

# Suitability

# 4

Photos (clockwise): 1. Mt. Lowe Circlebridge View. NPS Photo. 2. Cooper's Hawk. Photo by Eric Lowenbach. 3. Puente Hills. NPS Photo. 4. Aerial of the Los Angeles urban area. Photo by Bruce Perry, Dept. of Geological Sciences, CSU Long Beach.



# Chapter 4: Suitability

## Introduction

To be considered suitable for addition to the national park system, an area must represent a natural or cultural resource type that is not already adequately represented in the national park system, or is not comparably represented and protected for public enjoyment by other federal agencies; tribal, state, or local governments; or the private sector.

Adequacy of representation is determined on a case-by-case basis by comparing the potential addition to other comparably managed areas representing the same resource type, while considering differences or similarities in the character, quality, quantity, or combination of resource values. The comparative analysis also addresses rarity of the resources, interpretive and educational potential, and similar resources already protected in the national park system or in other public or private ownership. The comparison results in a determination of whether the proposed new area would expand, enhance, or duplicate resource protection or visitor use opportunities found in other comparably managed areas. The suitability analysis is applied to those areas found to be nationally significant, the San Gabriel Mountains and the Puente-Chino Hills.

## NPS Thematic Framework – Natural and Cultural Themes

The National Park Service (NPS) developed a thematic framework for evaluating potential and existing units within the national park system. The basic thematic framework includes a series of natural and cultural themes.

Every unit of the national park system preserves important aspects of our nation's natural and/or cultural heritage. The NPS uses a series of natural history and cultural themes to categorize the important resources protected by national park units. The themes are used to evaluate whether resources in a study area would broaden and diversify resources protected by the national park system.

The following analysis is organized by natural history and cultural history themes represented by the study area.

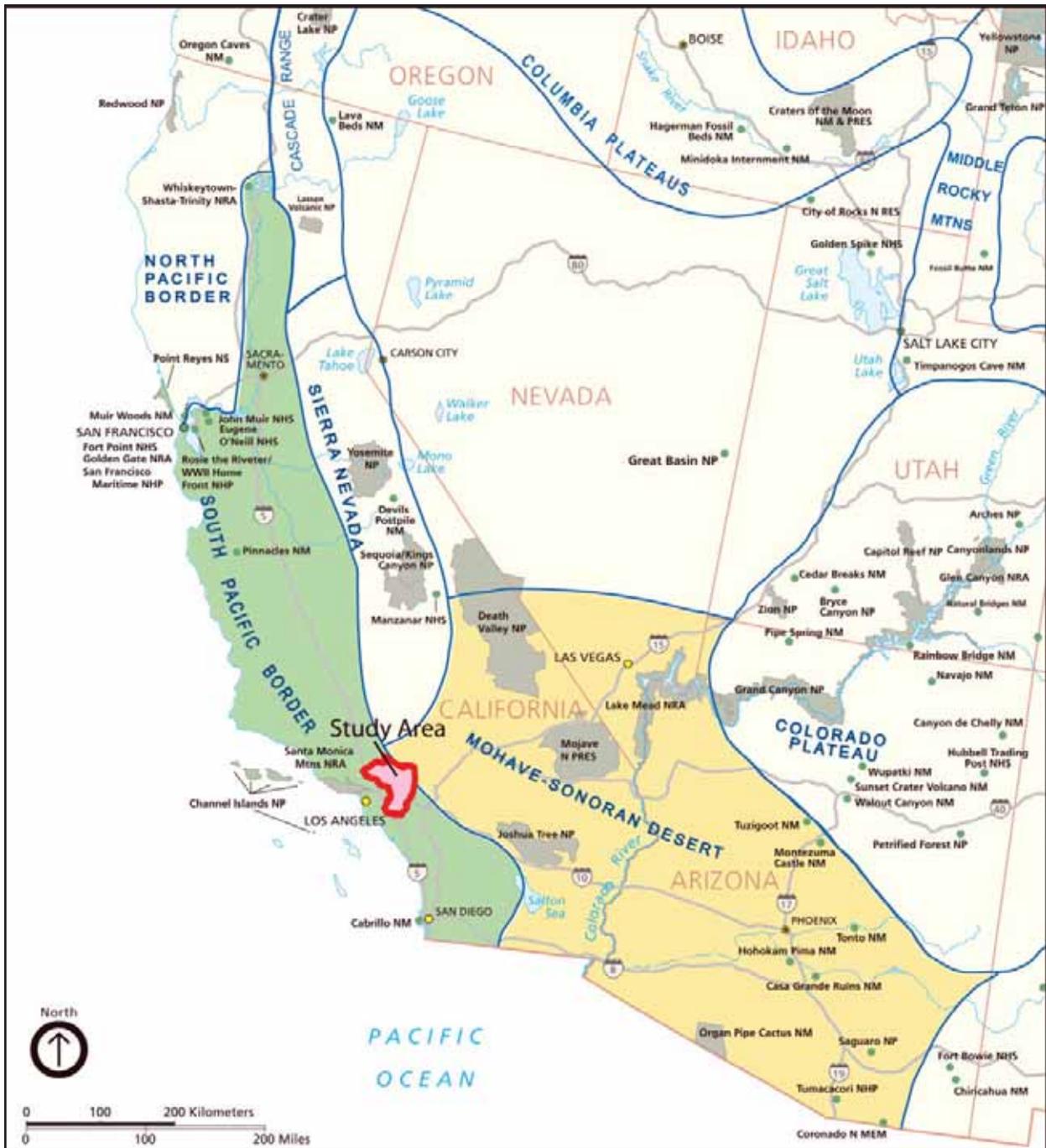
## Natural History Themes

### Biophysiographic Regions

The physiographic and biologic features of the country tend to be regionally oriented dividing the country into natural regions. These regions give primary consideration to the geologic histories, structures, and landforms, which in turn influence the climates, soils, vegetation, and animal life associated with the regions (NPS 1990). These biophysiographic regions provide the context for determining whether nationally significant natural resources of an NPS special resource study area are adequately represented in the national park system or other comparably managed areas. The thematic framework is described in the publication "Natural History in the National Park System" (NPS 1990).

The majority of the study area is located in the South Pacific Border biophysiographic province or natural region as described in "Natural History in the National Park System (see graphic, *National Park biophysiographic regions*)." The South Pacific Border region includes the southern Coast Ranges, the Transverse Ranges, the Peninsular Ranges of California and the Central Valley. These ranges have extensive forested areas composed of a mixture of coastal, Sierran, and inland species (NPS 1990).

The northern end of the study area lies partially in the Mojave-Sonoran Desert region. This region includes the Mojave and Sonoran deserts in southeastern California, southernmost Nevada, and southern Arizona. Their physiographic features are roughly similar to those of the Great Basin. The major river system is the lower Colorado River. Both the Mojave and Sonoran deserts have hot summers and warm winters but their vegetation is different. The Mojave Desert of southern Nevada and southeastern California has simple plant communities dominated by creosote bush and bur-sage, with Joshua trees at 3000-4000 feet. The Sonoran Desert, in Baja California and inland Mexico and extending in southern Arizona, has more diverse vegetation characterized by columnar cacti (NPS 1990). The study area does not contain any Sonoran Desert resources, therefore, this comparative analysis includes park units and comparable sites from the Mojave Desert portion of this region only (park units west of the Colorado River).



**National Park Biophysigraphic Regions**, adapted from the Physiographic Provinces Mpa, NNL Program, Pacific West Region, Oakland, CA 1/24/04, M.G.

## Comparison of Similar Areas by Theme and Sub-Theme

### San Gabriel Mountains

#### NATURAL HISTORY THEMES REPRESENTED IN THE SAN GABRIEL MOUNTAINS

As described in Chapter 3, *Resource Significance*, natural history themes are a series of categories encompassing the natural phenomena of the country. Themes represented by nationally significant resources in the San Gabriel Mountains include:

- Landforms of the Present
- Land Ecosystems
- Aquatic Ecosystems

#### Landforms of the Present

The “Landforms of the Present” theme describes the character of the landscape as a physical and scenic entity as it exists today, as well as present and past geologic events and processes. Principal features of the natural landscape such as mountain systems, river systems and lakes are included in this theme. Each landform possesses certain distinguishing qualities and characteristics which set it apart from others. The following sub-themes related to Landforms of the Present are represented in the San Gabriel Mountains:

- **Mountain Systems:** San Gabriel Mountains
- **Sculpture of the Land:** Devil’s Punchbowl
- **River Systems and Lakes:** East, West and North Forks of the San Gabriel River, Little Rock Creek, Santa Clara River

#### MOUNTAIN SYSTEMS

The form, composition, and structure of mountain systems are manifestations of a wide variety of geologic events and processes and constitute veritable record books of the earth’s history. As stated in Chapter 3, San Gabriel Mountains significance lies in the evidence of *active mountain building* and the *diverse array of geological features*, both of which are directly associated with the *San Andreas Transform Fault System*.

