

# Management of Park Resources

As a unit of the national park system, Mojave must be managed in accordance with the National Park Service preservation mission as provided in the agencies authorizing legislation (Organic Act of 1916; 16 USC 1), which provides that the primary purpose of park units is:

*"...to conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations."*

## RESOURCE PROTECTION GOALS AND CRITERIA

Specific resource protection goals and criteria have not yet been established. Management of the Preserve's resources is currently guided by direction provided in the enabling legislation and NPS regulations and policies. A set of protection goals and criteria will be developed through the inventory and monitoring program to establish a standard set of resource protection guidelines.

## INVENTORYING AND MONITORING

### **Background**

Inventorying and monitoring of the Preserve's natural and cultural resources is necessary to gain a more complete understanding of their value and condition.

Project priorities are determined on the basis of existing staff availability and funding. An annual performance plan is prepared annually that provides goals, objectives, and annual work plans. Mojave's strategic plan also establishes five-year goals that provide a limited view of resource issues and allocation of staffing and funding.

The Bureau of Land Management established long-term monitoring areas in the Ivanpah Valley and near Colton Hills. These are fenced areas that have precluded cattle and burro grazing for many years. Dr. Hal Avery of the Biological Resource Division, USGS, Riverside, California, is presently conducting research and monitoring of the desert tortoise the Ivanpah area. A reexamination of the plant growth within and outside of Colton Hills enclosure has not been conducted for almost 20 years. This area has been segregated from large mammal grazing pressure for over 30 years and may be used to measure the effects of grazing on the desert environment.

### **Plan Actions**

Mojave will assemble baseline inventory data describing the natural and cultural resources under its stewardship, and will monitor the resources at regular intervals to detect or predict changes. The resulting information will be analyzed to detect changes that may require intervention and to provide reference points for comparison with other, more altered environments. Mojave will also use this information to maintain — and, where necessary, restore — the integrity of natural systems, and to protect the public, park staff, and the park infrastructure.

Mojave will develop and implement a systematic, integrated program to identify, inventory, and monitor its natural and cultural resources. This program will be developed through collaborative partnerships with government agencies and public and private organizations with natural and cultural resource management or research expertise. A comprehensive strategy will be developed and implemented to ensure that regional, local or national trends are documented and appropriate actions undertaken. The National Park Service has identified twelve data sets that each park unit should collect in order to have a basic understanding of their resources. Mojave is actively working in cooperation with other desert parks on an integrated inventory and monitoring strategy, using the vital signs approach.

An example of a needed inventory is a biological inventory of all spring and wetland areas on Preserve lands, including the identification of threats, impacts, and necessary protections. Included in the inventory will be recommendations for restoration. In addition to federal lands, the National Park Service will work with private holders of water rights to restore modified water sources to natural conditions while still allowing for valid existing uses.

Mojave will consult with the research community regarding the benefits of retaining exclosures if the cattle grazing permits are retired.

## NATURAL RESOURCES

### Physical Resources

#### **Air Quality/Visibility**

##### **Background**

The Mojave Desert Air Quality Management District manages and enforces the Clean Air Act's air quality standards in the Mojave National Preserve. The

district includes the desert portion of San Bernardino County.

Congress established the Prevention of Significant Deterioration program as part of the Clean Air Act. To facilitate the implementation of this program, an area classification scheme was established. This classification scheme has class I receiving the highest degree of protection with only small amounts of certain kinds of additional air pollution (sulfur dioxide and particulate matter) allowed. The other two areas are class II, which allows moderate increases in certain air pollutants; and class III, which allows a large amount of new air pollution (Congress has yet to designate any class III areas). There are no class I areas in the California Mojave Desert. Mojave National Preserve is a class II floor area, meaning that it may never be redesignated to class III.

The Clean Air Act developed national ambient air quality standards for a finite number of criteria pollutants. The criteria pollutants are: sulfur dioxide, carbon monoxide, total suspended particulates, nitrogen oxides, lead, ozone, and particulate matter less than 10 microns in diameter (PM<sub>10</sub>).

The Environmental Protection Agency has classified the Mojave National Preserve as a nonattainment area for ozone and PM<sub>10</sub> standards. Nonattainment areas are areas that are not in compliance with the national ambient air quality standards, and therefore must reduce pollution to reach compliance.

The National Park Service is responsible for protecting air quality under both the 1916 Organic Act and the Clean Air Act. Although the Clean Air Act gives the highest level of air quality protection to class I areas, it also provides many opportunities for the National Park Service to participate in the development of pollution control programs to preserve, protect, and enhance the air quality of all units of the national park system, including class II areas.

Sections 118 and 176 of the Clean Air Act require federal agencies and facilities to meet all federal, state, and local air pollution control laws and regulations. If units or facilities are located in areas that do not meet federal or state air pollution control standards (nonattainment areas), those units or facilities must conform to requirements established to attain and maintain those standards. The requirements may include provisions to reduce emissions from existing facilities and limit emissions from proposed facilities on a greater than 1:1 basis.

### **Plan Actions**

The National Park Service will seek class I designation for the Preserve and will seek to perpetuate the best possible air quality in parks because of its critical importance to visitor enjoyment, human health, scenic vistas, and the preservation of natural systems and cultural resources. The National Park Service will work toward promoting and pursuing measures to safeguard these values from air pollution's adverse effects and will strive to set the best example for others to follow in all the agency's development and management activities. In cases of doubt as to the effects of existing or potential air pollution on park resources, the National Park Service will err on the side of protecting air quality and related values for future generations.

Since Mojave is located in a nonattainment area for one or more air pollutant, no action proposed in this plan will lead to violations of federal or state air pollution control laws or regulations, and no action will increase emissions or violate the state conformity requirements. The Preserve's staff will work with appropriate air pollution control officials to ensure compliance with all requirements.

### **Viewsheds/Visual Quality**

#### **Background**

Visibility is probably the most important air quality resource in the desert region, and it is the most easily affected by activities that generate dust (especially fine particulates) and sulfur dioxide. Visibility impacts occur from long-range transport of pollutants from as far away as the San Joaquin Valley and the Los Angeles basin (RESOLVE study 1988, cited in BLM 1995).

Nearby sources of emissions include the Army's National Training Center at Fort Irwin; Viceroy Mine near Searchlight, Nevada; the Mojave Generation Station near Laughlin, Nevada; Molycorp Mine and Stateline Power Generation Station near Primm (Stateline), Nevada; and vehicle traffic on Interstates 15 and 40.

Local pollution sources in the desert consist primarily of particulate matter from off-road vehicles, wind-blown soil, mining operations, livestock grazing, and agricultural activities. These sources have left certain areas denuded or sparsely vegetated, allowing wind erosion to occur and air quality to suffer and occasionally causing violations of particulate standards at many locations.

The National Park Service will seek to enhance beneficial effects and to mitigate adverse effects in ways consistent with its policies and management objectives. The agency will encourage compatible adjacent land uses and seek to mitigate potential adverse effects on park values by actively participating in planning and regulatory processes of neighboring jurisdictions, other federal, state, and local agencies, and Native Americans.

### ***Plan Actions***

Mojave National Preserve will prepare guidelines for the built environment to establish visual consistency and themes in facility development. Guidelines will also be created for reaching visual compatibility with surrounding landscapes, significant architectural features, and site details. The primary objective of these guidelines will be to create harmony between the built environment and the natural environment.

With the increasing use of cellular communication equipment, more antennas and relay equipment are being installed throughout the country. The overall management goal of each NPS unit is to protect and maintain the visual quality of the landscape and the built environment. To help achieve this goal, a communication management plan will be prepared that will address the NPS goals and the need to establish sites for communication equipment. No new permits will be issued until the completion of such a plan. The plan will include the following requirements:

- All above-ground communication equipment must not distract from the visual quality of the scenery.
- Each new proposal for radio or cellular antennas or towers must demonstrate that the equipment would provide a critical service for visitors and NPS staff and is not duplicative.
- The installation of new equipment outside the Preserve or on existing communication towers or at defined sites must be considered before the construction of new sites is considered.
- New locations will be reviewed through the environmental assessment process, which must consider impacts on the visual quality of the scenery.

The National Park Service will work with neighboring landowners on topics of mutual interest being sensitive to the influences and effects that park management might have on adjacent landowners.

## **Night Sky**

### ***Background***

Mojave is a naturally quiet desert environment with very dark night skies that offers visitors and researchers opportunities for natural quiet, solitude, and star gazing with few human caused noise or light glare sources. However, the northern and southern boundaries are interstate highways. Traffic on these highways and the lights from Baker, California, Primm, Nevada, and Laughlin, Nevada are beginning to have a noticeable adverse effect on the night sky. No known background data currently exist that document the dark sky. Mojave recognizes that preservation of this resource is critical to the future visitor experience.

### ***Plan Actions***

The National Park Service will partner with communities and local government agencies to minimize reflected light and artificial light intrusion on the dark night sky, recognizing the essential component that a carpet of stars against a black night sky is for a natural outdoor experience. The National Park Service will strive to set the best example in all developments that involve the use of artificial outdoor lighting, ensuring that such lighting is limited to basic safety requirements and shielded to the maximum extent possible, to keep light on the intended subject and out of the night sky. Baseline light measurements will be established to monitor changes over time.

## **Natural Ambient Sound**

### ***Background***

Mojave National Preserve is generally a quiet landscape, with occasional, short-term interruptions of the natural quiet. Depending on the atmospheric conditions, the closeness to a noise source, and topographic features, visitors generally experience very little human-caused noise while in the backcountry. Occasional overflights of commercial jets at cruising altitudes, small private aircraft, and rare military jets at low altitudes may be heard. Vehicle noise is generally not an issue within the Preserve in spite of some nearby major roads (I-15, I-40, and major paved roads). Because of the Preserve's vastness, most areas are well away from traffic and its noise. Other areas where localized noise occurs are at the Razor Open Area, adjacent to the western boundary of the Preserve, the Union Pacific and Santa Fe rail lines, and mining operations. The Union Pacific and Southern Pacific railroad lines are heavily used, but the faint distant rumble of freight

trains is faintly audible when one is within a few miles of the tracks.

### **Plan Actions**

The National Park Service will strive to preserve the natural quiet and sounds associated with the physical and biological resources of Mojave. Activities causing excessive or unnecessary sounds in or adjacent to parks, including low-level aircraft overflights, will be monitored, and action would be taken to prevent or minimize unnatural sounds adversely affecting park resources and values or visitor enjoyment. The National Park Service will cooperate with the Department of Defense to minimize impacts on visitors and resources from military overflights. The National Park Service will strive to set the best example in all developments that involve the use of equipment that produces noise.

## **Soils**

### **Background**

A wide array of soils comprises Mojave National Preserve. Examples include: soils with sandy textures with gravel and cobble cimas; soils with medium textures; soils with calcium carbonate (e.g. caliche) accumulations; fine textured soils found in playa prone areas; soils with a developed horizon reflecting age or formation during a different moisture regime; shallow soils; and upland soils. The park also contains escarpments, ephemeral streams, a large area of dunes, and a lava flow area (e.g. Lava Beds). Detailed soil surveys have not been conducted. However, a digitized, general soils map is available from the statewide digital soils database.

### **Plan Actions**

Mojave will seek to inventory and preserve its soil resources, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Soil surveys will follow National Cooperative Soil Survey Standards. Products will include soil maps, determinations of the physical and chemical characteristics of soils, and the interpretations needed to guide resource management and development decisions. In particular, areas of existing disturbance and potentially sensitive soils, such as cryptogamic crusts, will be highlighted for possible restoration or protection.

