tram Historic Structure, and Leadfield. Five additional properties have been determined eligible for listing. Nomination forms have been completed for 17 other properties, although most of these nominations are more than 15 years old. These outstanding nomination forms need to be updated and resubmitted. The rest of the park's structures still need to be evaluated for significance.

Death Valley staff do an excellent job interpreting the park's historic structures. Wayside exhibits explain the significance of some of Death Valley's most highly visited and important structures, and interpreters also share information and stewardship messages with visitors at these sites.

Interpretation at Scotty's Castle is the most extensive at Death Valley. About half of the park's interpretive budget is spent on living history tours of the house and grounds. Costumed interpreters lead visitors around the house, which also serves as a museum. Visitors interested in the technology of the house can get a behind-the-scenes tour of the 1930s state-of-the-art infrastructure that produced electricity and other services for the house's occupants. Informational booklets and a replica 1930s newspaper distributed to visitors tell the story and history behind Scotty's Castle and its characters, and provide messages of preservation and protection. Scotty's Castle itself, according to its 1997 condition assessment, is in fair condition.

### Mojave National Preserve

In 2003, Mojave's List of Classified Structures contained about 77 entries. This list needs to be



updated to include additional known structures such as the more than 100 structures Mojave acquired when grazing leases were retired. Recent condition assessments of most of the listed historic structures found that 58 percent are in good condition. But in 2004, Park Service policy regarding the List of Classified Structures changed so that only those structures that have been formally determined to be eligible for listing in the National Register of Historic Places can be included on the list and thus benefit from preservation funding from certain sources. As a result of this policy change, Mojave's List of Classified Structures was reduced to a total of 12 structures.

Mojave does not have an annual historic structure monitoring program, and staff struggle to keep pace with preventive maintenance. The preserve's maintenance staff perform some routine maintenance on historic structures, and regional Park Service staff, when available, assist with larger restoration and rehabilitation projects. If funding permits, Mojave's facility manager and other maintenance staff will obtain historic preservation training.

Several historic structures at the OX Ranch and Kessler Spring Ranch are being rehabilitated to house preserve staff. This will help alleviate Mojave's housing shortage and should facilitate resource protection since buildings that are used tend to receive regular maintenance attention. In addition, the Kelso schoolhouse and associated buildings have been stabilized and the Rock House has been rehabilitated.

The Rock Springs Land and Cattle Co. Historic District is currently being nominated to the National Register of Historic Places.

#### ARCHAEOLOGY—GREAT POTENTIAL EXISTS FOR ADDITIONAL RESEARCH

People have lived in the California desert region for thousands of years. Pottery, primitive tools, beads, and petroglyphs remain from prehistoric cultures, while ranching, mining, military, and railroad artifacts tell of more recent times.

Within Joshua Tree, Death Valley, and Mojave, there are more than 4,300 known prehistoric and historic sites. This number will likely skyrocket as more lands within the parks are inventoried. So far, just a fraction of the parks' lands have been surveyed for archaeological resources. Although Section 110 of the National Historic Preservation Act mandates surveys of all park acreage, the California desert parks cover vast acreages, and very little funding is available for archaeological work.

Condition assessments are needed for many of the parks' identified archaeological sites. Without complete inventories, baseline site records, and condition assessments, park staff cannot focus protection efforts on the most vulnerable and significant sites.

Historic ranching, farming, and mining activities as well as early park development disturbed some archaeological sites, and looting, vandalism, and erosion threaten sites today. Some monitoring is done, but activities are often sporadic because of staffing constraints and other projects that need attention.

Unlike many parks, each of the California desert parks is fortunate to have at least one archaeologist as a permanent staff member. However, these staff are often program managers and are required to do other cultural resource work to help alleviate staffing shortfalls in other program areas. Partnerships with Park Service regional offices and the Western Archeological and Conservation Center in Tucson, Arizona, and contracts with university researchers allow the parks to accomplish archaeological work that would not otherwise be possible.