#### National Park Service Units

Existing national park units within the South Pacific Border and Mojave-Sonoran Desert Regions that represent the theme Mountain Systems include:

#### South Pacific Border Region

- Channel Islands National Park
- Golden Gate National Recreation Area
- Pinnacles National Monument
- Santa Monica Mountains National Recreation Area
- Whiskeytown-Shasta-Trinity National Recreation Area

#### Mojave-Sonoran Desert Region

- Death Valley National Park
- Joshua Tree National Park
- Lake Mead National Recreation Area
- Mojave National Preserve

#### Scientific Study and the San Andreas Fault

The San Andreas Fault System formed along the translational boundary between the North American and Pacific Plates. As one of the few places on Earth where a transform-fault plate-boundary occurs on land rather than beneath the sea, the San Andreas fault system is one of the most studied structural features on the planet. The theory of plate tectonics evolved based on scientific study of the San Andreas Fault. The San Gabriel Mountains were formed by the San Andreas fault to the north and a series of thrust faults to the south.

National park units within the two provinces that represent mountain systems which are also associated with the San Andreas fault system include Channel Islands National Park (NP), Golden Gate National Recreation Area (NRA), Pinnacles National Monument (NM), Santa Monica NRA, and Joshua Tree NP.

Death Valley NP, Lake Mead NRA, Joshua Tree NP, and Mojave NP (including Cinder Cone National Natural Landmark) are more associated with active continental rifting processes associated with the Basin and Range Province. This area is characterized by fault-block mountain systems separated by basins or rift valleys. The Whiskeytown-Shasta-Trinity NRA is located within mountain systems that are associated with subduction zones of the Pacific Northwest (Lillie 2005).

Santa Monica NRA, Pinnacles NM, Golden Gate NRA, Channel Islands NP and Joshua Tree NP are national park units that have been changed and altered by activity along the massive San Andreas transform fault system. Of these national park units, Pinnacles NM is the only unit whose park purpose and significance expressly relate to plate tectonics and the San Andreas fault. Pinnacles NM contains a remnant of an ancient strata volcano that was split

by the movement of the two continental plates and provided key evidence for the basis of the theory of plate tectonics. The Pinnacles Rocks are believed to be part of the Neenach Volcano that occurred 23 million years ago near present-day Lancaster, California, some 195 miles (314 km) southeast of Pinnacles. Activity on the San Andreas fault split the volcano and the Pacific Plate crept north, carrying the Pinnacles.

The long history of research on the San Andreas fault in the San Gabriel Mountains, which continues today, expands on the story of plate tectonics told at Pinnacles NM. In the early 20th century, noted geologist Levi Noble conducted a long-term study of a fifty-mile stretch of the San Andreas fault near the San Gabriel Mountains. Noble was the first scientist to advance ideas about large-scale lateral movement on the San Andreas fault (Norris and Webb 1990, Wright and Troxel 2002).

Noble's 1927 landmark paper contains the first printed statement that lateral displacement occurred along the San Andreas fault for many miles. Noble observes, "*Scarcely anywhere in the fault zone are the rocks on the opposite sides of the master fault similar* (Wright and Troxel 2002)." The concept was an important precursor to later ideas regarding plate tectonics (Carter 1982b). Since the time of Levi Noble, geologists and scientists have continued to make new discoveries and expand research on the San Andreas fault.

The portion of the San Andreas fault that traverses the study area is also the location of the highest elevation point along the San Andreas Fault. This highpoint is located in the northeastern corner of the study area near the Big Pines area of the Angeles National Forest. Here one can see the deep and wide crevasse at the plate boundary. The deep crevasse highlights the magnitude of activity associated with this transform-plate boundary. Most areas along the San Andreas fault are filled with sediments, alluvium or water (in the case of sag ponds) which makes such landform gaps less obvious. The highpoint is therefore an excellent location to interpret this important geologic feature.

### **Active Mountain Building**

The San Gabriel Mountains may be one of the best locations in the United States to observe and study active mountain building. One of the most tectonically active mountain systems in the United States, tectonic activity along the San Andreas and other regional faults is forcing the mountains to rise at a rate of as much as 2 inches a year (Murphy 1985). Large events such as the Sylmar earthquake

of 1971 (6.6 magnitude) have resulted in the San Gabriel Mountains rising six feet in relation to the San Fernando Valley floor (Norris and Webb 1990).

### **Geologic Diversity**

The geologic composition of the San Gabriel Mountains also differs in rarity, quality and quantity from mountain systems at comparable national park units such as Pinnacles NM and Mojave NP. As described in the previous chapter, the San Gabriel Mountains contain the most extensive, best-exposed and most completely studied exposures of the San Gabriel Mountains anorthosite massif, the Mount Lowe plutonic suite, and Pelona schist. Some of the oldest rocks (over one billion years old) on the west coast of the United States are located in the San Gabriel Mountains. While a rich array of ancient rocks are also found in Mojave NP, these geologic features differ from those represented in the San Gabriel Mountains. In addition, the relations of geologic formations present in the San Gabriel Mountains, but that are more widespread elsewhere in California, enable geologists to understand how the Earth's crust has evolved in the region. In this way, the geologic composition of the San Gabriel Mountains serves as a "Rosetta Stone" for understanding the evolution of the Earth's crust (Powell 2007a).

Of the national park units that represent the theme mountain systems, in no other single national park unit does the visitor have an opportunity to observe the forces of the San Andreas fault system and how it relates to active mountain building. The geologic diversity of the San Gabriel Mountains is also unique and has helped scientists to understand how the southern California region evolved.

### **Comparably Managed Areas**

Outside of the national park system other areas that represent mountain systems include:

#### **National Natural Landmarks (NNLs)**

- Mt. Diablo State Park, CA
- Amboy Crater, CA
- San Andreas Fault, CA

#### **National Forests**

- Angeles National Forest, CA
- San Bernardino National Forest, CA

#### **National Natural Landmarks (NNLs)**

Mt. Diablo State Park, located in the northern South Pacific Border natural region, is not associated

with the San Andreas fault. Its primary significance is that it contains the best examples of diapiric (igneous intrusion) geologic processes in the South Pacific Border natural region.

The San Andreas Fault NNL consists of a privately-owned winery located in San Benito County, CA. The Cienega Winery property represents one of the best illustrations of earth displacement caused by small crustal movements. One-half of a winery structure has moved eight inches in nine years. Although this site has been specifically designated to represent the San Andreas Fault, it does not have the long history of research associated with the San Gabriel Mountains, nor does it tell the story of active mountain building associated with the San Andreas fault. Because it is privately owned and managed, the site does not expressly interpret evidence of displacement. However, several online geologic guides direct visitors and students to portions of the building affected by displacement along the fault.

The only NNL in the Mojave-Sonoran natural region associated with the theme mountain systems is the Amboy Crater. Located in eastern San Bernardino County, Amboy Crater is an example of a recent volcanic cinder cone with an unusually flat crater floor (NPS 2008a). Amboy Crater NNL is partially owned by the Bureau of Land Management (BLM). Other portions are located on private land. The BLM provides a viewing platform, interpretative information and trail access to the crater.

**National Forests.** The San Gabriel Mountains are primarily managed by the Angeles National Forest. However, a comprehensive interpretive and educational program on the theme mountain building is currently lacking.

The San Bernardino Mountains in the San Bernardino National Forest are located just east of the San Gabriel Mountains and the Angeles National Forest. The two ranges are separated by the Cajon Pass which was formed by the San Andreas fault. The San Andreas fault lies to the south of the San Bernardino Mountains, whereas it lies north of the San Gabriel Mountains. Although the San Bernardino Mountains are directly affected by the forces of the San Andreas fault, they do not experience the rapid uplift associated with the San Gabriel Mountains which are compressed by the San Andreas fault to the north and a series of thrust faults to the south. Thus, the topography of the San Bernardino Mountains is much gentler. While similar geologic units are found in the San Bernardino Mountains, the geologic make-up of the San Gabriel Mountains differs vastly from the

San Bernardino Mountains. Ancient rocks in the San Gabriel Mountains are not found in the San Bernardino Mountains.

Compared to the San Bernardino Mountains, the San Gabriel Mountains have greater opportunity for interpretation, education and scientific study of the San Andreas fault, plate tectonics, mountain building and regional geology.

### **Conclusion: Mountain Systems**

Of the national park units and comparably managed areas that represent the theme mountain systems, in no other area does the visitor have an opportunity to observe the forces of the San Andreas fault system and how it relates to active mountain building. In addition, the San Gabriel Mountains contain a diversity of geological features that represent some of the oldest rocks on the west coast of California. These units have helped geologists to understand how the Earth's crust has evolved in the region. The San Gabriel Mountains could expand greatly on the story of the San Andreas fault and plate tectonics in the national park system.

### **SCULPTURE OF THE LAND**

The Sculpture of the Land sub-theme includes landforms produced by erosive action of water and wind, landslides and other physical or chemical land shaping events or phenomena. The Devil's Punchbowl is an excellent example of sculpture of the land created by impressive geologic forces.

The scenic Devil's Punchbowl consists of magnificently exposed ridges and ravines etched into steeply tilted and folded sandstone that protrudes out of the surrounding substrate. Located between the San Andreas and Punchbowl fault zones, tectonic activity forced the Devil's Punchbowl formation into areas of older crystalline rocks associated with the San Gabriel Mountains. This striking landform is a dramatic example of earth movement caused by plate tectonics.

The Devil's Punchbowl was identified by two previous studies as a nationally significant geological feature (NPS 1974 and NPS 1976). The latter study recommended it for designation as a National Natural Landmark. It was described as "an ideal place to ponder the importance of the regional faults and to view the San Gabriel Mountains (NPS 1976)." Managed by Los Angeles County Parks, the Devil's Punchbowl features an interpretive center and interpretive trails which explain the significance of the site.