Potential impacts on soil resources will be monitored as necessary. Management action will be taken to prevent or mitigate adverse, potentially irreversible, impacts on soils. Conservation and soil amendment

practices may be implemented to reduce impacts. Importation of offsite soil or soil amendments may be used to restore damaged sites. Offsite soil normally will be salvaged soil, not soil removed from pristine sites, unless the use of pristine-site soil can be achieved without causing any overall ecosystem impairment. Prior to using any offsite materials, Mojave will develop a prescription, and select the materials that necessary to restore the physical, chemical, and biological characteristics of original native soils without introducing any exotic species.

When soil excavation is an unavoidable part of an approved facility development project, Mojave will limit the excavation to the minimum amount necessary, and avoid erosion or offsite soil migration during and after the development activity.

## **Water**

### **Background**

**Groundwater.** Groundwater is found underneath most of the Preserve and varies greatly in depth and quality. The Mojave River is the primary subsurface water source for the Preserve (BLM 1996). Groundwater is the Preserve's principal source for desert springs, seeps, and a few ephemeral streams, and its only perennial spring, Piute Creek. The maintenance of groundwater quality and quantity is critical to the survival of desert surface waters and their associated plant and animal life.

**Surface Water Sources.** Over 200 springs and seeps have been identified in the Preserve (King and Casebier 1981). Many, if not most, have been altered by the installation of retention dams, pipelines, and troughs for livestock use. Most are also available for wildlife and burro use. In the eastern portion of the Preserve is a 1-mile perennial stream called Piute Creek, which is an important wildlife water source as well as a popular recreation site. The small springs and seeps in the Preserve offer isolated and limited water for plants, wildlife, or domestic or commercial purposes. Some springs produce potable water, but overall water quality is poor because of high dissolved mineral concentrations (BLM 1996).

Water wells have been drilled primarily for domestic use and livestock needs, but a number of wells have also been drilled for mining use. Viceroy Gold Mine has developed a well field that is adjacent to and within the Preserve. This well field is within a 9-square mile area located northwest of the mining site. Viceroy is permitted to pump 725 acre-feet per

year, but it has been averaging about 400 acre-feet (about 11 million gallons per month) since 1995 (BLM 1997).

Water wells have also been drilled specifically for visitor and administration use at the Mid Hills campground and Hole-in-the-Wall campgrounds.

**Floodplains and Wetlands.** No systematic inventory of 100 and 500-year floodplains, or wetland areas has been undertaken in the Preserve. Some general information is available on USGS topographical maps. Specific inventories are often conducted when a development project may encounter these resources.

**Water Rights.** Initial research on outstanding water rights in the Preserve that are recorded at the State Water Resources Control Board in Sacramento revealed that there were approximately 110 appropriated water rights claims on 97 water sources (springs, seeps, streams, wells) in their records that existed in the Preserve in 1997. Many of these were obtained by ranchers who lease grazing allotments. In April 2000, the NPS accepted donation of the Granite Mountains grazing permit, including water rights on 29 water sources. Other rights may exist that have not been recorded with the State. In November 2000, the National Park Service also accepted donation of the Kessler Springs and Lanfair Valley permits, including 53 water rights.

The California Desert Protection Act of 1994 in section 706(a), with respect to each wilderness area, reserves a quantity of water sufficient to fulfill the purposes of the act. Section 706(b) mandates that the Secretary of the Interior and all other officers of the United States take "all steps necessary to protect the rights reserved by this section." Federal reserved rights generally arise from the purposes for the reservation of land by the federal government. When the government reserves land for a particular purpose, it also reserves, explicitly or by implication, enough unappropriated water at the time of the reservation as is necessary to accomplish the purposes for which Congress or the president authorized the land to be reserved, without regard to the limitations of state law. The rights vest as of the date of the reservation, whether or not the water is actually put to use, and are superior to the rights of those who commence the use of water after the reservation date. General adjudications are the means by which the federal government claims its reserved water rights. The McCarran Amendment (66 Stat. 560, 43 U.S.C. 666, June 10, 1952) pro-

vides the mechanism by which the United States, when properly joined, consents to be a defendant in a suit to adjudicate water rights. The precise nature and extent of the National Park Service's water rights probably will remain uncertain until the United States is joined in an adjudication, the Department of Justice files claims to water rights on behalf of the National Park Service, and the court decrees the United States. Hence, it is the responsibility of both the National Park Service and the Bureau of Land Management to protect the reserved water rights established under the California Desert Protection Act and other applicable federal authorities.

### **Plan Actions**

**Groundwater and Surface Water.** Water for the preservation, management, development, and use of the Preserve's water system will be obtained and used in accordance with legal authority and with due consideration for the needs of other water users. Water will be used efficiently and frugally. The National Park Service will seek to protect, perpetuate, and possibly restore surface water and groundwater as integral components of park aquatic and terrestrial ecosystems. Surface water and groundwater withdrawn for public use will be the minimum amount necessary to achieve Preserve purposes. All water withdrawn for domestic use will be returned to the watershed system once it has been treated to ensure that there will be no impairment of Preserve resources. Interbasin transfers will be avoided. The effects to the Preserve's resources from water withdrawn from sources outside of the Preserve (for example, developments at Primm and mining activities at the MolyCorp mine at Mountain Pass) would be monitored. If adverse effects were found, the National Park Service will take all legal and appropriate steps necessary to protect natural resources from the effects attributed to such activities. The park will work with holders of water rights to restore modified waters sources to natural conditions while still allowing for valid uses consistent with the State permit.

Pursuant to Congressional direction in the California Desert Protection Act, Mojave National Preserve will seek to restore, maintain, or enhance the quality of all surface and ground waters within the Preserve consistent with the Clean Water Act (33 USC et seq.) and other applicable federal, state, and local laws and regulations.

**Floodplain and Wetland Areas.** The occupancy and modification of floodplain and wetland areas

will be avoided wherever possible. Where no practicable alternatives exist, mitigating measures will be implemented to minimize potential harm to life, property, and the natural floodplain and wetland values. Management of floodplain and wetland areas is subject to the provisions of Executive Order 11988, "Floodplain Management" (42 USC 4321), Executive Order 11990, "Protection of Wetlands" (42 USC 4321), and the Rivers and Harbors Act (33 USC 401 et. seq.), and section 404 of the Clean Water Act (33 USC 1344).

**Water Rights.** Should the National Park Service seek to acquire private land within its boundaries, the essential water rights attached to those lands will also be sought for acquisition.

The National Park Service in its general planning process for each unit of the national park system, and the Bureau of Land Management in its planning process for each wilderness area, have jointly agreed to incorporate their respective policies, guidelines, and administrative procedures and apply the following principles to discharge their responsibilities under section 706 of the California Desert Protection Act to manage and protect federal reserved water rights (Desert Managers Group 1995):

- inventory all water sources within the boundaries of the wilderness area/park unit
- identify as a federally reserved water right all unappropriated water from any water source identified on federal lands within the boundaries of designated wilderness and/or park areas in the California desert
- share water source inventory data
- jointly request from the California Division of Water Rights notification of any filing for appropriated water rights within or adjacent to the boundaries of BLM wilderness or units of the national park system
- defend federally reserved water rights through the state of California administrative process and, if necessary, seek judicial remedy in the appropriate courts
- quantify the amount of water reserved to fulfill the purpose of the reservation as part of any adjudication in California in which the United States may be joined under the McCarran Amendment
- where necessary, pursue acquisition of any existing nonfederal appropriated water right within their respective jurisdictions

- because use of percolating groundwater does not require a permit from the state of California, participate in local government proceedings that authorize nonfederal parties to withdraw percolating groundwater where such withdrawals may impact water sources within their respective jurisdictions to which federally reserved water rights are attached
- participate in any proceedings pursuant to Nevada state water law that may authorize withdrawal of groundwater where such withdrawal may impact water sources within their jurisdictions to which federally reserved or appropriated water rights are attached

## Paleontological Resources

### *Background*

The Preserve contains a fragile and irreplaceable paleontological record. The richness and diversity of that record is unknown as significant inventory work has not been performed on the various geologic formations that do or could contain fossil resources. Fossils have many values including (1) stratigraphic indicators for correlation of deposits containing them and for determination of relative geologic age, (2) records of past life forms showing the course of evolutionary trends of plants and animals, and (3) evidence of changing paleoenvironments.

A literature and records search was completed for the Preserve area by Robert E. Reynolds, Curator, Earth Sciences, San Bernardino County Museum, Redlands, California. The records and literature search identified a number of potentially sensitive fossiliferous areas in the planning area. Significant paleontological resources and records relating to paleobiostratigraphic events that occur within or near the Preserve are as follows:

- The world's oldest mitosing cells, 990 million years old, are preserved in silica in the Beck Spring Formation.
- Significant Cambrian trilobite and invertebrate fossil localities mark the boundary of the Paleozoic Era, 550 million years of age.
- The only dinosaur tracks in California and the only record of Jurassic dinosaurs in California are in the Mescal Range, just north of the Mojave National Preserve.
- Early records of crustal extension and breakup that occurred 24 million years ago to form basins in the Mojave Desert are found in or near the Preserve. Significant occurrences of fossils,

including rhinoceros, camel, canid, felid, bird track, and plant, are located in the Ship Mountains, Little Piute Mountains, Hackberry Mountains, Castle Mountains, Lanfair Valley, and Wild Horse Mesa in or near Mojave National Preserve.

- There are significant Plio-Pleistocene fossil localities, which are being damaged by erosion and amateur collecting, at Valley Wells and Kingston Wash.
- Cave deposits in the Mescal Range have produced significant vertebrate fossils.

### **Plan Actions**

Paleontological resources, fossils and their associated data, are the physical evidence of past life on the earth and include representatives of all kingdoms of life — Monera, Protista, Fungi, Plantae, and Animalia. Trace fossils (burrows, tracks, etc.) are included. These resources will be managed in accordance with NPS *Management Policies* and goals established by the National Park Service Strategic Plan.

Paleontological resources will be inventoried, monitored, protected, and preserved, and where appropriate, made available for scientific research. Collection of specimens will only be allowed in limited circumstances. All specimens collected from the park will be appropriately curated and have adequate documentation of the specimen, the locality, the geologic context, and other pertinent data. Where appropriate, the resources will be managed for public education and interpretation in accordance with park management objectives and approved resource management plans. The National Park Service will identify areas where additional research by the academic community will aid in protection of the resources. The park will also seek to develop collaborative partnerships with other parks, government agencies and public and private organizations with paleontological resource management or research capabilities/expertise.

To protect paleontological resources from harm, theft, or destruction, Mojave will ensure that the nature and specific location of these resources remain confidential. Mojave will take all actions necessary to prevent unauthorized collection and removal of fossils. The sale of scientifically significant original paleontological specimens (which includes *all* vertebrate specimens) is prohibited in parks.

## **Geological Resources**

### **Background**

The geology of Mojave National Preserve is very

complex and diverse due to igneous and metamorphic activity and structural deformations associated with these activities. Erosional geologic processes have altered the landscape resulting in outcrops of rocks ranging from Precambrian to Recent ages.