#### Joshua Tree

Archaeological study at Joshua Tree dates back to the work of Elizabeth and William Campbell, who settled in Twentynine Palms in 1925. Their pioneering work uncovered much information about the area's early inhabitants. The Campbells believed in the importance of research and preservation, and through their

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Archaeological resources are found throughout the desert parks, but funding and staffing shortfalls limit work. Just a small fraction of the parks' acreage has been surveyed, and few sites are listed in the National Register of Historic Places.

work they assembled an impressive collection of more than 65,000 artifacts that are now housed in the park's well-built museum storage facility.

There is great potential for additional archaeological work at Joshua Tree. Less than 3 percent of the park has been systematically inventoried for archaeological sites (only about 5,660 of these acres have complete coverage), and the 234,000 acres added in 1994 have not been surveyed at all. Using data from a sample survey, it is estimated that there are about 23,436 archaeological sites throughout Joshua Tree, but only 580 have been recorded and listed in the Park Service archaeological database. Not all of the listed sites have condition assessments, and most existing assessments are out-of-date.

None of Joshua Tree's prehistoric archaeological sites or districts are listed in the National Register of Historic Places, but six have been determined eligible. Several more determinations are pending.

Joshua Tree has a program in place to monitor some of its most vulnerable sites, but follow-through is almost non-existent as a result of funding and staffing shortages and competing priorities. Areas containing dense archaeologi-

cal resources are often found close to developed areas that are frequently used by visitors, and repeated disturbance to these resources has been documented by park law enforcement. To mitigate some damage, staff are growing native vegetation that will be used to rehabilitate social trails and reclaim parking and picnic areas located in sensitive areas.

Joshua Tree has a permanent full-time cultural resources manager on staff to care for resources, but this person is also responsible for history, landscape preservation, ethnography, historic structures, and paleontology, severely limiting the amount of time spent on archaeology. A temporary archaeological technician conducts virtually all fieldwork as project funds allow, but the money supporting this position could be reallocated at any time. Because of funding constraints, the technician had to abandon a study of how backcountry camping affects archaeological resources. The initial research documented dispersed backcountry and wilderness camping on a limited number of acres and evaluated the effects on archaeological sites. Funds are needed to support at least one permanent full-time archaeological technician to continue this and other resource stewardship projects.

### Death Valley

Death Valley has been fortunate recently to employ a wealth of archaeological expertise: a seasonal archaeologist, an archaeology technician, and a lead archaeologist. However, the lead archaeologist is the only permanently funded position, and the park will soon lose a seasonal archaeologist and technician because of a lack of funds. Project funds, when available, support archaeology work crews.

Death Valley is so expansive that just 6 percent of its 3.4 million acres have been systematically surveyed for archaeological resources, and federal compliance requirements take up about 60 to 70 percent of the park archaeologist's time each year, limiting the time spent on surveys. As

of April 2004, 2,355 archaeological sites have been documented in the Park Service's system-wide database. Only 13 percent of these sites are listed in good condition.

None of Death Valley's prehistoric archaeological sites or districts are listed in the National Register of Historic Places and none have been determined eligible. However, nominations have been prepared for 14 archaeological districts, including Furnace Creek Wash, Saline Valley, and Eureka Valley.

### Mojave

The vastness of the preserve, combined with funding and staffing constraints, make comprehensive archaeology work at Mojave a challenge. The best information staff have comes from the Park Service's Archaeological Sites Management Information System, a database that includes more than 1,400 identified archaeological sites at Mojave. Eleven percent of them are in good condition, 7 percent are in fair condition, 77 percent are in unknown condition, and the rest are in poor condition or have been destroyed. However, these estimates are based on outdated surveys, and new condition assessments are needed.

Park staff are working to evaluate Mojave's archaeological sites so that significant ones can be nominated for the National Register of Historic Places. The Piute Springs and Aikens Wash archaeological districts are the only ones in the park that are currently listed in the National Register, but more than 40 other sites have been found to be eligible. The park is making progress in adding sites to the official Park Service database and should be commended. Mojave staff have mapped and completed site records for more than 50 of the park's archaeological sites.