## National Park Service Units

There are numerous national park units within the South Pacific Border and Mojave-Sonoran Desert natural regions that represent the theme Sculpture of the Land including:

### South Pacific Border Region

- Channel Islands National Park
- Golden Gate National Recreation Area
- Pinnacles National Monument
- Santa Monica Mountains National Recreation Area

### Mojave-Sonoran Desert Region

- Death Valley National Park
- Joshua Tree National Park
- Lake Mead National Recreation Area
- Mojave National Preserve

Of the NPS units in the South Pacific Border and Mojave-Sonoran natural regions, landforms within Pinnacles NM, Joshua Tree NP, Death Valley NP, Mojave NP and Lake Mead NRA are most similar to the Devil's Punchbowl in the San Gabriel Mountains.

Pinnacles National Monument features volcanic breccia that was associated with an ancient volcano. Over time these formations have been impacted by wind, erosion and seismic activity associated with the San Andreas fault which has caused cracks and talus cave features. While these features provide an ideal location to learn about and study the San Andreas fault and plate tectonics, they differ from the Devil's Punchbowl which was down-dropped into areas of older crystalline rocks creating stark contrasts between the structure and its surrounding landscape.

Joshua Tree NP features giant granite boulders that are related to the effects of subduction along the San Andreas fault. These granite boulders are remnant magma chambers that formed during subduction of the Farallon Plate (Lillie 2005). Although related to activity along the San Andreas fault, these features are located quite a distance from the fault itself.

Death Valley NRA, Mojave NP and Lake Mead NRA are renowned for their unusual geologic features associated with the Mojave Desert, Colorado Plateau and the Basin and Range geologic provinces. Some of these forms bear resemblance to the Devil's Punchbowl in the San Gabriel Mountains. For example, Marble Mountain in Death

Valley NP features dipping sedimentary rocks and Lake Mead NRA contains a steeply dipping cliff face at Gale Hills. Mojave NP is significant for volcanic geological features such as Cima Dome, the Cinder Cones, as well as the Kelso Dunes. However, none of these features are directly associated with the San Andreas fault.

Channel Islands NP, Golden Gate National NRA, and Santa Monica Mountains NRA contain examples of sculpture of the land related to both plate tectonics as well as the ongoing erosion associated with coastal environments.

### Comparably Managed Areas

Outside of the national park system other areas that represent the sculpture of the land include:

### National Natural Landmarks (NNLs)

- Anza-Borrego Desert State Park, CA
- Rainbow Basin, CA
- Turtle Mountain Natural Area, CA
- Ramsey Canyon, AZ

### County Parks

- Devil's Punchbowl Natural Area, CA
- Vasquez Rocks County Park, CA

### National Natural Landmarks (NNLs)

Anza-Borrego Desert State Park NNL, most of which is located in eastern San Diego County, is the largest desert state park in the nation. The state park contains some of the best examples of the various desert biotic communities in the Colorado Desert as well as excellent examples of desert geological phenomena. A combination of up-thrusting and subsidence formed this park's unique landforms which consist of valleys, badlands, canyons, oases, and mountain ranges.

Rainbow Basin NNL is located in San Bernardino County eight miles north of Barstow. Managed by the Bureau of Land Management, the basin is notable for the fantastic and beautiful shapes of its rock formations, particularly the Barstow Syncline. However, the primary significance of this site is the fossil evidence of insects, larger Micoene mammals and mammal tracks and the deep erosional canyons with rugged rims.

Also located in San Bernardino County, the Turtle Mountain Natural Area NNL, managed by the Bureau of Land Management, features two mountain sections entirely different in composition which illustrate past volcanic phenomena with

superimposed sculpturing of mountain landforms by weathering and uplift.

Ramsey Canyon Preserve's primary significance is its well-defined habitat created by a vertical-sided gorge. The gorge features an extension of Mexican flora and fauna into the American side of the International Boundary, and contains plants which normally occur only at higher elevations. The preserve is owned and managed by the Nature Conservancy (NPS 2008a).

The landforms in these NNLs differ from Devils Punchbowl Formation. While the San Gabriel Mountains are directly influenced by forces on the San Andreas fault, most of the NNLs that represent "sculpture of the land" are primarily desert landscapes more closely associated with forces of the Basin and Range geologic province.

**County Parks.** A good portion of the Devil's Punchbowl formation in the San Gabriel Mountains is currently managed by Los Angeles County Parks. The Devil's Punchbowl Natural Area features a small nature center with information about the area's geology, wildlife, plants. Guided tours are offered about such topics and various hiking trails area available for visitors to experience the resources.

Wedged between the San Gabriel Mountains and the Sierra Pelona Mountains in the Soledad Basin, the Vasquez Rocks are composed of steeply tilted andesite volcanic rocks, non-marine red beds, sedimentary breccia, claystone, mudstone and limestone. The Vasquez formation is spectacularly displayed at Vasquez Rocks County Park just west of the study area where the rocks were thrust up as the North American tectonic plate initially collided with the Pacific Plate about 25 million years ago. The Vasquez Formation volcanic rocks are also found in the San Gabriel Mountains along the Soledad Basin.

The Vasquez Rocks are similar in character to the Devil's Punchbowl. However, they do not feature the dramatic contrast in geologic units that is evident at the Devil's Punchbowl.

### **Conclusion: Sculpture of the Land**

While many national park units in South Pacific Border and Mojave-Sonoran natural regions contain striking landforms similar to the Devil's Punchbowl, Devil's Punchbowl's prominent location in the San Andreas Fault zone makes it an ideal location to learn about the significance of the this important fault while enjoying a highly scenic landscape. The Devil's Punchbowl features are sharply contrasted with its surrounding geology and landscape creating

one of the most dramatic examples of earth movement caused by plate tectonics and active mountain building. Interpretation and education on plate tectonics and geology is currently available at the Devil's Punchbowl Natural Area.

Of the comparably managed areas that represent the theme sculpture of the land, the Vasquez Rocks County Park is most similar to the Devil's Punchbowl in terms of its character and the opportunity to interpret plate tectonics and the San Andreas Fault.

The NNLs that currently represent sculpture of the land are more associated with the Basin and Range geologic province. They do not present the same opportunity to interpret the San Andreas Fault, plate tectonics and active mountain building.

### **RIVER SYSTEMS AND LAKES**

River systems and lakes are noteworthy features of the natural landscapes often revealing past and ongoing geological process. Portions of the river systems in the San Gabriel Mountains meet the eligibility criteria for National Wild and Scenic River designation. Free-flowing sections of Little Rock Creek and the north, east and west forks of the San Gabriel River retain high levels of integrity and support sensitive wildlife. The riparian areas in the San Gabriel Mountains provide some of the richest habitat for freshwater fishes in southern California.

**National Park Service Units.** Existing national park units within the South Pacific Border and Mojave-Sonoran Desert Regions that represent the theme River Systems and Lakes include:

#### **South Pacific Border Region**

- Channel Islands National Park
- Golden Gate National Recreation Area
- Santa Monica Mountains National Recreation Area
- Whiskeytown-Shasta-Trinity National Recreation Area

#### **Mojave-Sonoran Desert Region**

- Lake Mead National Recreation Area

Of these national park units, Channel Islands NP and Santa Monica Mountains NRA represent river systems most similar in quality and character to the systems found in the San Gabriel Mountains. While the Golden Gate and Whiskeytown-Shasta-Trinity NRAs contain excellent examples of river systems and lakes, these systems differ from those represented in the San Gabriel Mountains in that they are more associated with northern California ecosystems.

The Santa Monica Mountains NRA is home to freshwater aquatic habitats and two of the last salt marshes on the Pacific Coast. While this habitat provides refuge to a significant number of rare species, the primarily marine influence and lower elevations support different species than those found in the San Gabriel Mountains. The San Gabriel River and its mountain tributaries provide some of the richest habitat for native freshwater fishes in southern California. Similarly, the tidal systems at Channel Islands NP are heavily marine influenced and differ in both vegetative structure and species composition from the San Gabriel Mountains.

The character of river systems in the Santa Monica Mountains NRA and Channel Islands NP are different from the river systems in the steep, rugged San Gabriel Mountains. River systems in the San Gabriel Mountains are highly influenced by the topography and active geologic processes. Measured as a function of the horizontal distance from the ocean, these mountains present the greatest vertical elevation gain from the ocean when compared to anywhere else in the continental United States (McPhee 1989; Gumprecht 1999).

The proximity of mountains to the sea presents unique climatic conditions and orographic effects, causing large amounts of annual rainfall and significant flooding. Combined with the rapid erosion resulting from the active mountain-building in the San Gabriel Mountains, the river systems of the Los Angeles Basin are some of the most dynamic in California. Residents of the Los Angeles Basin went through extraordinary efforts in their attempts to stabilize these rivers. The result is the development of one of the most comprehensive flood control projects undertaken in the United States. The San Gabriel Mountains are an ideal location to interpret this story.

Significant desert river systems can be found at Lake Mead NRA. Despite alteration of the riverine environment from dams, the lakes at Lake Mead NRA contain excellent examples of desert riparian systems and provide habitat to rare and endangered species. This includes two endemic fish species listed as federally endangered, the razorback sucker and the bonytail chub. These species are native to Mojave, Colorado Plateau and Basin and Range geologic provinces.