The Mojave is characterized by isolated mountain ranges and ridges separated by alluvium-filled, irregular large valleys. Dividing Mojave National Preserve in half is the northeast trending Providence–Mid Hills–New York Mountain ranges. The principal valleys within the Preserve include Ivanpah Valley, Kelso/Cedar Wash, Lanfair Valley, Devils Playground, Piute Valley and the northern area of Fenner Valley. Ivanpah Valley and Kelso/ Cedar Wash line up in a northeasterly to southwesterly fashion, but drain in opposite directions because of an inconspicuous northwest trending divide near the town of Cima. Both Lanfair and Piute Valleys drain via Piute Wash into the Colorado River. The remaining valleys have self-contained drainage systems as represented by playa lakes such as Soda and Ivanpah.

### **Plan Actions**

Mojave will inventory, preserve and protect geological resources as integral components of the natural systems, including both geologic features and geologic processes. The park will work with partners to assess the impacts of natural processes and human-related events on geologic resources; maintain and restore the integrity of existing geologic resources; integrate geologic resource management into park operations and planning; and interpret geologic resources for park visitors.

As a natural ecosystem, geologic processes will proceed in Mojave unimpeded. Geologic processes are the natural physical and chemical forces that act within natural systems, as well as upon human developments, across a broad spectrum of space and time. Such processes include, but are not limited to, erosion and sedimentation, karst processes, seismic and volcanic activity. Geologic processes will be addressed during planning and other management activities in an effort to reduce hazards that can threaten the safety of park visitors and staff and the long-term viability of park infrastructure.

Mojave will protect geologic features from the adverse effects of human activity, while allowing natural processes to continue. Geologic features include rocks, soils, mineral specimens, cave and karst systems, canyons, sand dunes, dramatic or unusual rock outcrops and formations, and fos-

silized plants and animals. In Mojave, recognition of valid existing mineral rights may affect our ability to prevent all adverse effects, unless they are deemed significant or funding is available to purchase the valid right.

## Caves

### Background

Caves, as defined by the Federal Cave Resources Protection Act, include any natural feature that a person can enter. They include talus caves, erosion-al caves, dissolution caves, lava tubes, and others. They do not include mine adits, shafts, or declines. The Mitchell Caverns area within the Preserve has significant cave resources. Many other areas within the Preserve are also known to contain caves as defined by the Federal Cave Resources Protection Act. One of these is the fairly well known lava tube in the Cima/Lava Beds area of Mojave. Other tubes may occur, but a comprehensive inventory has not been completed.

Most of the caves have not been inventoried, so little is known of the specific resources at the sites or the impacts on them. The presence of speleothems (limestone cave depositional features), cultural materials, and bat usage will likely be found in many of the caves.

The Mitchell Caverns Natural Preserve was established in 1954 to protect and interpret two caves connected by a constructed tunnel. The 97-acre Mitchell Caverns Natural Preserve is within the larger 5,890-acre Providence Mountains State Recreation Area, which is operated by the California Department of Parks and Recreation. The developed cave area consists of two small, but well decorated caves. A tunnel connected the two caves, known as El Pavika and Tecopa, in 1968. The caves contain areas of interesting speleothems, provide roost area for at least two species of bats (one of which is *Plecotis townsendii*), and may hold archeological material in the entrance areas. This cave has had a long history of recreational use and has been impacted by human activity.

Cave of the Winding Stair is a small but deep cave in the recreation area, open by permit to experienced vertical cavers. Several other small and unsurveyed caves exist with the local area. Very little is known about these caves and a comprehensive inventory is needed.

### Plan Actions

Cave resources will be managed in accordance with the NPS *Management Policies* and specific guidance

in NPS Director's Order 77, the Federal Cave Resources Protection Act, and goals established by the Park Service Strategic Plan. In general, the park will manage caves in a manner that protects the natural conditions such as drainage patterns, air-flow, and plant and animal communities. Atmospheric, geologic, biological, ecological, and cultural resources will be addressed and managed in accordance with approved cave management plans.

The National Park Service will enhance its own knowledge of the resources present through comprehensive inventory and monitoring programs. It will also identify areas where additional research by the academic community will enhance the protection of the resources. The park will also seek to develop partnerships with academia, government agencies (in particular USGS), geological and paleontological societies, and others to enhance our conservation and management of the resources.

The National Park Service will continue to work cooperatively with the California Department of Parks and Recreation to assist with inventory, study and protection of significant cave resources that are found in the Providence Mountains.

In general, the NPS management direction is to avoid development of caves and to perpetuate natural conditions, while seeking to protect the resource. Potentially harmful developments or uses, including those that allow for general public entry, such as pathways, lighting, and elevator shafts, will not be allowed in, above, or adjacent to caves until it can be demonstrated that these will not significantly affect natural cave conditions, including subsurface water movements. Developments already in place above caves will be removed if they are significantly altering natural conditions. Where significant cave resources exist, a cave management program should be developed which may include the following elements, depending on the situation:

- interpretive program
- visitor safety
- cave protection guidelines
- cave restoration program
- trail and lighting system maintenance
- cave zoning classification system
- safety and health guidelines
- cave geographic information system
- inventory system and guidelines



## **Biological Resources**

### ***Background***

The wildlife and vegetative resources of Mojave National Preserve reflect the mingling of three major North American deserts: the Great Basin, the Mojave, and the Sonoran deserts. Vegetation consists primarily of species common to the Mojave Desert, but the Preserve also contains floral species of the Great Basin, Sonoran, and even some elements of the California coastal zone. Mojave National Preserve was established to preserve an ecologically diverse, yet fragile desert ecosystem, comprised of scenic, geologic and wildlife values unique not only to the Mojave, but the Great Basin and Sonoran desert environs as well. This transition zone, ranging from nine hundred to nearly eight thousand feet in elevation, embraces a plethora of landforms: cinder cones, sand dunes, dry lake beds, alluvial fans, mountain ranges, table-top mesas, large desert bajadas (alluvial fans) and valleys. This harsh Mojave desert landscape provides refugium for over one thousand plant and animal species, including threatened and endangered species.

### ***Plan Actions***

Management emphasis at Mojave will be on minimizing human impacts on native ecosystems and the dynamics of naturally functioning populations. Native ecosystems occur as a result of natural processes that have occurred, are now occurring, or may occur in the future. Any species that have moved onto park lands directly or indirectly as the result of human activities are not considered native.

## **Flora**

### ***Background***

The Preserve consists primarily of vegetative attributes of the Mojave Desert but contains floral species of the Great Basin, Sonoran and even some elements of the California Chaparral Zone.

Many plant species are distributed only within its boundaries; while other areas such as the New York Mountains contain species of manzanita, California lilac, oak, and silk tassel, which are normally associated with coastal California. The Mid Hills have significant stands of Great Basin sagebrush and Utah juniper. The strongest association however, is with the Sonoran Desert, whose northernmost range is often recognized to intermingle with the southern border of the park. Sonoran plant species such as pancake prickly pear and smoke tree are found extending a dozen or more miles into the southeast portion of Mojave National Preserve.

Community types common elsewhere in the desert and also present within the Preserve are the playas, saltbush, creosote-covered flats and alluvial fans, and Joshua tree woodlands. There are also many important unique or rare habitats within the Mojave. The Preserve is unusual in the complexity and density of the Joshua tree community, which is represented on Cima Dome. The quality and sheer vastness of the Joshua tree forest on Cima Dome is unparalleled anywhere in the world. There are seven different types of wash plant species associations including catclaw acacia, smoke trees, and desert willows. Higher elevations support grassland, sagebrush, blackbrush, pinyon-juniper woodlands as well as unique remnant habitats containing small white fir forests, and pinyon-junipers with oak. The Piute Creek desert oasis also supports a very fragile and limited community. A total of 803 species of plants representing 85 plant families have been identified in the Preserve (Thomas, 1999).

### ***Plan Actions***

Mojave National Preserve is considered a unique floristic area, with many plant species found only within its boundaries. Mojave will seek to perpetuate native plant life (such as vascular plants, ferns, mosses, algae, fungi, and bacteria) as critical components of natural desert ecosystems. Mojave will seek to develop a complete inventory of all floristic components and establish monitoring programs to serve as early warning systems for health of the system.

Plants and plant communities will be manipulated only when necessary to achieve approved management objectives. To the maximum extent possible, plantings will use seeds, cuttings, or transplants representing species and gene pools native to the ecological portion of the park in which the restoration project is occurring. In some isolated cases, plants that are historically appropriate for the period or event commemorated may be used. Use of exotic plant species is restricted to situations that conform to the exotic species policy. Plants and plant communities may be manipulated to maintain habitat for threatened or endangered species, but only native plants may be used if additional plantings are done, and manipulation of existing plants will be carried out in a manner designed to restore or enhance the natural functioning of the plant and animal community of which the endangered species is a natural part.

Use of non-natural plantings [exotic plants] may be permitted under the following conditions:

- In localized, specific areas, screen plantings may be used to protect against the undesirable impacts of adjacent land uses, provided that the plantings do not result in the invasion of exotic species.
- Where necessary to preserve and protect the presentation of significant cultural resources and landscapes, trees and other plants, plant communities, and landscapes will generally be managed to reflect the historic designed landscape or the scene that prevailed during the historic period.
- Where needed in developed areas, plantings would use native or historic species and materials to the maximum extent possible. Certain native species may be fostered for aesthetic, interpretive, or educational purposes.

## Fauna

### Background

In its entirety, the California desert contains no finer grouping of different wildlife habitats than in Mojave National Preserve, both from the standpoint of total number of species and the total number of animals.

The intermingling of the three desert environments has produced approximately 35 wildlife habitat types. The diverse habitats support about 300 species of wildlife. The literature documents 36 species of reptiles, 206 species of birds and 47 species of mammals. A few of the most notable species include the gila monster, desert tortoise, Mohave tui chub, Mojave fringe-toed lizard, regal ring-necked snake, and desert striped whipsnake. Significant avian fauna include the prairie falcon, Bendire's thrasher, California thrasher, gray vireo, golden eagle, Lucy's warbler, mourning dove and Gambel's quail. The Preserve has one of the more significant bat faunas of the California desert. There are also populations of rock squirrels in pinyon-juniper woodland, a relict population of dusky-footed woodrats, mule deer, porcupines, mountain lions, and desert bighorn sheep.

A large portion of the Preserve is critical desert tortoise habitat. Some of the highest densities of tortoise are found in the Ivanpah Valley in the north end of the Preserve.

### Plan Actions

The NPS management goal will be to preserve and protect native wildlife and their natural habitat in a manner that will result in self-sustaining populations

of native species. The NPS policy is to maintain all components and processes of naturally evolving park ecosystems, including the natural abundance, diversity and ecological integrity of all native species. The park will not promote actions that will attempt to solely preserve or enhance populations of individual species (except threatened, endangered, and sensitive species). Intervention in natural processes will only be undertaken: (1) when directed by Congress, (2) in emergencies when human life and property are at stake, (3) to restore native ecosystem functioning that has been disrupted by past or ongoing human activities, or (4) when directed by an approved recovery plan or conservation strategy.

## Sensitive Species

### Background

Within the Mojave National Preserve are confirmed populations or potentially viable habitat for 3 federally endangered, 1 federally threatened, 6 state (California) endangered and 1 state threatened plants and animals.

Federally listed species known to inhabit the Mojave National Preserve are the desert tortoise (*Gopherus agassizii*) and the Mohave tui chub (*Gila bicolor mohavensis*). Final recovery plans exist for both of these species. The southwestern willow flycatcher (*Empidonax trailli extimus*) and least Bells vireo (*Vireo bellii pusillus*) are listed birds that could periodically inhabit riparian areas such as Piute Spring but have not been verified to occur in the Preserve.