Mojave's cultural resources manager, hired in 2001, is a trained archaeologist. However, management duties include all aspects of cultural resources, fundraising, and project management, which leave little time for archaeological

fieldwork. Instead, an archaeology specialist is responsible for most hands-on care of archaeological resources throughout the preserve. Funds were recently acquired to support this technician on a permanent basis, and he was promoted to a permanent full-time position as staff archaeologist in 2005. Mojave also has archaeological expertise available from regional Park Service offices; however, these positions are poorly funded at the regional level and are gradually being eliminated as individuals retire or take other jobs.

Volunteers provide critical support to Mojave's archaeology program. For a nominal fee, volunteers receive two days of training from the California Archaeological Site Stewardship Program. Then each volunteer is assigned an archaeological site to monitor at various times throughout the year. This program helps keep park staff aware of any problems at monitored sites. Site stewards may also be called upon to assist with surveys and other archaeological efforts.

The Park Service's Vanishing Treasures program also provides support for Mojave's archaeological resources. In 2002, the program paid for masonry experts to make repairs and stabilize Fort Piute, an old military fort used to protect Euro-Americans traveling through the region.

### ARCHIVAL AND MUSEUM COLLECTIONS—ADDITIONAL STORAGE AND EXHIBIT SPACE NEEDED

Important collections of prehistoric pottery; American Indian artifacts; historical maps and photographs; documents; woven baskets;

Museum exhibits at the Furnace Creek Visitor Center are outdated, and this 1960s-era structure has a leaky roof that needs to be repaired.



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antique tools; mining equipment; fauna, flora, and paleontological remains; and everyday items reside at each of the California desert parks, providing windows into the lives of the region's past inhabitants. Park staff are responsible for caring for these items and interpreting them for today's visitors. With the total number of collection items exceeding 1 million items, each park faces challenges in providing adequate collection storage and exhibit space.

### Joshua Tree

Joshua Tree houses outstanding archival and museum collections that include one of the most complete regional archaeological collections, the Campbell Collection. At Keys Ranch, the home of Bill Keys and his family from 1917 to 1969, a variety of artifacts tell of homesteading, ranching, and mining in the early to middle 20th century. In sum, the park's archival and museum collections contain more than 245,000 items.

Most of these items are housed in Joshua Tree's museum storage building, which meets most storage facility criteria and currently provides adequate space for the full collection. The facility will soon be full and plans have been completed for increasing the storage area; however, no funds are currently available for construction. The park lacks secure and temperature- and humidity-controlled exhibit space to display collection objects. Only 95 of the more than 245,000 museum objects are on display, and these are in substandard exhibit space. More and improved exhibit space is needed. Visitors are welcome to tour the museum storage building to see other collection items, but park cultural resources staff must accompany them. Park staff would like to share the collections with visitors, but they do not have proper space to do so.

The park's museum technician currently cares for the archival and museum collections, but this position is in the process of being upgraded to a curator position. The curator will

also care for the Mojave National Preserve collections, and a curatorial technician is needed to assist with this work. In spite of the small staff size, the park's archive will be completely cataloged by the end of 2005 through a project-funded agreement with the Park Service support center in Tucson, Arizona, and three-quarters of the museum collection is currently cataloged.

Projects that need attention include preservation of fragile paper mining claims important to the area's history and conservation of items from Keys Ranch. Trained conservators are needed to help preserve the mining claims, and a management plan for Keys Ranch must be completed before conservation projects can be systematically conducted. Finally the park needs a long-term employee, with training, to manage the library and ongoing archiving of records.

### Death Valley

Death Valley's archive and museum collection, housed at both Cow Creek and Scotty's Castle, contains about 833,000 items, including carpets, textiles, artwork, weapons, tools, mining items, natural resource collections, and archaeological artifacts. About 55 percent of this extensive collection has been catalogued, and the park is meeting 85 percent of Park Service museum collection standards. According to the Park Service Automated National Catalog System, most of Death Valley's recorded collection items are in good condition.

Less than 1 percent of Death Valley's archive and museum objects are on display for visitors at Scotty's Castle and the Furnace Creek Visitor Center. Access to other items is granted according to management guidelines. The exhibits at the Furnace Creek Visitor Center are woefully out of date and funding is needed to complete their renovation. A recently completed Long-Term Interpretive Plan addresses rehabilitation of the visitor center, but funding has still not been secured.