Whereas Lake Mead features mostly lacustrine riparian areas, outstanding examples of desert riparian areas in the San Gabriel Mountains are associated with Little Rock Creek. Little Rock Creek is the only eligible Wild and Scenic River on the

northern slope of the San Gabriel Mountains which drains into the Mojave Desert region. Little Rock Creek differs in character from the other three units in that it traverses a greater elevation change. Over its course, Little Rock Creek transitions quickly from Sierran mixed conifer habitat in its upper watershed to juniper woodlands and finally to desert scrub habitat as it spreads into the Mojave Desert to the north.

The desert and high country setting of Little Rock Creek attracts visitors for picnicking, water play and driving opportunities and features a diverse array of wildlife including threatened, endangered, and sensitive species. Also present are prehistoric sites valued by local Native American tribes (USFS 2005). The Little Rock Creek is an excellent location to interpret the ecological transition from the southern California coastally influenced Mediterranean ecosystem to the Mojave Desert ecosystem as well as prehistoric human occupation of these sites.

### **Comparably Managed Areas**

Outside of the national park system other areas that represent the River Systems and Lakes include:

#### **National Natural Landmarks (NNLs)**

- San Felipe Creek Area, CA

#### **National Forests and Private Reserves**

- Angeles National Forest, CA
- San Bernardino National Forest, CA
- Los Padres National Forest, CA
- Santa Margarita Ecological Reserve, CA

#### **National Natural Landmarks (NNLs)**

No NNL was identified for the South Pacific Border natural region that represents the theme River Systems and Lakes. Within the Mojave-Sonoran Desert natural region, the San Felipe Creek Area in San Diego County features a marsh area containing what is probably the last remaining perennial natural desert stream in the Colorado Desert. Managed by the California Department of Fish and Game, this ecological reserve is open to the public for hiking and viewing wildlife. The Colorado Desert ecosystem is distinctly different in character from desert ecosystem associated with the San Gabriel Mountains (NPS 2008a).

**National Forests.** The Angeles National Forest manages eligible wild and scenic rivers in the San Gabriel Mountains. However, some segments are currently impacted by heavy visitation. Expanded visitor education programs about the importance of

these water resources and proper stewardship could expand and enhance their protection, and improve the overall visitor experience.

National Forests with comparable river systems to those found on the Angeles National Forest include rivers in the San Bernardino NF and the Los Padres NF. Located in the coastal mountains of the southern California coast, the San Bernardino and Los Padres National Forests both contain river segments that are eligible for Wild and Scenic River status. The Sisquoc River, Sespe Creek, and Big Sur River in the Los Padres National Forest are the only rivers within the South Pacific Border Region that are designated Wild and Scenic Rivers.

The U.S. Forest Service has identified twelve rivers on the San Bernardino National Forest that are eligible for Wild and Scenic River status. These rivers would be most comparable to those found in the San Gabriel Mountains. Although many of these rivers have comparable scenic, wildlife and recreational value, eligible river segments in the San Gabriel Mountains differ in both physical character and quantity of native fisheries.

Historically, the San Gabriel River was the most abundant trout stream in Southern California (Robinson 1946). Today, the West, North, and East forks of the San Gabriel River and their tributaries still contain highly significant aquatic habitats (Swift et al 1993, Deinstadt et al 1990). Rainbow trout populations occur on the West, North, and East Forks of the San Gabriel River, and in both San Gabriel and Cogswell Reservoirs. Average densities of over 3,500 fish per mile have been recorded on the West Fork (Deinstadt et al 1990). The San Gabriel River also contains the largest remaining populations of Arroyo chub (Wells et al 1975) and the Santa Ana speckled dace (Swift et al 1993). The San Gabriel River thus provides some of the best opportunities to interpret southern California native freshwater fisheries.

The Los Padres National Forest has three Wild and Scenic Rivers – a segment of the Sespe Creek, the Sisquoc River, and the Bid Sur. A four-mile segment of Sespe Creek in the Los Padres NF was included in the Wild and Scenic River system in 1992. Sespe Creek represents five outstandingly remarkable wild and scenic river values including: recreation, wildlife, geologic, fishery and scenic. Sespe Creek forms highly scenic, deep gorges that expose formations of the Topa Topa Mountain range. The creek is one of the southernmost anadromous fishery habitats (southern steelhead) in California. Other federally listed species found within the creek include the arroyo toad and the California condor.

Although access to Sespe Creek is limited since the Wild and Scenic river segment is primarily in wilderness areas, several trails provide opportunities for hiking, swimming and equestrian use along Sespe Creek (USFS 2003b).

The Sisquoc Wild and Scenic River is located in the Los Padres NF, in the County of Santa Barbara. The outstandingly remarkable values for the Sisquoc River are scenic, recreation, wildlife, heritage, and ecological values. The extensive riparian corridor, along the Sisquoc River remains relatively natural and surrounded by a large wilderness area. The scenic value of the river is associated with the narrow corridor of the river itself and the contrast of the geologic features, water, and riparian vegetation. Several federally listed threatened or endangered species are found in a relatively undisturbed riparian habitat. These species include Central California Coast Steelhead trout, California red-legged frogs, Arroyo toads, Least Bell's vireos, and California condors.

The Sisquoc River corridor has abundant prehistoric and historic sites. Patterns of travel and settlement along the river's length, and the sites that stand in evidence of the past, reflect the distinctive nature of the drainage. The corridor frequently has narrow travel passages, and many adjacent high flats that were occupied in prehistoric times and often homesteaded and cultivated in more recent times. The area also has cultural significance to modern Native Americans (USFS 2003c).

The Sisquoc River corridor offers excellent opportunities for solitude, primitive camping, hiking, horseback riding and other wilderness oriented activities. There is an established trail system that generally parallels the river out of the floodplain that periodically crosses the river.

The Big Sur Wild and Scenic River is located in the Los Padres NF. Outstanding remarkable values for which the Big Sur River was designated include scenic, recreation, and ecological values. Scenic values include: abundant, rapid, flowing water, with pools, springs and an occasional waterfall; interesting landforms; diverse tree canopy with redwoods; combination of scenic features uncommon to Central and Southern California. The three natural sulfur hot springs pools and the redwood-riparian environment provide outstanding opportunities for hiking, camping, swimming, fishing, picnicking, and nature study. Outstanding ecological values include a diverse combination of alders, maples, willows and bay with dominant over story of redwood (USFS 2003d).

Although the three Los Padres NF Wild and Scenic Rivers are outstanding examples of river systems, these systems differ significantly in character from rivers systems in the San Gabriel Mountains. The Sespe, Sisquoc and Big Sur Wild and Scenic Rivers support different fisheries, vegetation types and have distinctly different geologic make-ups than that of the San Gabriel River.

**Private Reserves.** The Santa Margarita River, located south of the study area in San Diego County, is the longest protected coastal river in southern California. Upper portions of the river are located in unincorporated areas of San Diego County while lower portions are protected by the Santa Margarita Ecological Reserve and the Department of Defense at Camp Pendleton. In contrast to the San Gabriel River, Santa Margarita River has its most significant resources in its lower reaches. These sections differ significantly in vegetative structure and geologic make-up from the San Gabriel Mountains. Although the lower Santa Margarita River offers exception educational and research opportunities, the restricted access limits interpretive and recreational opportunities.

### **Conclusion: River Systems and Lakes**

While several national park units in the South Pacific Border and Mojave-Sonoran natural regions contain excellent representations of the theme River Systems and Lakes, the San Gabriel Mountain river systems differ significantly in geologic character and processes and diversity of river habitats. Access to significant river systems in the San Gabriel Mountains is excellent. The rivers provide opportunities to interpret how the impact of mountain building on river processes shaped the Los Angeles Region.

Of the comparably managed areas, the San Gabriel Mountain river systems differ in geologic character and geologic processes, habitat type, fisheries and opportunities for access and interpretation.

### **Land Ecosystems**

The theme "Land Ecosystems" represents vegetation types as well as the animal populations and physical environmental features which are often important elements in identifying and evaluating sites. The following sub-themes related to Land Ecosystems are represented in the San Gabriel Mountains:

- **Chaparral** (shrubs and evergreen forest trees): Coastal sage scrub, San Dimas Experimental Forest (chaparral)

- **Dry Coniferous Forest:** Bigcone Douglas-fir, pinyon-juniper forest, subalpine forest.

### **CHAPARRAL**

Chaparral ecosystems include broad-leafed, mainly evergreen, species of shrubs or low trees, occurring as dense scrub or woodland. Almost 50% of the study area land cover is chaparral habitat.

The San Dimas Experimental Forest in the Angeles National Forest has been a leader in research of chaparral ecosystems and watersheds and provides superlative opportunities for scientific study.

### **National Park Service Units**

Existing national park units within the South Pacific Border and Mojave-Sonoran Desert Regions that represent Chaparral include:

#### **South Pacific Border Region**

- Cabrillo National Monument
- Channel Islands National Park
- Pinnacles National Monument
- Santa Monica Mountains National Recreation Area
- Whiskeytown-Shasta-Trinity National Recreation Area

#### **Mojave-Sonoran Desert Region**

- Joshua Tree National Park

Whiskeytown-Shasta-Trinity NRA represents chaparral species associated with more northern California affinities and Pinnacles NM represents chaparral communities associated with central California. Similarly, chaparral communities represented in the Mojave-Sonoran Desert natural region are more representative of desert chaparral communities. The Santa Monica Mountains NRA contains chaparral habitat most similar chaparral in the San Gabriel Mountains. However, given that the San Gabriel Mountains are located in a transition zone between two ecoregions, and the range of chaparral types associated with different elevations and climate, the San Gabriel Mountains contain a greater diversity of chaparral habitat..