California listed species known to occur in the Preserve are the desert tortoise, the Mohave tui chub, and the willow flycatcher (*Empidonax trailli*). The California (or western) yellow-billed cuckoo (*Coccyzus americanus occidentalis*), normally in need of broad riparian cover, may have some, but limited potential to appear in the Preserve.

There are no known federally listed or proposed plant species in the Preserve. Thorne's buckwheat (*Eriogonum ericifolium* var. *thornei*) is listed by the state of California as an endangered species. It is known from only two occurrences in the Preserve's New York Mountains. This buckwheat is found at elevations upward of 5,500 feet in pinyon and juniper woodland and prefers copper-rich gravel (*The Jepson Manual: Higher Plants of California*, James C. Hickman, ed.)

## **Plan Actions**

The National Park Service will identify, inventory, monitor and promote the conservation of all federally listed or proposed threatened or endangered species and their critical habitats in ways that are consistent with the purposes of the Endangered Species Act. As necessary, the National Park Service will control visitor access to and use of critical habitats and might limit access to especially sensitive areas. Active management programs will be conducted as necessary to perpetuate the natural distribution and abundance of threatened or endangered species and the ecosystems on which they depend. Such programs will be undertaken only after appropriate consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

The National Park Service will also identify, inventory, monitor and promote the conservation of all state and locally listed threatened, endangered, rare, declining, sensitive, fully protected, or candidate species that are native to and present in the Preserve, as well as their critical habitats. Controlling access to critical habitats or conducting active management programs might be considered that would be similar to activities conducted to perpetuate the natural distribution and abundance of federally listed species. Plant and animal species considered rare or unique to Mojave National Preserve will be identified, their distribution mapped, and programs established to monitor their status. All management actions for protection and perpetuation of special status species will be determined through the Preserve's resource management plan.

The National Park Service will develop collaborative partnerships with federal, state, and local agencies that manage lands adjacent to Mojave National Preserve, and with academic institutions with research capabilities in desert ecology or ecosystem management to help achieve these goals.

## **Desert Tortoise**

### **Background**

The range of the desert tortoise includes the Mojave and Sonoran deserts in southern California, Arizona, southern Nevada, the southwestern tip of Utah, and Sonora and northern Sinaloa, Mexico.

The Mojave population of the desert tortoise primarily occupies valleys and bajadas characterized by scattered shrubs. The soils range from sand to sandy-gravel, though caliche soils, desert pavement,

and rocky, boulder terrain are occasionally used (FWS 1994). Desert tortoises spend a large portion of the year underground to avoid extreme temperatures and, for younger tortoises, to avoid a variety of predators, such as coyotes, foxes, raptors, and ravens (BLM 1996). Tortoises generally are active during spring, early summer, and autumn when annual plants are most common and daily temperatures are tolerable. Additional activity occasionally occurs during warm weather in winter months and after summer rainstorms (BLM 1996).

Desert tortoise habitat has been destroyed, degraded, and fragmented as a result of urbanization, agricultural development, livestock grazing, mining and roads. The removal of tortoises by humans for pets or for use as food or folk medicine is also a major factor in the decline of the desert tortoise population (FWS 1994). A respiratory disease is an additional cause of desert tortoise mortality and population decline, particularly in the western Mojave Desert (FWS 1994).

The Mojave population of the desert tortoise (an administrative designation for animals living north and west of the Colorado River) is listed as a threatened species by the federal government since 1990 and the State of California. Critical habitat for this species was designated in 1994 (FWS 1994).

In June 1994, the U.S. Fish and Wildlife Service released the *Desert Tortoise (Mojave Population) Recovery Plan*, which presented recommended prescriptions for population recovery and included maps of the tortoise's critical habitat and where recovery actions are recommended.

There are two areas of designated critical habitat in the Preserve. The northern area includes Ivanpah Valley, south of Nipton Road, including the areas north, west and south of Cima Dome, extending up to Interstate 15. This area totals approximately 492,360 acres (769 square miles) and is within the Eastern Mojave Recovery Unit. The second area of the park that contains desert tortoise critical habitat is the Fenner/Clipper Valley. This area contains 280,103 acres (438 square miles) of federal land. This habitat is also within the Eastern Mojave Recovery Unit. Private, state and local agency lands were not considered in this general management plan recovery effort and are not considered part of the recovery effort unless the land is subsequently acquired by the adjacent managing agency. These two areas of critical habitat combined total about 772,463 acres (48%) of the Preserve designated as critical

habitat for this species (FWS 1994). Critical habitat also extends north of the Preserve onto BLM lands in the Shadow Valley area up to the southern slope of the Kingston Range and on adjoining BLM lands north of Nipton Road up to Ivanpah Dry Lake. There are also large areas of critical habitat to the south and east of the Fenner/Clipper valley area in California and Nevada.

The recovery plan provides five criteria for delisting, which are:

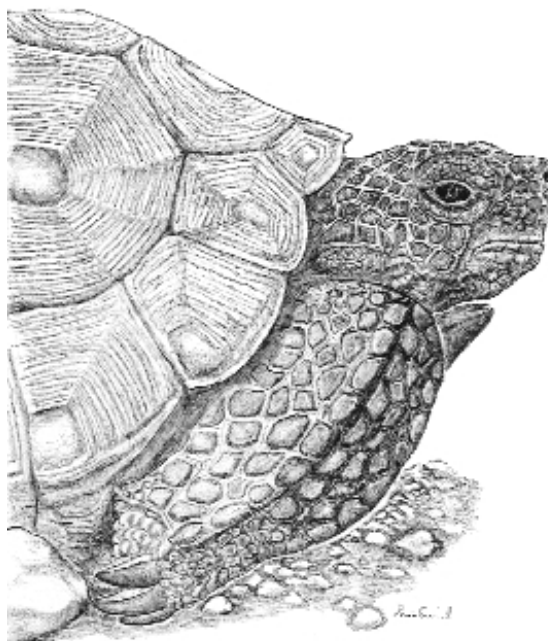
1. As determined by a scientifically credible monitoring plan, an upward or stationary trend within a recovery unit for at least 25 years;
2. At least one protected area (called Desert Wildlife Management Area by the Recovery Plan) with reserve level management of 1,000 square miles or more, except under unusual circumstances;
3. A population lambda (discrete growth rate) of at least 1.0 in each protected area;
4. Regulatory mechanisms and land management commitments are adequate and in place to ensure long-term habitat protection; and
5. The population is likely to remain stable or increase in the future.

### **Plan Actions**

The management goal of this plan is the full recovery and delisting of the desert tortoise following recovery of the Mojave population. NPS manages for multiple species and protection of habitats for all native species. Desert tortoise management is directly linked with the management of grazing, burros, hunting, and camping (see those discussions for details).

As part of this desert tortoise recovery proposal, the NPS recommends that the U.S. Fish and Wildlife Service modify existing critical habitat boundaries to coincide with the category I desert tortoise habitat as mapped by tortoise biologists. Category I habitat is an older BLM classification of tortoise habitat. Category I was the best quality habitat identified by tortoise biologists during their surveys in the 1970s. Critical habitat was designated in the Preserve to coincide with the category I habitat, except for Cima Dome, which was not classified, and the area south of Kelso Depot, which was BLM category II. The lands in Mojave above 4,000 feet on Cima Dome were not classified by BLM biologists as category I desert tortoise habitat. We believe that considering them as part of the critical habitat acreage

for recovery purposes is misleading since it is marginal tortoise habitat. Any tortoises in this area will still be fully protected because of the wilderness designation and other protective measures the park proposes to put in effect.



In order to ensure the long-term protection of the desert tortoise in the park, Mojave will implement or continue the following measures to protect the desert tortoise:

#### Management policies already in effect:

- Vehicles are permitted only on existing roads, camping and parking areas. All vehicles must be street legal and licensed. No offroad or wash driving is allowed anywhere in the Preserve.
- No competitive motorized events are permitted. Organized events that do not involve timed races might be acceptable on existing roads, outside desert tortoise active periods, with appropriate restrictions and subject to other NPS statutes and regulations.
- No existing or new landfills are allowed anywhere in park units under NPS regulations. The National Park Service is currently closing and cleaning up old, informal trash dumps. The National Park Service enforces regulations prohibiting dumping and littering.
- The National Park Service aggressively manages trash and litter to avoid subsidizing ravens. Raven proof trash containers are being installed throughout Mojave.

- No agricultural clearing or commercial vegetation harvest is permitted on park lands.
- No surface disturbance is permitted on park lands, unless it is balanced with appropriate restoration or acquisition of replacement lands for mitigation.
- The National Park Service imposes strict limits on research in the desert tortoise critical habitat that might adversely affect the desert tortoise.
- The National Park Service closely monitors permit actions and requires special stipulations to ensure desert tortoises are protected.
- The National Park Service has removed over 3,000 burros from the Preserve since 1997. A management goal of zero feral burros will remain in effect and removals will continue until the goal is reached.
- Mojave enforces NPS regulations (36 CFR 2.4(a)(2)(ii)) prohibiting plinking (random target shooting).
- NPS regulations require dogs to be on a leash (or under physical or voice control of owner for ensuring that their pets do not harass wildlife if used for hunting).
- No collecting of any natural or cultural resources, including desert tortoise, is permitted under NPS regulations, unless done under a research collection permit.
- In order to prevent the spread of disease from captive tortoises, the National Park Service prohibits the release of captive desert tortoises in accordance with 36 CFR 2.1. The park would work with other federal and state agencies to develop a cooperative program where residents can drop off unwanted and injured desert tortoises, and can adopt healthy, previously captive desert tortoises.

Additional NPS management actions to be taken:

- In high desert tortoise use areas, during the active season, the park will undertake additional temporary signing and staffing of heavily used entrances on busy weekends to raise visitor awareness of tortoise presence. If necessary, speed limits may be temporarily adjusted.
- The National Park Service will support and participate in an interagency regional study of raven predation in order to determine the appropriate management actions.
- No new roads will be built in the desert tortoise critical habitat. Duplicate roads and those that

provide access to range developments, active mines or other development sites will be closed and restored when no longer needed for that function.

- Congressional wilderness designation in 1994 resulted in the permanent closure of approximately 147 miles of unmaintained backcountry dirt roads in designated critical habitat. During the wilderness/backcountry management plan development over the next two years the NPS will inventory and evaluate all remaining open dirt roads in desert tortoise critical habitat and determine duplicate or unneeded routes. The goal will be to permanently close up to an additional 100 miles of roads.
- The park will strive to eliminate unnecessary rights-of-way (ROWs) and easements and will require minimum maintenance in order to prevent increased vehicle traffic. Holders of ROWs and easements may be required to install desert tortoise barrier fencing through the desert tortoise critical habitat if traffic levels suggest a problem and fencing is identified as enhancing protection of the tortoise. Maintenance activities on rights-of-way will be allowed only after the holder conducts an adequate survey of tortoise burrows along the route and complies with all stipulations from the USFWS biological opinion on this plan.
- The park will establish an active restoration program for disturbed areas after appropriate site-specific historical review and compliance.
- The National Park Service will make lands within the desert tortoise critical habitat a high priority for acquisition.
- The National Park Service will develop extensive educational materials on the life history, threats and recovery efforts of the desert tortoise for use in schools, museums, clubs, published media, site bulletins, and displays in the park information and visitor centers.
- The National Park Service will adopt minimum-impact fire suppression techniques in the desert tortoise critical habitat, followed immediately by restoration of disturbed areas.
- The National Park Service will encourage and support research on the impacts of fire on the desert tortoise.
- The park will inventory and eliminate hazards to the desert tortoise from abandoned mining activities or facilities (e.g., install devices to exclude the tortoise from mine shafts).