The largest threats to the park's collections and archives include shortcomings in pest con-



Museum collections at the California desert parks include a variety of objects that tell of the people who lived in the desert hundreds and thousands of years ago.

trol, housekeeping, and environmental monitoring and control. More than 1,900 original collection objects on exhibit at Scotty's Castle are at risk from theft, vandalism, and continued use. In addition, objects in storage are at risk because of a lack of environmental control, pest management issues, and limited storage space. Mitigation strategies have been developed, and some measures have already been taken to improve conditions. The museum management staff at Scotty's Castle hopes to secure funds to acquire new storage facilities.

#### **Mojave National Preserve**

Mojave has never had any staff to care for museum or archival collections. As a result, none of the collection items has been catalogued and no condition assessments have been done. In addition, the park is meeting just 17 percent of Park Service museum collection standards. However, the park's cultural resource manager believes that most collection items, which include library items, papers and photographic archives,

and historic items from the Kelso Depot, are in good condition. Mojave needs a temporary curator or archivist to help catalog its holdings and facilitate the efforts of researchers. A recent agreement with Joshua Tree will provide an upgrade to the park's museum technician position to curator. At that time, Joshua Tree's curator will oversee the Mojave collections and train the existing cultural resources staff in how to carry out the more routine museum management activities.

Storage for museum objects is not an issue for Mojave, partly because its collection is so small. Some of the park's archaeological items are kept at the Western Archaeological Conservation Center in Tucson, and some Chemehuevi baskets are stored at Death Valley. Additionally, the park recently built a 600-square-foot collection storage facility as part of its new park headquarters in Barstow, more than 50 miles away from the boundaries of the preserve. This new facility has excellent security, shelving, and environmental controls.



#### STEWARDSHIP CAPACITY— FUNDING AND STAFFING SHORTFALLS AFFECT RESOURCE PROTECTION AND VISITOR SERVICES

Stewardship capacity is a discussion of how well equipped the National Park Service is to protect the parks. The most significant factor affecting a park's ability to protect its resources is the funding a park receives from Congress. This discussion includes funding and staffing levels, park planning documents, resource education, and external support.

##### Joshua Tree

In 2004, Joshua Tree National Park had an annual operating budget of about \$4.1 million.

A 2001 business plan indicates that the park's total income from all sources for that year was closer to \$6 million, but that \$8.6 million was actually needed to meet park needs. The park also has more than \$12.8 million in unfunded resource management project requests that range from conducting an archaeological survey to increasing park knowledge and protection of groundwater resources.

Budget shortfalls affect the park staff's ability to inventory and protect cultural and natural resources. They do not have the resources to monitor and respond to all threats that the park faces such as urban encroachment, wildfires, non-native species, and resource loss from vandalism and poaching. Joshua Tree has no year-round physical scientist, wildlife biologist, or

vegetation ecologists, and funds are needed to purchase air quality equipment, conduct baseline studies on desert tortoise populations, rehabilitate abandoned mines, develop a groundwater monitoring program, research wildlife populations at risk, and conduct resource inventories and restoration at popular visitor areas.

The cultural resources program also suffers from funding constraints. Less than 3 percent of the park has been inventoried for archaeological sites, the park's library is staffed only a fraction of the time, and the historic Keys Ranch is not adequately protected from deterioration, theft, and vandalism.

Joshua Tree has a number of current planning documents, including a 1995 General Management Plan and plans for collection management and park wilderness. Staff are working to develop natural resource monitoring and fire management plans as well. Other plans are needed to address non-native species, rare species, coyotes, the Keys Ranch, and rock climbing. The park's Archeological Research Design is from 1969 and is badly in need of updating. An interpretive plan and an overall resource stewardship plan that states desired future conditions for park resources as well as a current list of research needs would also help staff better manage resources. The Resources Management Plan was last updated in 1999 and needs to be readdressed.

Park staff work hard to provide resource education opportunities for visitors. In 2004, staff made nearly 290,000 visitor contacts and offered 677 programs to nearly 20,000 students. However, outdated audio-visual equipment and small visitor facilities present challenges. The park's main visitor center was built in 1964 when visitation was a quarter of what it is today. Its exhibit area cannot accommodate a busload of visitors, and its book display area is inadequate. The Cottonwood Visitor Center is a modular design and was built as a temporary facility several years ago. It receives considerable visitation yet has no exhibits.