The presence of the San Dimas Experimental Forest in the San Gabriel Mountains is what distinguishes this area the most from existing units that represent the theme Chaparral. No other location has the extensive history of research and experimentation on chaparral watersheds. Data collected in the San Dimas Experimental Forest since 1933 represents some of the earliest and most comprehensive

records from continuously monitored U.S. Forest Service experimental watersheds in the United States.

Of the three national park units in the South Pacific Border natural region, Santa Monica Mountains NRA mostly closely represents chaparral habitat similar to what is found in the San Gabriel Mountains.

In recent years, the National Park Service has established Research Learning Centers throughout the nation to facilitate research efforts and provide educational opportunities. The California Mediterranean Research Learning Center (CMRLC) is an integral program of three units of the national park system: Cabrillo National Monument, Channel Islands National Park, and Santa Monica Mountains National Recreation Area. These three NPS areas represent outstanding examples of Southern California's Mediterranean Biome which includes chaparral communities.

The California Mediterranean Research Learning Center was established to support a broad scope of research on the terrestrial and oceanic aspects of the Mediterranean Biome, and promote research directed specifically at addressing management needs. Through the CMRLC, the NPS plans to engage citizens in science and research and will place a strong focus on education. While the CMRLC will likely conduct important research on chaparral systems, the program is new and does not have the years of focused, controlled research that has been conducted at the San Dimas Experimental Forest. The CMRLC will provide educational opportunities for the public which is currently not a function of the San Dimas Experimental Forest.

### **Comparably Managed Areas**

Outside the national park system other areas that represent chaparral include:

### **National Natural Landmarks (NNLs)**

- American River Bluffs and Phoenix Park Vernal Pools , CA
- Año Nuevo Point and Island, CA
- Miramar Mounds, CA
- Nipomo Dunes-Point Sal Coastal Area, CA
- Tijuana River Estuary , CA

### **National Forests**

- Angeles National Forest, CA
- San Bernardino National Forest, CA
- Los Padres National Forest

- Cleveland National Forest, CA

### **National Natural Landmarks (NNLs)**

The American River Bluffs and Phoenix Park Vernal Pools located outside of Sacramento, CA contain outstanding examples of rare plant community types such as blue oak woodlands and vernal pools. The landmark is owned by federal, county and private owners. Public access is readily available along the bluffs which feature a continuous trail. The Phoenix Park Vernal Pool Preserve is managed by the City of Fair Oaks Recreation and Park District. The pools are sensitive and public access is restricted.

Año Nuevo Point and Island on the northern California coast is the best known breeding ground in the world for the northern elephant seal; it is also habitat for Steller sea lions, California sea lions, and harbor seals. The area is managed by California State Parks.

Miramar Mounds in San Diego, California is an example of vernal pools habitat and distinctive geomorphic forms and soils that are now rare within California, particularly in coastal southern California. The Miramar Mounds NNL is owned and managed by the Department of Defense as part of the Marine Corps Air Station Miramar.

The Nipomo Dunes-Point Sal Coastal Area contains the largest, relatively undisturbed coastal dune tract in California, supporting both rare and endangered plants and animals and great species diversity and one of the last remaining tracts of pristine rocky coastline in the South Coast Ranges. The landmark is managed owned by federal, state, county and private landowners.

The Tijuana River Estuary on the southernmost tip of California is of the finest remaining saltwater marshes on the California coastline, containing three species of endangered birds and an important habitat for other wildlife, especially waterfowl (NPS 2008a).

While each of these NNL sites contain chaparral habitat, the quality of the chaparral is not the primary significance or purpose for designating any of the NNLs. None of the NNL sites has a chaparral research component similar to the San Dimas Experimental Forest.

**National Forests.** Southern California's four national forests (Angeles, Los Padres, Cleveland and San Bernardino) manage most of the southern California's chaparral resources. While national forest status ensures that the chaparral habitat

is under some level of federal protection, threats to chaparral in the national forests include infrastructure development such as power lines and roads, and increasing fire frequency as a result of human-caused ignitions (Halsey 2005).

The Angeles National Forest is home to the San Dimas Experimental Forest, unique among the four national forests, where significant research about chaparral ecosystems and watersheds has contributed to our knowledge and management of this type of ecosystem. Currently, there is little to no opportunity to provide interpretive and educational opportunities about the San Dimas Experimental Forest and the significant resource contributions which it has generated, both nationally and internationally. A comparison to other experimental forests and stations is further analyzed later in the cultural themes section of this chapter.

### **Conclusion: Chaparral**

Of the national park units and comparably managed areas that contain significant chaparral ecosystems in the South Pacific Border natural region, no other site has been so significant for historical and contemporary research on chaparral ecosystems and watersheds as the San Dimas Experimental Forest located within the San Gabriel Mountains. Additionally, the chaparral habitat types in the San Gabriel Mountains are diverse covering a range of elevations and spanning two distinct ecoregions.

### **DRY CONIFEROUS FOREST**

This sub-theme includes belts of coniferous forest and woodland dominated by Douglas-fir, ponderosa pine, and pinyon-juniper. At its lower limits these forests give way to steppe or chaparral ecosystems.

Outstanding examples of dry coniferous forest communities in the San Gabriel Mountains and foothills include: bigcone Douglas-fir, relict juniper communities, and southern California subalpine habitat.

### **National Park Service Units**

Existing national park units within the South Pacific Border and Mojave-Sonoran Desert Regions that represent the theme Dry Coniferous Forest include:

#### **South Pacific Border Region**

- Channel Islands National Park
- Golden Gate National Recreation Area
- Pinnacles National Monument
- Santa Monica Mountains National Recreation Area

- Whiskeytown-Shasta-Trinity National Recreation Area

#### **Mojave-Sonoran Desert Region**

- Death Valley National Park
- Mojave National Preserve
- Saguaro National Monument
- Montezuma Castle National Monument

Because of its high elevation, the San Gabriel Mountains contain rare examples of southern California subalpine vegetation. No other national park unit in the South Pacific Border natural region or the Mojave-Sonoran Desert Region contains this type of habitat which includes an unusual subalpine forest of krummholz lodgepole pine (*Pinus murrayana*) and 1,000 year-old limber pines.

Although examples of bigcone Douglas-fir and juniper woodlands are found in many of the existing national park units, the San Gabriel Mountains contain unique and outstanding examples of this type of habitat. The relict juniper woodland found at Mescal Creek in the San Gabriel Mountains is a remnant of vegetation that was prevalent in this area during the Pleistocene epoch (1.8 million - 8,000 years ago.) The bigcone Douglas-fir habitat found at Falls Canyon Research Natural Area is one of the best remaining examples of this declining community. Stands here include dense, mature bigcone Douglas-fir trees, some of which are over 350 years old.

### **Comparably Managed Areas**

Outside of the national park system other areas that represent Dry coniferous forest include:

#### **National Natural Landmarks (NNLs)**

- Consumnes River Riparian Woodlands, CA
- Patagonia-Sonoita Creek Sanctuary, AZ
- Ramsey Canyon, AZ

#### **National Forests and Monuments**

- Angeles National Forest, CA
- San Bernardino National Forest, CA
- Santa Rosa and San Jacinto Mountains National Monument, CA

#### **National Natural Landmarks (NNLs)**

The three National Natural Landmarks contain plant communities associated with dry coniferous forest. Consumnes River Riparian Woodlands contain a small remnant of a rapidly disappearing riparian woodland community type that once

formed a major part of the California Central Valley. The Patagonia-Sonoita Creek Sanctuary in Arizona features permanent stream-bottom habitat supporting rare aquatic biota, including the Gila Topminnow. This site is also the only known nesting spot in the country for the rare rose throated becard. Ramsey Canyon in Arizona features a vertical-sided gorge containing a well-defined microclimatic habitat, which consists of an extension of Mexican flora and fauna into the American side of the International Boundary, and contains plants which normally occur only at higher elevations (NPS 2008a). All three of these landmarks are managed by the Nature Conservancy. Each site contains a visitor/nature center and some opportunities for passive recreation such as wildlife viewing, nature study and hiking.

Although these three NNLs contain some dry coniferous forest habitat, this type of habitat is not dominant in any of the units. Each was established for their outstanding representation of riparian vegetation. Additionally, the combination of plant communities within these three NNLs is quite different than the significant habitats represented in the San Gabriel Mountains.

**National Forests and Monuments.** The San Bernardino National Forest contains examples of Dry Coniferous Forest habitat types most similar to the San Gabriel Mountains. The Millard Canyon Research Natural Area contains well-developed bigcone Douglas fir. However, this area is primarily preserved for its representation of interior live oak vegetation.

The Santa Rosa and San Jacinto Mountains National Monument (monument) is located approximately 100 miles east of Los Angeles encompassing 89,500 acres, the monument is jointly managed by the Bureau of Land Management, the Forest Service (San Bernardino NF) lands, the Agua Caliente Band of Cahuilla Indians, California State Parks, and the California Department of Fish and Game.