- The park will modify existing water developments (mostly small game guzzlers) to prevent desert tortoise from gaining access and to ensure they are able to escape from them.

Recommended Cooperative Interagency Management Actions:

- The National Park Service will support the proposed cooperative interagency desert tortoise population inventory and monitoring effort using protocols and methods adopted by the interagency Desert Managers Group. A coordinator was hired by the U.S. Fish and Wildlife Service to oversee this effort and Mojave has hired a wildlife biologist to coordinate our monitoring and research. The park will inventory and monitor desert tortoise populations throughout the Preserve in coordination with the interagency, rangewide efforts.
- The National Park Service will work with the California Department of Fish and Game to limit hunting in Mojave to big game and upland game bird species during their normal state seasons and cottontails and jackrabbits from September through January. This action, combined with the existing policy on no target shooting, will eliminate the discharge of firearms during the active tortoise period in the spring.
- The National Park Service will work with the county to find a suitable location outside the Preserve to relocate the Baker waste transfer station. The National Park Service will also encourage and provide support for the relocation of the open sewage lagoons so as to eliminate odors at the Preserve entrance and to reduce raven subsidizing.
- The National Park Service recommends that Caltrans, and communities of Baker, Nipton and Ludlow, and the County of San Bernardino, adopt and enforce appropriate steps to eliminate raven access to trash and food subsidies in areas within their immediate control. The National Park Service also recommends that these entities work with the National Park Service to develop and install public education materials on desert tortoise life history and threats at all rest stops along Interstates 15 and 40, and at other heavily used public use areas throughout the desert.
- The National Park Service recommends that the U.S. Fish and Wildlife Service develop and implement a coordinated interagency program of raven control and reduction in areas where raven

predation on juvenile tortoises exceeds natural levels. The raven is protected under federal law as a migratory bird and USFWS is the agency responsible for their management. Also, management of raven populations must be undertaken on a broad scale across many jurisdictions.

- The National Park Service recommends that the California Department of Transportation fund and install desert tortoise barrier fencing material on their existing fences along 25 miles of Interstate 15 and 39 miles of Interstate 40 that bisect desert tortoise critical habitat. These major highways are already significant habitat intrusions and receive substantial amounts of traffic. They also have numerous existing culverts to provide occasional tortoise passage.
- Mojave does not support the concept of installing new desert tortoise barrier fencing on paved roads in the Preserve. Mojave has already undertaken measures (entrance signs and information kiosks) to increase awareness of travelers of potential tortoise and other wildlife encounters. Fencing will lead to further habitat fragmentation and will conflict with our goal of eliminating fencing in the Preserve as grazing permits are retired. Other measures have been identified above that will be implemented seasonally to heighten awareness and slow traffic. However, the park will consider allowing barrier fencing along sections of the Kelso-Cima road if installed by Union Pacific as a construction mitigation measure. The fence will be placed out of visual site so as to not increase the visibility of tortoises walking along the fence. The fence will be left in place for a period of five years after construction and the park will undertake research to compare the fenced portion of this road with a similar unfenced portion to determine the advantages and disadvantages to tortoise and other animals.
- Mojave will work with the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the California Department of Fish and Game, and the San Bernardino County to develop road maintenance standards that minimize impacts on desert tortoise. Berms and roadside vegetation are two issues that need standards to be developed.

If a development project is proposed on federal land within the desert tortoise critical habitat (e.g. a right-of way, mining, range development) and will disturb or otherwise modify the native plant community or ground surface, the developer will be

required to purchase equivalent habitat for the desert tortoise's preservation in accordance with the compensation formula established by the Desert Tortoise Management Oversight Group. Similar requirements are enforced by U.S. Fish and Wildlife Service (USFWS) on private lands. Some activities might be required to provide for tortoise monitoring during the project. The National Park Service will apply stipulations as appropriate, for all activities permitted in areas where potential encounters with desert tortoise may occur. Mojave will continually evaluate ongoing research and consult with USFWS to modify these stipulations to reflect current research recommendations.

### **Mohave tui chub**

#### **Background**

The Mohave tui chub (*Gila bicolor mohavensis*) is in the minnow family and can reach over 10 inches in length. The Mohave tui chub was listed as an endangered species in 1970 by the U.S. Fish and Wildlife Service. The Mohave tui chub is the only fish native to the Mojave River basin in California. The arroyo chub (*Gila orcutti*) was introduced into the Mojave River system in the 1930s. This exotic chub successfully hybridized with the Mohave tui chub, and by 1970 the latter fish species was believed to have been eliminated by this process of introgression. A small population of genetically pure Mohave tui chub was found at a small pond (6 feet deep and 9 feet in diameter) at Soda Springs on the western bank of the dry Soda Lake (FWS 1984). Since its rediscovery, populations have been successfully introduced to constructed ponds at Soda Lake, Camp Cady, and China Lake Naval Air Weapons Station. The total estimated population at these four areas is between 10,000 and 20,000 fish (Mohave tui chub recovery team meeting, November 1996).

The Mohave tui chub is morphologically similar to the Owens tui chub (*G. b. Snyderi*) and the Lahontan tui chub (*G. b. obesa*) (FWS 1984). A genetic study, completed in September 1997, found that the Mohave tui chub is a distinct subspecies (May et al. 1997).

#### **Plan Actions**

A population of the endangered Mohave tui chub (*Gila bicolor mohavensis*) is maintained in small artificial ponds at Soda Springs. A final recovery plan exists for this species. Mojave will develop a cooperative agreement between the National Park Service, California Department of Fish and Game (CDF&G), U.S. Fish and Wildlife Service and

California State University to identify management objectives and strategies, consistent with the recovery plan, for maintaining the Mohave tui chub population (such as cattail and other aquatic plant removal and dredging of the pond). Mojave National Preserve will also pursue funding to provide for continued maintenance of the ponds and monitoring of the population.



**Desert Bighorn Sheep**

#### **Background**

Native populations of Nelson's bighorn sheep (*Ovis canadensis nelsonii*) are found in most of the mountainous terrain of the park, with population estimates as of 1994 at between 400 and 675 or more animals (Torres, S. G. et al. 1994). The population is listed as "fully protected" by the state, primarily due to the fragmentation of habitat throughout its range. It is not a federally listed species. Mojave National Preserve provides substantial protected habitat for desert bighorn sheep and is also one of the few places in California where bighorn sheep hunting is allowed. Limited hunting of bighorn sheep began in 1987 (BLM 1988). A limited number of permits to hunt bighorn sheep are issued each year by CDF&G through a lottery system. (See Table 1: Bighorn Sheep Populations in or near Mojave National Preserve).

#### **Plan Actions**

The park management goal is to inventory, monitor, and protect a self-sustaining population of bighorn, while allowing some hunting as mandated by Congress. Research will be encouraged and supported to address the following management issues:

- To determine the need for artificial water guzzlers and predator control.
- To determine the impact that rock-climbing has on sheep lambing in the Clark Mountains.
- To determine potential effects of jet noise from the proposed development of a major regional airport only miles from the park's northern boundary.

## Sensitive Habitats

### Background

**Chaparral Habitat:** Several canyons, located within the New York Mountains, contains a unique assemblage of plants and an interesting blending of plant communities not found elsewhere within the Preserve. Besides the small stand white fir trees (see section below), an “enriched” pinyon-juniper-oak woodland, or interior chaparral community, is found in Caruthers, Keystone, and Live Oak Canyons. Manzanita (*Arctostaphylos pungens*), oaks (*Quercus chrysolepis* and *Q. turbinella*), silktassel (*Garrya flavescens*), single-leaved ash (*Fraxinus anomala*) western service-berry (*Amelanchier utahensis*), holly-leaved redberry (*Rhamnus ilicifolia*), yerba santa (*Eriodictyon angustifolium*), and desert olive (*Forestiera neomexicana*) are all species that occur in the chaparral habitats of California and Arizona. Chaparral is typically a fire tolerant community, supporting intense fire due to volatile compounds in the plants, but recovering over time to a similar community. Calcicolous scrub, a community that grows only highly calcic soils, is also found within the New York Mountains.

**White Fir Populations:** Small populations of Rocky Mountain white fir (*Abies concolor concolor*), relict populations from the late Pleistocene-early Holocene period can be found in the upper reaches of the New York Mountains and on Clark Mountain. These pockets of white fir trees probably exist due to favorable conditions at the microsite level, with humidities in these small areas sufficient to favor sufficiently low evapotranspiration rates (Latting and Rowlands 1995). These north-facing canyons are wetter and cooler than the surrounding desert and shelter these relict stands.

**Joshua Tree Woodlands:** The most obvious feature of Cima Dome, next to its unique geological form, is the Joshua tree (*Yucca brevifolia jaegeriana*). The Joshua tree woodland covering the dome and surrounding areas is considered to be the largest and most dense stand within the tree's range, covering in excess of 150 square miles and probably containing more than a million trees. Although methods of aging of the trees are still subject to some disagreement, some of the trees with base diameters in excess of three feet and heights of 30 feet or more, may be 500–1,000 years old. The Joshua tree forest on the Cima Dome has not been surveyed and mapped for age distribution, nor are there any quantitative data to indicate the status of new seedling recruitment into the population. Joshua

trees are susceptible to wildfire, and above ground portions of the plants are often killed.

### Plan Actions

Mojave will inventory, map and monitor sensitive, unusual and limited distribution habitats. The National Park Service will also encourage and support research to assist in determining threats and appropriate management strategies. The park will encourage and support visitor use and education efforts in order to promote understanding of them.

**White Fir:** Fire planning will address efforts to protect white fir stands from wildfire, since they are not tolerant to extremes in heat and have a thin outer bark. Its seedlings need shade to germinate and establish, so if a stand were destroyed by fire, conditions for new tree growth will not be favorable.

**Joshua Tree Woodlands:** Park management goals will include:

- Inventory and monitor the extent, density, and age distribution of the Joshua tree woodland.
- Research the long-term effects of grazing and, possibly, how the removal of cattle would effect population dynamics of the Yucca species.
- Investigate fire management strategies that consider short and long-term fire effects on components of this community and determine appropriate strategies.

## Other Unusual Plant Communities

### Background

**Calcicolous Scrub:** Vegetation associated with limestone and dolomitic outcrops occurring in the Providence, New York, and Clark mountains. Characterized by the occurrence of many uncommon plants.

**Sagebrush Scrub:** Great Basin sagebrush (*Artemisia tridentata tridentata*) occurs in the Round and Gold Valleys in the Mid Hills area. This community is typical of the Great Basin desert to the north and is one example of the intersection of the three great southwestern deserts.

**Desert Grassland:** A large expanse of desert grassland containing about 20 species of perennial grasses is found in eastern Lanfair Valley.

**Shadscale Scrub:** A stand of *Atriplex confertifolia* occurs at Valley Wells and is characteristic of alkaline soils of the Great Basin Desert.



**Kelso Dunes:** The Kelso Dunes, reaching over 600 feet above the surrounding terrain, are the largest accumulation of sand within the Devil's Playground area. The Kelso Dunes are one of six "booming" dune systems in the entire world. These are dunes that emit audible booming, humming, or buzzing sounds as they shift. Sand from the Kelso Dunes originated in Afton Canyon fan at the southern end of Soda Lake (Lancaster). They also support psammophytic, or sand-growing plant communities and a diverse, but largely unseen contingent of diverse and sometimes rare invertebrates. Dune invertebrates include arthropods such as scorpions, roaches and beetles. Scorpions prey on smaller insects. Roaches and beetles depend on wind-blown organic material for both food and for nursery sites.