Volunteers, partnerships, and local community support help park staff protect Joshua Tree's resources. In 2004, 117 volunteers contributed more than 24,000 hours to the park, helping with search and rescue operations and revegetation projects. The Joshua Tree National Park Association contributed \$148,000 from book sales in 2004, and the Wildlands Conservancy has helped the park acquire critical lands over the years. An outreach program on the desert tortoise involves partnerships with several different groups, including the Defenders of Wildlife and off-highway vehicle groups. Advocacy groups such as NPCA, the Sierra Club, the California Wilderness Coalition, and the Access Fund are voices for resource stewardship, and local citizen groups such as Citizens for the Chuckwalla Valley continually show their support of the park and have helped organize against the proposed Eagle Mountain Landfill.

#### Death Valley

Death Valley's 2004 operating budget of \$6.78

Joshua Tree's main visitor center was built in 1964 when visitation was a quarter of what it is today.

## WHAT YOU CAN DO TO HELP:

- **Support or become a member of groups helping to protect the park:** National Park Foundation (<http://www.nationalparks.org/Home.asp>), Joshua Tree National Park Association ([www.joshuatree.org](http://www.joshuatree.org)), Death Valley Natural History Association ([www.deathvalleydays.com/dvnha](http://www.deathvalleydays.com/dvnha)), NPCA ([www.npca.org/support\\_npca/](http://www.npca.org/support_npca/)), and other organizations.
- **Volunteer in the Parks.** Many parks are looking for dedicated people who can lend a helping hand. To learn about opportunities, contact Joshua Tree National Park at 760.367.5524; contact Death Valley National Park at 760.786.3200; and contact Mojave National Preserve at 760.252.6120.
- **Become an NPCA activist and learn about legislative initiatives affecting parks.** When you join our activist network, you will receive *Park Lines*, a biweekly electronic newsletter with the latest park news and ways you can help. Join by visiting [www.npca.org/takeaction](http://www.npca.org/takeaction).

million was less than its 2002 and 2003 budgets, and is more than \$10 million less than what is needed. In 2005, Congress approved small budget increases for all national parks, which resulted in about a \$29,000 increase for Death Valley. This small increase does not cover costs associated with salary adjustments, cost of living adjustments, or homeland security activities. The park also has more than \$30 million in unfunded project requests that range from preserving the endangered Devils Hole pupfish and other aquatic species to stabilizing threatened historic structures and remedying law enforcement radio communications deficiencies.

Staff positions go unfilled because of essentially flat budgets and rising park operations and management costs. Of the 44 unfilled positions at Death Valley, more than one-third are resource management and protection positions. Since 2001, the park has lost nine staff positions.

Death Valley staff work to offer up-to-date resource education programs and exhibits to nearly 1 million visitors each year, but funding shortfalls make this a challenge. The park's main visitor center at Furnace Creek is located in a 1960s era structure with a leaky roof, and exhibits are outdated. Museum objects in Scotty's Castle need better protection, and some should be replaced with reproductions so that the originals can be preserved. Although the park soon will complete a long-range interpretive plan, money has not been identified to support these projects.

In 2004, Death Valley partnered with Distance Learning Corporation to create an online tour of the park's wildlife, which included opportunities for students to interact with park staff. The tour was marketed to schools throughout the country, and nearly 7,000 students participated in 2004.

### Mojave

Mojave National Preserve's fiscal year 2005 budget is nearly \$3.87. An estimated \$4.29 million more is needed to adequately protect

WALLY PACHOLKA / ASTROPICS.COM



Park staff, including Joshua Tree Superintendent Curt Sauer and Joe Zarki, recently celebrated the tenth anniversary of the California Desert Protection Act.





Infrastructure needs compete with resource management needs at Death Valley.

resources; provide visitor services and infrastructure; interpret the preserve's resources for visitors; and support appropriate law enforcement levels. Mojave's current budget supports 39 permanent staff members.