Within the monument vegetation ranges from cactus, creosote, chamise, and red shank along desert slopes, to stands of ponderosa pine, mixed conifer, Jeffrey pine, and lodgepole pine. Significant habitats include high-country conifer forests, live oak in deep canyons, a diverse cactus scrub community, pinyon juniper woodlands, and the fan palm oasis in Palm Canyon, the largest oasis of California fan palms in the United States.

Similar to the San Gabriel Mountains, the monument has a dramatic landscape rising abruptly from near sea level in the valley to the San Jacinto

Peak at 10,834 feet. Five distinct "life zones," from Sonoran Desert to Arctic Alpine provide exceptionally diverse biological resources.

Higher elevations of the monument support subalpine vegetation such as lodgepole pine. The lodgepole pine habitat at the national monument differs in character from that found in the San Gabriel Mountains in that lodgepole pine habitat at Mt. San Antonio in the San Gabriel Mountains contain a variety of rare alpine and subalpine plants, partly related to the local geology. The area also supports an unusual subalpine forest of krummholz lodgepole pine, *Pinus murrayana*. Disjunct western juniper (*Pinus occidentalis* ssp. *australis*) also occurs here.

### **Conclusion: Dry Coniferous Forest**

No other national park unit in the South Pacific Border natural region or the Mojave-Sonoran Desert Region contains the types of Dry Coniferous Forest habitat found in the San Gabriel Mountains. Of the other comparably managed sites, the Santa Rosa and San Jacinto Mountains are most similar in character and quantity of habitat types. However, the San Gabriel Mountains maintain unique and unusual subalpine species not found in these locations.

### **Aquatic Ecosystems Themes**

The theme "Aquatic Ecosystems" is based on geomorphic and other physical aspects of aquatic ecosystems. The sub-theme "Streams" represents aquatic ecosystems with flowing waters. The following sub-theme related to Aquatic Ecosystems is represented in the study area:

- **Streams:** Alluvial fan sage scrub, riparian habitat

#### **STREAMS**

Streams include flowing waters with biological characteristics that are determined by the physical properties of the stream bed and by the nature of the watershed. The San Gabriel Mountain foothills contain some of the best remaining examples of alluvial fan sage scrub in the Los Angeles Basin. This type of vegetation is most common at the canyon mouths along the coastal side of the San Gabriel, San Bernardino, and San Jacinto Mountains. These floodplain systems are formed by extreme floods and erosion and features vegetation that has uniquely adapted to nutrient-poor substrates and subsurface moisture (Hanes et al 1989).

Since riparian areas were discussed in the previous section on River Systems and Lakes, the

comparative analysis for this theme will focus on the alluvial fan sage scrub component of vegetation. Specific areas of well-developed alluvial fan vegetation within the study area include: the Big Tujunga Wash, the San Gabriel River Wash, San Antonio Creek, and the upper Santa Clara River.

### **National Park Service Units**

Existing national park units within the South Pacific Border and Mojave-Sonoran Desert Regions that represent the theme Streams include:

#### **South Pacific Border Region**

- Channel Islands National Park
- Golden Gate National Recreation Area
- Pinnacles NM
- Santa Monica Mountains National Recreation Area
- Whiskeytown-Shasta-Trinity National Recreation Area

#### **Mojave-Sonoran Desert Region**

- Death Valley National Park
- Lake Mead National Recreation Area
- Organ Pipe Cactus National Monument
- Saguaro National Monument
- Tonto National Monument
- Tuzigoot National Monument

Alluvial fan sage scrub is a distinct and rare plant community found on alluvial fans and floodplains along the southern base of the Transverse Ranges and portions of the Peninsular Ranges in southern California. As discussed in the previous chapter on significance, alluvial fan sage scrub habitat is extremely rare. Excellent examples of remaining alluvial fan sage scrub are not found on any of the existing national parks in the Transverse and Peninsular Ranges. An analysis of ten of the most well-developed alluvial fan vegetation stands in Los Angeles, Riverside and San Bernardino Counties found that Big Tujunga Wash is one of three sites which exhibit the most species diversity and the San Gabriel River is among one of two sites that exhibits the greatest structural diversity (Hanes et al. 1989). San Antonio Canyon and the upper Santa Clara also contain excellent examples of alluvial fan sage scrub.

None of the national park units in the South Pacific Border Region or Mojave-Sonoran Desert Region which represent “Streams” contain significant examples of southern California alluvial scrub vegetation.

### **Comparably Managed Areas**

Outside of the national park system other areas that represent streams include:

#### **National Natural Landmarks (NNLs)**

- Consumnes River Riparian Woodlands, CA
- San Ridge Wildflower Preserve, CA
- Canelo Hills Cienega, AZ
- Patagonia-Sonita Creek Sanctuary, AZ
- Ramsey Canyon, AZ

#### **National Forests and Bureau of Land Management Lands**

- San Bernardino National Forest, CA
- Santa Ana Wash Area of Environmental Concern, CA

#### **National Natural Landmarks (NNLs)**

None of the NNLs in the South Pacific Border Region or Mojave-Sonoran Desert Region which represent the sub-theme “Streams” contain significant examples of southern California alluvial scrub vegetation.

#### **National Forests and Bureau of Land Management Lands**

Of the remaining large, intact stands of alluvial fan sage scrub in southern California, most sites are located on privately-owned lands or lands not expressly managed for resource values or public enjoyment. Two protected area sites are located in the San Bernardino National Forest (NF) and on Bureau of Land Management (BLM) lands.

The San Bernardino NF protects one of the largest intact stands of alluvial fan sage vegetation in southern California. Located in the pass between the San Gabriel and San Bernardino Mountains, the Cajon Wash alluvial fan sage scrub supports one of the most important populations of short-joint beavertail (*Opuntia basilaris* var. *brachyclada*), occurrences of Plummer’s mariposa lily (*Calochortus plummerae*) and Parry’s spineflower (*Chorizanthe parryi* var. *parryi*), all of which are considered sensitive species. Public access to this area is via the Pacific Crest National Scenic Trail where it crosses Cajon Wash at Crowder Canyon, the Mormon Rocks Fire Station, and a nearby interpretive trail located in the northern section of the Cajon Wash alluvial fan sage scrub area (USFS 2005).

The Santa Ana Area of Critical Environmental Concern protects 755 acres of lands north of the City of Redlands, CA within the floodplains of the

Santa Ana River and Plunge Creek. This area was set aside to provide special management for two federally listed endangered plant species associated with alluvial fan sage scrub, the Santa Ana River woolly-star (*Eriastrum densifolium* ssp. *sanctorum*) and the slender-horned spineflower (*Dodecahema leptoceras*). The Upper Santa Ana River Wash is primarily managed for water recharge, sensitive species habitat, and sand/gravel mining. The area is generally not accessible to the public, and the BLM parcels are surrounded by lands that are also closed to public use.

### Conclusion: Streams

No other national park unit in the South Pacific Border natural region or the Mojave-Sonoran Desert Region contains the alluvial fan vegetation unique to the Transverse and Peninsular Ranges of southern California. Of the comparably managed areas, the San Bernardino National Forest is the only publically accessible protected area with significant alluvial fan sage scrub.

The significant alluvial fan sage scrub areas within the study area are primarily privately owned or managed by local water districts. However, several of these areas are adjacent to public lands and trails providing potential interpretive opportunities. The Santa Fe Dam Recreation Area along the San Gabriel River contains significant alluvial fan sage scrub which is publicly accessible through recreational and interpretive trails.

## Cultural Themes

The NPS Thematic Framework (2000) for historical themes provides guidance on:

- evaluating the significance of resources for listing on the National Register of Historic Places, for designation as national historic landmarks, or for potential addition to the national park system
- assessing how well the themes are currently represented in existing units of the national park system and in other recognized areas; and,
- expanding and enhancing the interpretive programs at existing units of the national park system to provide a fuller understanding of our nation's past. (NPS 2000)

## Cultural Themes Represented in the San Gabriel Mountains

Themes represented by nationally significant resources in the San Gabriel Mountains include:

- **Expressing Cultural Values**
- **Expanding Science and Technology**

### EXPRESSING CULTURAL VALUES

The theme "expressing cultural values" covers expressions of culture – people's beliefs about themselves and the world they inhabit. This theme also encompasses the ways that people communicate their moral and aesthetic values (NPS 2000). The following topic related to Expressing Cultural Values is represented in the San Gabriel Mountains:

- **Architecture:** San Dimas Experimental Forest

### Architecture

Architecture is focused on the development and expression of building design within the United States. It deals with the careers and works of leading architects, structures of outstanding value in design, the evolution of significant architectural styles, and structures richly representative of particular types or geographical regions.

The San Dimas Experimental Forest (SDEF) contains buildings and landscape features that are excellent examples of U.S. Forest Service architecture in the Pacific Southwest Region. Architects Blanchard and Maher designed the buildings in the region to reflect California's architectural heritage (wood buildings of the early days of the Mother Lode Country) (Jones & Stokes 2004).

Facilities at the SDEF headquarters at Tanbark Flat include a laboratory/office, residences, a mess hall, conference room, and several storage/utility buildings. Research/monitoring equipment includes rain gauges, stream gauges, debris dams, water quality samplers, a weather station, and a historical lysimeter complex. The lysimeter complex remains the largest structure of its type in the world. Other important CCC structures include stone landscape features

The SDEF retains the character, feeling, and association of its historic period. The SDEF has always functioned as an experimental forest and the built environment is largely unchanged since the SDEF was first established in the 1930s. The Pacific Southwest Research Station and Angeles National continue to maintain the facility (USFS 1999a).