**Mojave Yucca:** The slopes of the Hackberry, Woods, and Providence mountains support stands of very tall (up to 25 feet) *Yucca schidigera*.

**Succulents (Cactus Gardens):** Many slopes of the Preserve mountains support extensive stands of succulent shrubs, including barrel, silver cholla, buckhorn cholla, hedgehog, Mojave mound, beavertail, and prickly pear cacti.

**Riparian:** Piute Creek, the Preserve's only perennial stream, and the ephemeral Bull Canyon's stream in the Granite Mountains supports a lush stand of cottonwoods, willows, and other riparian vegetation. Seeps and springs are relatively scarce and sometimes support riparian species. Studies have shown riparian areas, including large washes, to be extremely important for ecosystem biodiversity and sustainability.

**Mesquite:** Mesquite thickets, which indicate a high water table, occur in substantial numbers near Crucero, south of Soda Lake. Illegal offroad vehicle usage from the adjacent BLM Rasor OHV area poses threats to this community.

**Smoke Tree:** The smoketree (*Dalea spinosa*) is a species reaching its northern distribution in or near the Preserve. This Sonoran desert plant occurs in washes primarily along interstate 40, although it is also found in the Mojave River drainage west of the Preserve. A large assemblage of smoketree in Piute Valley was recognized by the Bureau of Land Management as a Sensitive Unusual Plant Assemblage.

#### **Plan Actions**

Plant communities, identified as "unusual," meaning they may be particularly sensitive to disturbance,

or are limited in distribution, will be inventoried, monitored and studied to determine appropriate management actions.

### **Introduced Species**

#### **Background**

Exotic (nonnative) species can include both plants and animals. They are generally defined as those species that occur in a given place as a result of direct or indirect, deliberate or accidental actions by humans. The exotic species introduced because of such human action would not have evolved with the species native to the place in question and therefore would not be a natural component of the ecological system characteristic of that place. There are 60 known nonnative plant species that have been identified in the Preserve. Examples of exotic wildlife species in the Preserve include burros and chukar, and plants like tamarisk, goat-head thorns, halogeton, cheat grass and Russian thistle.

#### **Plan Actions**

Nonnative plants and animals will not be used/introduced, except at historic sites where treatment plans (using the "Secretary of the Interior's Standards for Historic Properties") have been approved by the superintendent. The management of populations of exotic plant and animal species, up to and including eradication, will be undertaken in accordance with NPS *Management Policies* wherever such invasive species threaten park resources or public health and when control was prudent and feasible.

### **Burros**

#### **Background**

Before the passage of the California Desert Protection Act, the Bureau of Land Management (BLM) administered herd management areas (HMAs) in what is now the Mojave National Preserve. Their prescribed number of burros for what is now the main unit of the Preserve was 130 animals. On February 28, 1995, the superintendents of Death Valley National Park and Mojave National Preserve signed an agreement with the BLM to an interim management policy for burros on lands formerly managed by the BLM.

A survey conducted in September 1996 estimated there were 1,415 burros in the surveyed portion of Mojave (National Park Service, 1997). This figure was produced from mark-recapture estimates derived from over 200 hours of helicopter aerial surveys. The areas chosen for the survey included

approximately 985,000 acres of the 1.6 million-acre park. Funds limited the amount of land that could be surveyed; therefore, the study targeted previous BLM Herd Management Areas.

Since the survey was conducted, burro distribution has been discovered to be more extensive than originally determined. The number of burros estimated to exist within the Preserve outside of the original study area, based on casual observations by the park's field biologist, is at least a few hundred burros. Although an exact number cannot be determined unless a new survey is conducted, for planning purposes, a revised population estimate of 1,650 animals is believed to have existed in Mojave at the time of the 1996 survey.

To plan the burro removal program in Mojave, annual population increases due to reproduction are calculated. Empirical evidence indicates that burro herd sizes can increase at rates ranging from 11 to 29 percent per year (Douglas and Hurst, 1993; Morgart and Ohmart, 1976; Ruffner et. al., 1977; Woodward, 1976). Experience at Mojave suggests that a reproduction rate at the upper end of this spectrum is most representative of Mojave burro herds, as indicated by:

- Results of the 1996 Mojave survey showed that "when the reproductive rate is looked at as a percentage of the adult population accompanied by colts, the values...averaged 25.8%" (National Park Service, 1997).
- Of the 520 burros captured in Mojave during calendar year 1998, approximately 50% were female. Of those females, nearly every animal was either pregnant or accompanied by a colt<sup>1</sup>.

Taking into account these indicators of high reproductive rates, it is therefore reasonable to assume a herd reproduction rate of 25% for estimating the size of the Mojave burro population during the multi-year capture and removal program.

Mojave received Natural Resource Preservation Program (NRPP) project dollars to remove burros from 1999–2001.

In September 1997, Mojave began removing burros by live trapping them in corrals. In one month 600 burros were captured and removed. Between June and October 1998, 520 burros were captured and

removed; and in 1999, Mojave captured and removed 650 animals; for a total of 1,770 burros removed from Mojave during the two and one-half year period. Assuming a 25% average annual population growth, plus these three years of captures, there were approximately 915 burros in Mojave at the beginning of calendar year 2000 (see table 2).

### Plan Actions

Feral burros are an invasive, nonnative species that damage native habitat and compete with desert bighorn, desert tortoise and other native species for limited forage. The proposed management goal at Mojave is to remove all burros from inside the boundary and implement actions, to the extent practicable, to ensure that they do not reenter.

Thirty days after the "Record of Decision" was signed, the National Park Service's multi-phased plan for the removal of the remainder of Mojave's burros became effective. Burros will be removed in a multi-phased approach similar to that used successfully in Death Valley National Monument (NPS, 1982) as described below.

**Phase One.** During phase one, up to two years will be allowed for the live capture and removal of as many burros as possible. The methods and procedures for capture, transport, and placement are the same as those used in the existing management program. They are summarized below and presented in detail in the *Action Plan for the Removal of Feral Burros* (NPS, 1998c). The capture techniques will include water trapping, horseback wrangling, helicopter-assisted roping and trapping, and net gunning. The captured burros will be placed through the BLM adoption program, animal protection groups, or direct or indirect placement programs of the National Park Service.

Four **capture methods** will be used or considered for Mojave's burro program: 1) water trapping, 2) horseback wrangling, 3) helicopter-assisted roping and trapping, and 4) net gunning. A phased approach will be employed in implementing these methods. Water trapping is considered the easiest and least expensive means of capture, with horseback wrangling and helicopter methods becoming increasingly more difficult and expensive. The more difficult capture methods, however, are also more effective at capturing elusive, remote, and solitary animals. It is anticipated that as water trapping

<sup>1</sup> This observation implies an even higher reproductive rate than the 1996 survey suggests, but these numbers are not from a representative sample, so generalizations cannot be made about the entire population of Mojave burros.

becomes less effective, horseback wrangling and helicopter methods will become the primary focus of capture operations.

The four capture methods are described in detail below. The number of burros that are removed with each method is subject to modification as the program progresses and various capture methods prove more or less effective than anticipated.

**1. Water Trapping.** Burros are habituated to drinking at certain cattle corrals and developed waters in the desert. During water trapping, the animals enter a corral through a one-way gate known as a "finger trap" or "trigger" to obtain water, and cannot exit. Only existing corrals or previously developed water sources are used. Temporary corrals would be set up around those developed water sources planned for trapping where no corral exists. Temporary corrals are made of 6-rail livestock panels. No trapping is or would be conducted at springs, wetlands, riparian areas, or other sensitive environments. All trapping locations are previously heavily impacted by livestock and feral burro use.

Traps are checked for animals every day during water trapping operations. Trapped animals are loaded on a trailer and hauled to a central holding corral, where they await shipment out of Mojave. Holding corrals, like the trapping corrals, are located on ground that is previously heavily disturbed by livestock use. Only existing corrals are used. Burros wait in the holding corral no more than five days before shipment out of the park. Whether in the trap or in the holding corral, burros are given constant access to water and are provided adequate feed.

Water trapping has been highly successful at Mojave, resulting in the capture of 1,841 burros during three separate trapping seasons. Experience in other locations suggests that water trapping is most effective in the summer, when the animals are more thirsty and more willing to enter a trap to get a drink, and when there are fewer natural water sources available. Based on the effectiveness of the water trapping program to date, however, Mojave is attempting to water trap burros on a year-round basis. If water trapping becomes ineffective in the spring, fall, or winter, trapping during these seasons will be halted. Additionally, it is anticipated that as the program progresses, even warm-season water trapping will become less

successful, because the burro herd will be reduced to only those animals that drink at natural sources.

**2. Horseback Wrangling.** As burro numbers are reduced, water trapping will become less effective. One alternative is horseback wrangling, where riders capture burros by driving them into corrals or by roping the animals and leading them into corrals. Efforts would be made to use existing corrals or set up temporary corrals (using six-rail livestock panels) in previously disturbed areas. Like water trapping, burros will be moved to a central holding corral where they await removal from the park. They will be held no more than five days, would have free access to water, and will receive regular food.

It is anticipated that horseback wrangling will be used throughout the life of the program to capture animals that cannot be water trapped and are not concentrated enough to warrant the expense of helicopter capture. Costs per animal capture are expected to increase over the life of the program as burros become harder to reach due to terrain factors and distance from roads.

**3. Helicopter-Assisted Roping and Trapping.** During helicopter-assisted trapping, a helicopter is used to locate burros and herd them into a funnel trap. Wranglers wait until the burros enter the mouth of the funnel trap and then close in behind the animals, herding them into the corral. During helicopter-assisted roping, a helicopter is used to herd the animals to a capture site where wranglers are waiting. The wranglers rope the animals and lead them to a corral. Like the other two methods, captured burros will be placed in a temporary holding corral where they would be cared for while awaiting removal from Mojave.

Helicopter-assisted roping and trapping will be employed to capture burros in those areas where water trapping and horseback wrangling are not feasible or effective, and where there is a high enough concentration of burros that helicopter methods will prove cost effective. Costs per animal capture are expected to increase over the life of the program as burro numbers are reduced. In FY2000, Mojave initiated helicopter-assisted roundups in the Lava Beds and Granite Mountains, resulting in the capture of over 513 burros by this technique.

4. **Net Gunning.** During net gunning, a net is fired onto the animal from an overhead helicopter. Animal handlers (either already on the ground or in the helicopter) then move the burro to a designated holding corral. Captured animals will be placed in a temporary holding corral where they are cared for while awaiting removal from Mojave. It is anticipated that only the most remote and elusive burros will be captured through net gunning. Net gunning will be used sparingly and only in those situations where no other option exists for burro capture. Costs per animal are expected to be extremely high.

Mojave currently utilizes three **placement sources** for captured burros. The market for burros in the United States is limited, and no single placement source is capable of absorbing all the burros that must be removed. Cost also factors into decisions on placement. The three placement sources are:

1. **The Fund for Animals' Black Beauty Ranch.** The Black Beauty Ranch, located in East Texas and owned by the late Cleveland Amory's Fund for Animals, is a haven for unwanted animals. In a signed general agreement with the NPS, the Fund has agreed to accept up to 300 Mojave burros per year at the Black Beauty Ranch. Under the terms of the agreement, the Fund takes the animals free of charge. The NPS must finance shipping the animals to Texas, plus all necessary veterinarian check-ups and blood work. Mojave contracts for shipping and veterinarian services.