For a young preserve, Mojave has completed a number of resource protection plans, including ones to guide fire management and land protection. Additional management plans needed include those for water resources, roads, and museum and archive collections.

Interpreting resources for visitors is an important goal for Mojave staff. New interpretive wayside exhibits throughout the park teach visitors about natural and cultural resources, and the newly rehabilitated Kelso Depot, scheduled to re-open in Fall 2005, will contain museum exhibits and other visitor information. Preserve staff would also like to open a resource education center in the basement of the Kelso Depot, but funds have not been identified for this project.

With visitation exceeding 500,000 people each year, the preserve does not have enough

interpretive staff. The park employs a chief of interpretation, two rangers, and four visitor use assistants. Additional staff are needed to serve the preserve's high number of visitors.

Mojave receives strong support from partnerships with research organizations, universities, and other groups. The University of California's Sweeney Granite Mountain Research Center and California State University Desert Studies Consortium conduct research within the preserve, and researchers from the University of California and California State University, Fullerton, research facilities have completed most of the existing preserve inventory and monitoring work. Contributions from individual donors via the National Park Foundation have helped Mojave acquire lands within the boundary of the preserve. Congressional support for the preserve has also been strong. Rehabilitation projects and land acquisitions might not have occurred without support from Sen. Dianne Feinstein (D-CA), Rep. Jerry Lewis (R-CA), and Sen. Harry Reid (D-NV).



## APPENDIX: METHODOLOGY

To determine the condition of known natural and cultural resources in the California desert parks and other national parks, the National Parks Conservation Association developed a resource assessment and ratings process. It examines current resource conditions, evaluates the park staff's capacity to fully care for the resources, and forecasts likely conditions over the next ten years. The assessment methodology can be found online at NPCA's State of the Parks® web site ([www.npca.org/stateoftheparks/](http://www.npca.org/stateoftheparks/)).

Researchers gather available information from a variety of research, monitoring, and background sources in a number of critical categories. The natural resources rating reflects assessment of more than 120 discrete elements associated with environmental quality, biotic health, and ecosystem integrity. Environmental quality and biotic health measures (EBM) address air, water, soils, and climatic change conditions as well as their influences and human-related influences on plants and animals. Ecosystems Measures (ESM) address the extent, species composition, and interrelationships of organisms with each other and the physical environment for indicator, representative, or all terrestrial and freshwater communities.

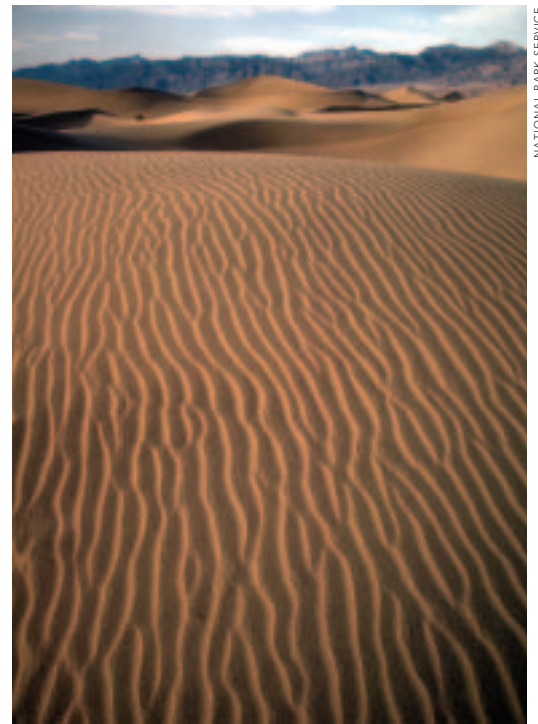
The scores for cultural resources are determined based on the results of indicator questions that reflect the National Park Service's own Cultural Resource Management Guideline and other Park Service resource management policies.

Stewardship capacity refers to the Park

Service's ability to protect park resources, and includes discussion of funding and staffing levels, park planning documents, resource education, and external support.

For this report, researchers collected data and prepared a paper that summarized the results. The draft underwent peer review and was also reviewed by staff at Joshua Tree National Park, Death Valley National Park, and Mojave National Preserve.