Another factor that makes the SDEF stand out is that a group of conscientious objectors (CO) was assigned to work at the SDEF through the duration of the war. Because the forest was short on workers during the war, the COs were able to do the work to maintain the SDEF (Jones & Stokes 2004). This story is not represented at comparable national park sites.

### **National Park Service Units**

A variety of architectural styles are represented in national parks. Some buildings were representative of mainstream American architecture, while other architects' designs were influenced by nature. "Rustic" design spread throughout the nation during the 1930s work-relief programs of the Depression (NPS 1986).

The U.S. Forest Service has many rustic facilities of the Civilian Conservation Corps (CCC) era. Forest Service architecture is distinctive from region to region since building design was influenced by local conditions and building materials (Jones & Stokes 2004). The U.S. Forest Service Blanchard and Maher designs are similar to the NPS rustic design in California.

There are many national park units in the west that have structures constructed by the CCC and other Depression era labor programs. In 1977, the NPS Western Regional Office prepared a report on NPS Rustic Architecture. The report includes a comprehensive list of rustic structures in the NPS western region (now the Pacific West and Southwest Regions) that appear to qualify for listing on national register of historic places. The following national park areas include significant facilities of the rustic architectural style in the West constructed by Depression era labor programs (NPS 2008b):

- Pinnacles National Monument, CA
- Bandelier National Monument, NM
- Crater Lake National Park, OR
- National Park Service Southwest Regional Office, NM

Similar to the designs for the forest service administration buildings in the Pacific Southwest Region, national park architects combined native wood and stone with native styles to create structures that fit naturally within the landscape.

All of the national park examples are different than the SDEF because they are not solely used for research. Also, the role of the conscientious objectors is unique to the SDEF.

The Pinnacles National Monument East Entrance District includes features associated with the early park development and administration and the craftsmanship of the CCC and Works Progress Administration (WPA) programs. Types of facilities include small cabins now used for offices and a nature center, trails, and the dam that forms the Bear Gulch reservoir. This district is similar to the facilities at SDEF through its reflection of California regional architecture and its chaparral setting. However, Pinnacles does not have the range of types of facilities represented at SDEF. Pinnacles National Monument offers interpretation of the CCC history while interpretive and educational opportunities of U.S. Forest Service architecture at the SDEF are not available. Public access is restricted and use of the SDEF is focused on scientific research.

Bandelier National Monument, Crater Lake National Park, and the NPS Southwest Regional Office also contain significant rustic architecture constructed by the CCC and other Depression era labor programs. These park and the regional office structures reflect different settings than that of the SDEF and Pinnacles National Monument.

The Bandelier CCC Historic District includes the largest collection of CCC-built structures in a national park area that has not been altered by the addition of new structures within the district (NPS 1977). The SDEF has more structures identified than Bandelier. The architecture at Bandelier also differs from that of the SDEF since the buildings were designed and built to mimic a pueblo/small New Mexican village in keeping with rustic architecture principles.

Crater Lake National Park was chosen for one of the most comprehensive rustic architectural programs undertaken by the NPS. Landscape architect Merel Sager layed out the administrative, residential and maintenance facilities and established design guidelines. Work on the site was done by CCC crews. The rustic character of the buildings was carried throughout a sequence of small stone-and-timber cottages. Although Crater Lake National Park has a collection of CCC structures, the natural setting is different than at SDEF and it does not have the range of types of facilities represented at SDEF (NPS 1977).

The National Park Service Southwest Regional Office in New Mexico is the largest known adobe office building and one of the largest secular adobe buildings in the United States. The CCC cut and shaped the timbers, formed the thousands of adobe bricks, and erected the building, and the WPA put

in the mechanical systems and other aspects of the finished product. Although this is a significant NPS structure built by the CCC, it does not compare to the range and types of facilities constructed by the CCC at the SDEF.

### Comparably Managed Areas

There are no national historic landmarks that represent the California Mother Lode Country architecture. There are no other national forest areas within the Pacific Southwest Region that contain the quality and quantity of the types of CCC-constructed rustic architecture facilities and landscape features representing the “wood buildings of the early days of the Mother Lode Country” as the SDEF in the Angeles National Forest. The building plans were adopted by other forests. Several California Department of Forestry buildings constructed during the 1930s were based on these plans. Examples of these remnant structures within the U.S. Forest Service and California Department of Forestry include:

- Tahoe National Forest, North Bloomfield Ranger Station: ranger residence and garage; Camptonville Ranger Station (Downieville Ranger District fire station): office, 2 residences, 2 garages
- Modoc National Forest, Patterson Ranger District: garage
- Sierra National Forest, North Fork Ranger Station (Bass Lake Ranger District): supervisor’s residence
- Shasta –Trinity National Forest, Weaverville Ranger Station, Mt. Shasta Ranger Station: headquarters office building, ranger’s residence, auto shop, oil house, two warehouses, two large garages, and storage building
- Plumas National Forest, headquarters
- California Department of Forestry, Alma Forest Fire Station: kitchen-mess hall (Joslin 1995)

None of these sites contain the range, quality, and quantity of structures as the SDEF. Many of these buildings have been modified and their uses have changed over the years.

There are ten experimental forests/areas in the Pacific Southwest Region including the San Dimas Experimental Forest. There are no other experimental forests in the region that have historic structures based on the early U.S. Forest Service building plans and constructed by the CCC, in fact, most have few to no facilities:

- Caspar Creek, Challenge, North Mountain, Redwood, Stanislaus-Tuolumne, Swain Mountain: no facilities
- Hawaii, Onion Creek, San Joaquin, and Teakettle: limited infrastructure/facilities
- Sagehen Experimental Forest: modern facilities

### Conclusion: Expressing Cultural Values

The facilities at the SDEF are the best representation of the U.S. Forest Service architecture influenced by the wood buildings of the early days of the California Mother Lode Country. Among comparable national park areas, Pinnacles National Monument has CCC rustic architecture most similar to the SDEF. However, Pinnacles does not have the range of types of facilities, including those associated with research, represented at SDEF. Other California national forests have few remaining structures of the Blanchard and Maher designs, but there are no other sites, including experimental forests, that have the diversity of types, quality, quantity, and character as the SDEF.

Although the SDEF offers educational and research opportunities, interpretive opportunities are lacking. The SDEF could include interpretation by organizations that conduct field trips or educational tours of the SDEF. The SDEF provides limited tours and scheduled visits for local youth. However, the SDEF does provide information to the public through a web site. This information includes some information about the CCC constructed facilities.

### EXPANDING SCIENCE AND TECHNOLOGY

This theme focuses on science, which is modern civilization’s way of organizing and conceptualizing knowledge about the world and the universe beyond. This is done through the physical sciences, the social sciences, and medicine. Technology is the application of human ingenuity to modification of the environment in both modern and traditional cultures. Technologies can be particular to certain regions and cultures. The following topics related to Expanding Science and Technology are represented in the San Gabriel Mountains:

- Experimentation and Invention
- Technological Applications
- Scientific Thought And Theory

Within the San Gabriel Mountains, these topics are represented by the Mount Wilson Observatory and San Dimas Experimental Forest.

The Mount Wilson Observatory provides excellent representation of the sciences of astronomy and

astrophysics. The National Park Service report entitled "National Survey of Historic Sites and Buildings report (1964)" included the section "The Arts and Sciences: Scientific Discoveries and Invention" that addressed astronomy. Twelve sites, including the Mount Wilson Observatory, related to the history of the science of astronomy were examined for designation under this theme. A subsequent national historic landmark theme study for Astronomy and Astrophysics (1989) included an NHL nomination for the Mount Wilson Observatory.

The San Dimas Experimental Forest provides excellent representation of chaparral ecology. As described under the Natural History Themes, Land Ecosystems: Chaparral, the San Dimas Experimental Forest has been a leader in research of chaparral ecosystems and watersheds and provides superlative opportunities for scientific study.

The following comparative analysis is organized by the sciences: (1) astronomy and astrophysics and (2) chaparral ecology.

### **Astronomy and Astrophysics: Mount Wilson Observatory**

#### ***Experimentation and Invention***

The Mount Wilson Observatory represents experimentation using new scientific instruments and methods for studying the sun and the universe. The Mount Wilson Observatory provided many significant contributions to the science of astronomy and our understanding of the universe. Many astronomers and other scientists, including Edwin P. Hubble and Albert Michelson, conducted significant research and experiments at the Observatory. Astronomy questions including the nature of sunspots, the temperature and composition of stars, and the structure and origin of the universe were addressed at the Mount Wilson Observatory. Astronomers and physicists made astrophysics a modern science. George Ellery Hale proved that sunspots are actually regions of reduced solar temperature while Albert Michelson conducted experiments to accurately measure the speed of light.

Experimentation often required the invention of new technology. Inventions related to the observatory include, the five large telescopes designed by Hale, and new technologies, including new large scale telescopes, reflectors, refractors and cameras to study distant astronomical objects.

#### ***Technological Applications***

George Ellery Hale's vision of a modern observatory combining a solar telescope and a large reflecting

telescope was achieved at the observatory, making it a model for modern observatories. Hale's telescopes laid the technological foundation for all large modern telescopes (NPS 1989). For example, the flexible optical system for the 150-foot solar telescope developed by Hale became a model for future large reflectors.