Upon arrival at the Black Beauty Ranch, the burros become the property of the Fund for Animals, and they are adopted to interested parties or live out their lives on the ranch. In 1998, 100 burros were successfully sent to the Black Beauty Ranch under this agreement. In 1999, 300 animals were placed there.

2. **Private Contractor.** In 1998, Mojave contracted with a private company to remove and market burros for the NPS. The company picked up the burros from the park, transported the animals to their facilities, and sold them to private entities. Their market included selling burros for pets, breeding, pack stock, and other recreational purposes. Under contract stipulations, no burros were sold for slaughter, and the company made available to the NPS records indicating where each burro was sold. The program with this company has been highly successful,

resulting in the placement of hundreds of burros. Mojave will continue to use this contract to place burros in the future.

3. **Bureau of Land Management Wild Horse and Burro Adoption Program.** The BLM has a well-established adoption program for horses and burros removed from the wild. During 1997, Mojave placed 600 burros through the BLM program. Another 100 animals were placed with BLM in 1999. Due to a saturated market, fiscal considerations, and BLM's interpretation of the 1971 Wild and Free-Roaming Horse and Burro Act, BLM's ability to take burros from Mojave is limited, but this option will be used in the future where appropriate.

Burro herd migrations, size of the park, and uncertainties associated with the effectiveness of the various capture methods make predictions on the timing of burro capture very difficult. Generally, horseback wrangling and helicopter-assisted capture will be conducted during the warmer months when burro herds are concentrated around water sources. Water trapping, which is assumed to be more effective in the summer, will nevertheless be attempted year-round to test the efficacy of a four-season operation.

Predictions about **capture locations** are also difficult to make. Mojave is a large area with few geographic boundaries that can inhibit burro migration within the park. The 1996 survey (NPS, 1997) and burro monitoring over the last three years by park staff, suggest that burro herds are concentrated in the following general locations: Granite Mountains, Providence Mountains/Clipper Valley, Woods/Hackberry Mountains, New York Mountains, Ivanpah Mountains, Cima Dome, Cinder Cones, and Clark Mountain. The combined area of these locations totals over one million acres. Predicting burro herd locations within these general geographic areas is problematic. Decisions on general capture areas will be based on monitoring observations taken approximately two weeks prior to capture operations.

Decisions regarding specific trap and holding corral locations will be made immediately after the determination of the general capture locations. The specific number of livestock corrals in Mojave that could serve as potential traps or holding facilities is unknown, but may number in the dozens. Potential holding facilities exist within a few miles of almost all capture locations.

**Phase Two.** Upon signing of the "Record of Decision," the National Park Service will provide a maximum of six months during which animal protection groups may remove any remaining animals, at their expense, from areas of the Preserve where live trapping/capture techniques have achieved the maximum cost effective results. If the group's proposal is agreeable with the NPS, an agreement will be negotiated and signed between the National Park Service and the interested group(s). The National Park Service will provide oversight, logistics support, and the use of some equipment and corrals.

It is anticipated that most of the Mojave's burros will likely be captured and removed through phases one and two. If an agreement with an animal protection group is not reached within six months of the signing of the "Record of Decision," the NPS will immediately begin Phase three. Phases one and two must result in adequate removals each year to reduce the populations substantially in the area being targeted. If phase one proves unsuccessful in the first year, the NPS could move to phases two and three as needed to achieve the desired results. One area of the Preserve may remain in phase one, while other areas proceed to phases two and three as necessary.

**Phase Three.** In phase three, NPS staff or contractors will eliminate the remaining few animals in a humane manner to achieve a zero population. This action will occur only when desert tortoises are not active above ground. By timing operations in this manner, juvenile tortoises will not be subject to increased predation by ravens, which are likely to congregate near burro carcasses. Phase three will continue for an indefinite time. The park also maintains the option of implementing phase three if live captures do not succeed in reducing populations. As captures proceed, a particular area of the park could be placed in phase two or three separate from the rest of the park.

The NPS is aware of the burro's potential for rapid population growth (up to 25% per year). The above proposed removal strategy will result in a burro population that approaches zero within five years of its initiation in 1997.

A BLM burro Herd Management Area (HMA) lies adjacent to Clark Mountain, with no natural or constructed barriers to prevent burros from entering this satellite unit of the Preserve. No other BLM HMAs exist immediately adjacent to Mojave. In addition, the BLM proposes to retain cattle grazing surrounding the Clark Mountain area. Because of this situation, the National Park Service will:

- Fence the Clark Mountain unit of the Mojave National Preserve, following the Preserve boundary. To allow for deer and bighorn sheep ingress and egress, critical portions of the fence would be constructed similar to that proposed by Andrew, Lesicka, and Bleich (1997), which allows deer and bighorn sheep to pass, but not burros or cattle. This alternative could not be implemented until the existing cattle grazing permits within the park are retired.
- Work cooperatively with BLM and CDF&G on conducting joint gathers and aerial surveys.

## Rocky Mountain Mule Deer

### Background

The California Department of Fish and Game introduced the Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) into the New York and Providence Mountains of the Preserve in February and March of 1948 from Arizona (Dasmann 1968). Nine bucks and 31 does were released. The first authorized hunt of this population was in 1955. The department estimates that about 25 deer are taken per year. The population has remained relatively stable since the first introduction.

Mule deer are native to the Mojave Desert and occur in nearby mountain ranges. Although the deer in Mojave were introduced by the California Department of Fish and Game, anecdotal information suggests that a resident population may have occurred in the pinyon-juniper and sagebrush habitat prior to these introductions. It is likely that these deer have interacted and bred with adjacent herds over the last 50 years and may now be genetically similar. DNA studies would help to resolve this apparent information discrepancy.

### Plan Actions

No actions to remove this species are warranted until the genetics of the deer population are studied.

## Chukar

### Background

The chukar (*Alectoris graeca*), an upland game bird popular among hunters, was first introduced into California (from India) in 1932 (Malette c.1970). Between 1932 and 1955, more than 52,000 birds were released by the California Department of Fish and Game (Malette c.1970). The birds prefer rocky open hills and flats. Sightings have been reported from below sea level to above 12,000 feet in the White Mountains and Sierra Nevada. The animal is abundant in parts of the Preserve.

**Plan Actions**

In order to protect the native quail population and to maintain a native desert ecosystem, the NPS will encourage reductions in this population of exotic birds by seeking a higher bag limit, as compared to the native quail population. No new releases of these, or other exotic species, will be authorized.

**Nonnative Plants**

**Background**

There are 60 known nonnative plant species that have been identified in the Preserve. Tamarisk or salt cedar (*Tamarix ramosissima*), Russian thistle, and introduced annual grasses (from Europe and Asia) are some of the more pernicious exotics within the Mojave National Preserve. These species often out-compete native vegetation, subsequently eliminating or displacing natives and associated native animals. Annual plants such as introduced grasses and Russian thistle often cause an unnatural increase in the amount of dried material available as wildfire fuel.

Salt cedar, an introduced shrub or small tree 5 to 20 feet tall, is an opportunistic invader of moist areas. Both the Bureau of Land Management and the National Park Service have ongoing control programs that are attempting to manage this invasive plant. Continuing control is needed to prevent this weedy tree from outcompeting and eliminating native vegetation. A larger, less invasive relative, the athel (*T. Aphylla*), has been planted (typically as a windbreak or sand-break) in a number of locations in the Preserve (e.g., near Kelso Depot). This species does not spread easily and is not considered a threat. Some of these trees may be considered part of the historic landscape would be evaluated during planning efforts for those sites.

Russian thistle (commonly called tumbleweed) is common in many disturbed areas in Mojave National Preserve, such as at old mining sites and along roadsides. Introduced annual grasses such as *Bromus* and *Schismus* species are serious pests when mature (Hitchcock and Chase 1971). "The narrow, sharp-pointed minutely barbed florets (or fruits) with their long rough awns work into the eyes, nostrils, and mouths of stock, causing inflammation and offer serious injury" (Hitchcock and Chase 1971). The increase of these grasses throughout much of the arid west is believed to be an important contributing factor in the increase in desert wildfires, which were uncommon at one time.

**Plan Actions**

**Tamarisk.** Mojave will continue to identify and remove the invasive nonnative salt cedar tamarisk (*Tamarisk ramosissima*). Successful control of tamarisk has been demonstrated in numerous projects throughout the southwest. Only authorized herbicides will be used in tamarisk control efforts. Such herbicides are non-persistent, non-toxic to aquatic life and are used in accordance with accepted management practices and proper dosages. Any use of poisons or other chemical agents on federal lands within the Preserve, including use by the park or by permittees, requires review and permission under the NPS Integrated Pest Management program.

Athel tamarisk trees (*Tamarisk aphylla*), such as those planted along the Union Pacific railroad corridor for protection of the tracks from blowing sand, do not spread easily and are not considered a threat. Retention of athel tamarisk trees at Kelso Depot and Zzyzx as part of the historic landscape will be evaluated during planning efforts for those sites.

**CULTURAL RESOURCES**

**Program Goals**

The National Park Service will develop and implement a systematic, integrated cultural resource management program in accordance with the NPS *Management Policies* (2001) and *Director's Order 28*. This program will identify, inventory, monitor, and evaluate archeological sites, historic properties, cultural landscapes, and ethnographic resources; nominating significant resources to the National Register of Historic Places and will manage, protect, and preserve such listed properties in a way that will preserve their documented archeological, architectural, ethnographic, historic, or research values. The program will be developed through collaborative partnerships with government agencies and public and private organizations with cultural resource management expertise.



Mojave's resource management plan will address the requirements, projects, and funding to implement the cultural resource program. To support this program, the National Park Service will develop collaborative partnerships with government agencies, as well as public and private organizations with expertise in cultural resource management or research capabilities. These entities could include federal, state, and county agencies, academic institutions, local and regional cultural and historical associations, and Native American tribes affiliated with lands in the Preserve. As requested, the National Park Service will cooperate with owners of historic properties within the Preserve boundaries to ensure their preservation. To achieve cultural resource program objectives, under the authority of 36 CFR 1.5, the National Park Service might control or limit human activities in areas designated as culturally sensitive or threatened.

### **Baseline Data**

The National Park Service will develop and implement a systematic applied cultural resource research program to ensure that (1) there will be adequate baseline information on location, condition, threats, and significance/integrity of resources; (2) interpretation and preservation treatment of resources will be accurate; and (3) appropriate means will be used to manage, protect, preserve, and interpret Native American heritage or other ethnographic resources. The research program will include the following studies:

- archeological studies, including a regionally based archeological research plan, an archeological overview and assessment, and archeological identification and evaluation studies
- ethnographic studies, including an ethnographic overview and assessment, a cultural sites inventory, and cultural affiliation studies
- historic resources studies (including possible separate studies of ranching, mining, transportation, and military use), historic structure reports, historic furnishings plans, an administrative history, and special history studies. A historic resources study is an illustrated narrative history and normally is accompanied by draft National Register forms together with requisite maps and photographs for all properties identified within the study as meeting National Register criteria, while the study itself identifies those which lack either sufficient age, or integrity, or significance, and thus have been

evaluated as not qualifying for the National Register. The historic resource study should evaluate privately-owned properties within the Preserve without preparation of NR forms so that should such properties later be acquired or be potentially affected by some Federal action, their status will already have been evaluated. Mojave National Preserve is so large an area and current funding for historic resource studies comes in such small amounts that it will be necessary to schedule a series of historic resource studies, each focused on a different topic, to cover the history of the resources within the Preserve: (1) mining; (2) ranching; (3) homesteading (4) exploration; (5) transportation routes (trails [Old Spanish Trail], wagon roads [Beale's Road, Mojave Road], railroads, automobile roads [Route 66], etc.) and communication facilities; (6) settlements and towns; (7) military camps, Patton's Desert Training Center facilities, and Desert Strike training (1964); (8) military operations against Desert Indians; (9) prohibition and law enforcement; miscellaneous other topics not covered by the foregoing Recreation] etc.