NPCA's State of the Parks program represents the first time that such assessments have been undertaken for units of the National Park System. Comments on the program's methods are welcome.



# ACKNOWLEDGMENTS

For more information about the  
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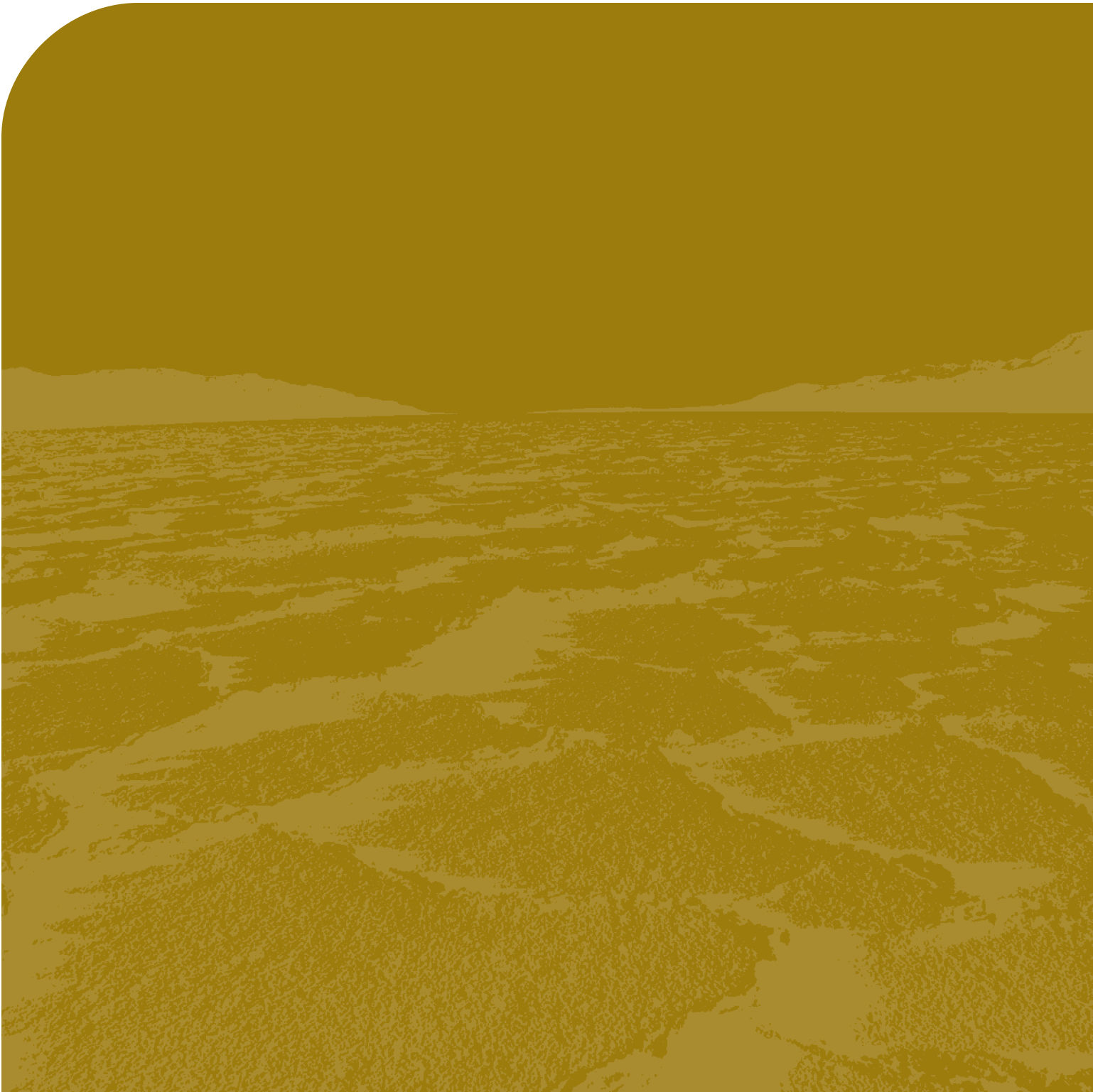
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