- a scope of collections statement and a collection management plan
- revising the list of classified structures, cultural landscape inventories, evaluations, and assessments with emphasis on themes of the history of western exploration and settlement, mining, ranching, and railroading

### **List of Classified Structures**

The List of Classified Structures (LCS) is a park's computerized inventory of known historic and prehistoric structures having historical, architectural, or engineering significance in which the NPS has, or plans to acquire, any legal interest. Properties included in the LCS are either on or eligible to the National Register or are to be treated as cultural resources by law, policy, or decision reached through the planning process even though they do not meet all National Register requirements. The LCS documents significance, condition, use, threats, treatments, cost estimates for treatment, and physical description. Seventy-two structures are currently listed in the Preserve's LCS. This list is a preliminary list and will be maintained and updated as necessary to reflect current research, surveys and interpretations.

## **Cultural Landscapes**

### ***Background***

The Cultural Landscape Inventory (CLI) is an evaluated inventory of all cultural landscapes (landscapes, component landscapes, landscape features, and component landscape features) having historic significance in which the National Park Service has or plans to acquire legal interest. The CLI provides the baseline information for a cultural landscape. As such, the CLI assists park managers and cultural resource specialists in planning, programming, and recording treatment and management of listed landscapes. The Cultural Landscape Inventory has three primary functions:

- To identify and inventory cultural landscapes in a national data base,
- To record information about these resources related to their identification, location, description, characteristics, historical development and current management, and
- To provide park staff with the information necessary to make informed decisions about appropriate treatment of these cultural resources.

A Cultural Landscape Report (CLR) serves two important functions; it is the principal treatment document for cultural landscapes and the primary tool for long-term management of those landscapes. A CLR guides management and treatment decisions about a landscape's physical attributes, biotic systems, and use when that use contributes to historical significance. A comprehensive Cultural Landscape Report has three parts, which include:

- A site history with maps, a description of the existing conditions, and an analysis and evaluation of the identified resources,
- Proposed treatment of the landscape, and
- A record of treatment for that landscape

At least sixteen potential historic landscapes have been identified in Mojave National Preserve that are potentially eligible for listing on the National Register of Historic Places, but cultural landscape studies have not been undertaken to identify their character-defining elements.

### ***Plan Actions***

Landscapes reflecting mining, ranching, railroading, and ethnographic activities can be seen throughout the Preserve. The Preserve will inventory the cultural landscapes and prepare nomination for those

determined to be eligible for the National Register of Historic Places.

A Cultural Landscape Inventory of the Kelso Club House and Restaurant Historic District was completed in FY 2001. A Cultural Landscape Inventory of the Soda Springs Historic District commenced in FY 2000. The basic cultural landscape inventories have been completed for:

Zzyzx Mineral Springs Historic District (Draft Nomination) (Landscape)  
 Kelso Depot Historic District (Draft Nomination) (Landscape)  
 Mojave Road (Landscape)

Potentially Significant Landscapes that will be evaluated:

Marl Springs  
 Rock Springs  
 Paiute Pass (feature)  
 New York Hills Historic District (1890s) (Landscape)  
 Death Valley Mine (Landscape)  
 Vanderbilt Site (Component)  
 Providence Mountains Historic District (Landscape)  
 Foshay Pass (Feature)  
 Macedonia Mining District (Landscape)  
 Rock Springs/Government Holes (Component)  
 Ivanpah Historic District (Landscape)  
 Ivanpah (Component)  
 Clark Mountain Mining District (Landscape)  
 General Patton's Desert Training Center (Camp Essex) (Landscape)  
 Lanfair Valley (Landscape with multiple owners)

Given the following historic landscapes are not managed by the NPS there are no plans to evaluate these resources for possible listing:

Union Pacific Los Angeles to Salt Lake City Line (Landscape)  
 Boulder Transmission Line (Landscape)  
 Mitchell Caverns (Landscape)

## **National Register Properties**

### ***Background***

Authorized by the National Historic Preservation Act of 1966 and administered by the NPS in the National Center for Cultural Resources Stewardship and Partnership Programs, the National Register is the nation's official list of districts, sites, buildings,



structures, landscapes and objects in both public and private ownership that are significant in American history, architecture, archeology, engineering, and culture. Section 110 of the NHPA mandates that all federal properties that are over 50 years of age must be inventoried and evaluated for eligibility to the National Register. It further directs that those properties over 50 years of age that have not yet been evaluated be treated as though they were eligible to the National Register until documented as non-eligible.

The following properties within Mojave NP are listed on the National Register:

- Kelso Depot
- Piute Pass Archeological District
- Aikens Wash National Register District
- Historic Boulder Transmission Lines 1, 2, and 3 Archeological District

### ***Plan Actions***

The Kelso Depot was listed on the national register in August 2001. A Historic Structure Report containing history, archeology and architecture sections, and both historic, HABS, and other recent drawings has been completed and published on the Kelso Depot. A Historic Furnishings Report for the Kelso Depot has also been completed (November 2001) for certain rooms that are proposed to be refurbished to their historic appearance.

The following properties have been determined to be potentially eligible to the National Register and National Register nomination forms are being prepared for them:

- Soda Springs Historic District
- Mojave Road
- Rock House

The Historic Resources Study, scheduled for completion by 2005, will identify and evaluate additional properties that may be nominated to the National Register such as the Ivanpah and Providence townsites and the Death Valley Mine.

If the Soda Springs Historic District is determined to be eligible to the National Register, management of the facility could be affected. The National Park Service will produce a Cultural Landscape Report / Historic Structures Report that will specify the historic preservation treatments for the various historic structures and cultural landscape elements at Soda Springs that

were associated with Dr. Springer and the Zzyzx Mineral Springs. The report may recommend the preparation of development concept plans for the coordination of new and existing facilities to better support current and proposed operations.

As a result of the series of historic resource studies, a large number of other properties, including numerous ranches, homesteads, townsites, railroad stations, mines, springs, and ranching developments may be evaluated for their historical significance and integrity.

## **Ethnography**

### ***Background***

Attention to the peoples whose lifeways are traditionally associated with resources under National Park Service stewardship is mandated in legislation and the NPS *Management Policies* (2001). Ethnography, part of cultural anthropology, is concerned with the peoples associated with parks, with their cultural systems or ways of life, and with the related technology, sites, structures, other material features, and natural resources. In addition to traditional regimes for resource use and family and community economic and social features, cultural systems include expressive elements that celebrate or record significant events and may carry considerable symbolic and emotional weight. These include rituals, sacred narratives such as origin myths, verbal arts including folk tales, and performing and graphic arts. Cultural anthropologists refer to behavioral, value, and expressive patterns, and technology, as features of cultural systems. Preservation specialists may use the term "intangible" to refer to behavior, values, and expressive culture.

### ***Plan Actions***

Developing programs, policies, guidelines, and data to help Preserve management identify and protect culturally significant resources falls to the Preserve's applied ethnography program. A major goal is to facilitate collaborative relationships between the NPS and the people, including Native American groups and the ranching and grazing communities in the Preserve area, whose customary ways of life affect, and are affected by, NPS resource management. Seeking practical outcomes, the program identifies issues that concern management, communities, and the resources they both value and provides information to promote mutually acceptable solutions.

While no ethnographic or traditional cultural properties have been identified in the Preserve, this may change during future dialogues, between NPS staff, the Native American tribes, and the ranching and grazing communities.

## Collections Management

### **Background**

The Preserve has existing collections onsite, including a library, a growing collection of paper and photographic archives, and a few historic items from Kelso Depot. Archeological materials emanating from compliance activities currently are stored at WACC. A recently purchased collection of Chemehuevi baskets is being curated at Death Valley National Park. Future acquisitions may include archeological collections, historical collections relating to mining, ranching/homesteading, native and ethnographic communities, and modern military exercises; and contemporary items associated with recreation/tourism (for example, Soda Springs).

### **Plan Actions**

The National Park Service will prepare a scope of collections statement and a collection management plan to address and document the management, protection, preservation, and use of natural and cultural specimens, objects, documents, photographs or electronic media in accordance with the provisions of NPS *Director's Order 77*. The scope of collections statement will address the significance of the collections and set limits on collections consistent with the park's mission, purpose and identified themes in its interpretive prospectus. It would also address collections generated by research, resource management, and compliance activities. The collection management plan will document and evaluate alternative approaches to management, preservation, and protection of collections identified in the scope of collections statement. Alternatives will include developing in-house collection management capability, with a museum storage facility, or developing cooperative agreements with other park units, other federal agencies, or universities and museums. Mojave staff are currently working with the Pacific Great Basin and Columbia Cascades staff curators and the Death Valley National Park curators regarding these alternatives and other curatorial planning needs. Curatorial storage preference will be given to local facilities that will be more readily accessible to park staff and researchers.

## Archeological Resources

### **Background**

Archeological resources occur in almost every unit of the national park system. What makes archeological resources significant are their identity, age, location, and context in conjunction with their capacity to reveal information through the investigatory research designs, methods, and scientific techniques used by archeologists. Such resources are critical to understanding and interpreting American prehistory and history; however, archeological resources are fragile and may be easily destroyed unless proper attention is paid to their management as mandated by the following federal laws and policies, and their respective implementing regulations, standards, and guidelines:

- NPS *Management Policies* (2001)
- Antiquities Act of 1906
- Sections 106 and 110 of the National Historic Preservation Act of 1966
- Archeological and Historic Preservation Act
- Archeological Resources Protection Act of 1979
- Native American Graves Protection and Repatriation Act of 1990

There is significant documentation of archeological information at Mojave which continues to expand. Since 1997, Mojave has been developing an archeological sites management inventory system (ASMIS). The ASMIS database is the NPS standard database for archeological resources and provides data necessary to complete GPRA reporting requirements. All Mojave archeological base maps on file in San Bernardino have been digitized. Archeological and project data collected up to 1999 (approx-



mately 1,300 sites) has been entered in the database. All available site files have been scanned, verified, and entered in the database. A GIS has been created to integrate all available data through a series of custom tools in ArcView. ASMIS is the only electronic site database for national parks in California like Mojave.

In 1996 the California Historical Resources Information System (CHRIS) was initiated, with the support of the Desert Managers Group, for the development of an Internet-based GIS application for the digitizing archeological information available in the California Information Centers. A massive undertaking, thus far the CHRIS has digitized all the

base maps at the San Bernardino Information Center.

### ***Plan Actions***

Mojave National Preserve will seek to identify, protect, preserve, and interpret archeological resources under its jurisdiction.

The development phase of the ASMIS program will continue with completion anticipated in 2001. Updates to the database would be undertaken as new information becomes available. Except as necessary for projects with proposed land disturbance, little new archeologically-based research is anticipated in the foreseeable future.