Hale designed the telescopes and other equipment to be flexible to accommodate changing needs and uses. The 100-inch Hooker reflector was used to produce the first detailed photographs of "spiral nebulae." Hale estimated that the Hooker reflector could photograph at least two million nebulae. Today, the Hooker reflector is equipped with a modern adaptive optics system and is used in a variety of high-resolution studies.

#### ***Scientific Thought and Theory***

Before establishing the Mount Wilson Observatory, George Hale worked at the Yerkes Observatory in Wisconsin. Through his work at Yerkes, Hale believed that the future of astronomy required the study of astrophysics, the term he invented. Hale needed to establish a mountaintop observatory that would combine a solar telescope and a large reflecting telescope in order to understand the physical processes that took place in the sun and other more distant stars. Hale explained this when he wrote: "The story of the origin of the sun and its development is illustrated in stars of many types which are no less important to a thorough understanding of its physical constitution than is a direct investigation of solar phenomena (NPS 1989)."

In the 1920s, many scientists at Mount Wilson Observatory were able to gather important data about the stars and universe. In 1920, Albert Michelson determined the diameter of the star Betelgeuse to be 215,000,000 miles. In 1923 Edwin Hubble studied the Cepheid variable star in Andromeda Galaxy providing proof that the Milky Way is only one of many galaxies. In 1929, Hubble used the 100-inch Hooker reflector to gather data that showed the universe to be in a regular state of expansion. This provided the first clues to the origin of the universe and corrected Einstein's belief that the universe was static. Later, direct evidence for the "Big Bang" theory was collected (NPS 1989).

#### **National Park Service Units**

There are no units in the national park system that represent astronomy. Under a previous thematic framework for cultural resources, national park units were listed under the subtopic of "Physical Sciences." There were no park units identified

for “Astronomy.” Two sites were identified for representation of “Physics,” Benjamin Franklin National Memorial (Affiliated Area) and Edison National Historic Site. Edison National Historic Site was also identified for the theme, “Chemistry.”

### Comparably Managed Areas

Several studies, documents, and properties listed in the National Register of Historic Places included sites for consideration under this topic. More than 100 sites, including laboratories, workshops, homes and sites associated with the lives and achievements of famous American astronomers were included in the theme study list. Observatories/laboratories related to astronomy that are national historic landmarks (NHLs) include:

- Cincinnati Observatory, Cincinnati, OH
- Hubble, Edwin, House, San Marino, CA
- Lowell Observatory, Flagstaff, AZ
- Hale Solar Laboratory, Pasadena, CA
- Stellafane Observatory, North Springfield, VT
- Gaithersburg Latitude Observatory, Gaithersburg, MD
- University of Illinois Observatory, Urbana, IL
- Vassar College Observatory, NY

These facilities, including Mount Wilson Observatory, are owned and managed by non-governmental institutions. Since 1986, Mt. Wilson Observatory has been operated under an agreement with the Carnegie Institution of Washington by the Mount Wilson Institute, a non-profit corporation whose mission focuses on scientific research, historic preservation, astronomical education and public outreach. In 2003, Mount Wilson Observatory’s 99-year lease was renewed by the U.S. Forest Service. The Friends of the Mount Wilson Observatory Association works to provide public appreciation and education about the observatory.

The Lowell Observatory in Arizona, the Cincinnati Observatory in Ohio, and the Hale Solar Laboratory in California are the NHLs that are most comparable to the Mount Wilson Observatory. Experiments conducted at these facilities produced data and results that complemented those at Mount Wilson. At the Lowell Observatory, experiments were conducted to help prove that the universe was expanding. The Cincinnati Observatory’s publication of *Stellar Proper Motions*, which provided data in determining the structure and rotation of the Milky Way, also provided data for theories, such as the Big Bang. George Ellery Hale worked at the Hale Solar

Laboratory, which he designed, during the latter part of his life. These facilities are still in operation for research or education.

Since the 1930s, Mount Wilson has provided many opportunities for visitors. Open to visitors during weekends and holidays, the observatory provides an educational program, exhibits, and regular lectures by the staff and visiting astronomers. Public use of the 60 inch telescope continues today. The museum interprets the astronomical knowledge in the 1930s and knowledge today. Visitors can view the historic Hooker telescope inside the dome. Picnic areas and Skyline Park, operated by the U.S. Forest Service, are open to the public. The Mount Wilson Observatory Association provides walking tours.

The Mount Wilson observatory continues to provide opportunities for scientific study in the field of astronomy. Several guest institutions including the University of California, Berkeley; the University of California, Los Angeles; Georgia State University; University of Illinois at Champaign-Urbana; and the University of Southern California have facilities on the observatory. The Mount Wilson Observatory Association provides support to the Observatory.

Similarly, Lowell Observatory and Cincinnati Observatory offer public access. Lowell offers a range of guided and other specialized tours and telescope viewing. It also has a visitor center, museum, and exhibits. Many observatories are affiliated with universities and also provide opportunities for research. However, the long history of the observatory, with its public and educational opportunities, and the combination of the observatory facilities and other amenities provided by the U.S. Forest Service makes the Mount Wilson Observatory unique compared to these other sites.

The Stellafane Observatory in Vermont, the Gaithersburg Latitude Observatory in Maryland, the University of Illinois Observatory in Illinois, and the Vassar College Observatory, in New York are other national historic landmarks that represent astronomy.

In addition, there are other important observatories and facilities that have not been designated national historic landmarks for their representation of astronomy. After the Mount Wilson Observatory location became impacted from light pollution in the Los Angeles Basin, Hale founded the Palomar Observatory in San Diego, which includes the 200-inch reflector. Its completion in 1948 made it the largest reflecting telescope in the world. At the Lick Observatory near San Jose, California, the 36-inch

Clark refractor was the first large telescope placed on a site chosen for its astronomical advantages, rather than for convenience.

Mauna Kea Observatories on the Island of Hawaii hosts the world's largest modern astronomical observatory, with telescopes operated by astronomers from eleven countries. The telescopes include the largest optical/infrared telescopes in the world (the Keck telescopes), the largest infrared telescope and the largest submillimeter telescope in the world (Institute for Astronomy, University of Hawaii).

### **Chaparral Ecology: San Dimas Experimental Forest**

#### ***Experimentation and Invention***

The San Dimas Experimental Forest represents "experimentation and invention" related to chaparral ecology. Study of the Big Dalton Canyon and San Dimas Canyon watersheds was the first major streamflow erosion study by the California Forest and Range Experiment Station and only the fourth such investigation of its kind in the world. The long record of studies conducted at the SDEF is unmatched in this region (Jones & Stokes 2004).

The initial research and experiments at the SDEF were focused on increasing water yields from watersheds. Scientists were able to monitor rainfall and runoff from the 1930s to 1950s with a network of rain gauges, stream gauges, and weather stations. Water consumption by various plant species was studied in lysimeter and runoff plots. Using the data gathered, scientists then attempted to increase water yield in the Bell and Monroe watersheds through vegetation manipulation (Jones & Stokes 2004).

After a fire in 1960 had burned the research watersheds, the research was focused on postfire rehabilitation, then on runoff and erosion. Scientists conducted experiments to control runoff. In subsequent decades, studies focused on ecosystem-level issues, including air pollution, soil genesis, postfire plant and animal succession and recovery. Soil research on the SDEF has included some pioneering studies on the "hydrophobic," or water-repellent, layer that forms after fires (Jones & Stokes 2004).

#### ***Technological Applications***

Research and monitoring equipment were developed for the long-term studies at the SDEF. The Lysimeter facility at SDEF (tunnel and instrument room), completed in 1937, is still the largest of its kind in the world. Rain gauge

networks as described earlier were developed to accurately measure precipitation and flumes were developed to measure and withstand debris flows. Most of this equipment, including the lysimeter facility, are still intact and are continuing to be used for research (Jones & Stokes 2004).

#### ***Scientific Thought and Theory***

The SDEF, established in 1933, has one of the longest – if not the longest – record of research on chaparral ecosystems. Long-term studies (described earlier) have yielded data for learning how to control runoff and for the identification of postfire soil conditions (Jones & Stokes 2004).

#### **National Park Service Units**

There are several national park units in California that include chaparral ecosystems (See discussion under "Natural History Themes"). The California Mediterranean Research Learning Center (CMRLC) promotes study of chaparral ecology and includes the following national park units:

- Santa Monica Mountains National Recreation Area (NRA)
- Channel Islands National Park
- Cabrillo National Monument

As described in the natural history themes section, the CMRLC program is new and its research differs from the watershed studies of the SDEF. The SDEF has a longer record of research than the more recently established CMRLC.

#### **Comparably Managed Areas**

There are ten experimental forests/areas in the Pacific Southwest Region including the San Dimas Experimental Forest. One experimental area and one experimental forest are most similar to the SDEF in their research focus:

- North Mountain Experimental Area (NMEA), San Bernardino National Forest
- Caspar Creek Experimental Watershed, Redwood National Forest

The North Mountain Experimental Area (NMEA), established in 1964, is the only U.S. Forest Service Experimental Area that is located in a chaparral ecosystem. The NMEA research differs from that of the SDEF. Whereas the SDEF studies have focused on watersheds, including hydrologic processes and postfire rehabilitation, the NMEA research is focused on prevention and control of forest and range fires. The SDEF has a longer record of research on chaparral ecosystems than the NMEA .

Caspar Creek Experimental Watershed, established in 1962, also conducts watershed studies, but it is located on the northern coast of California and has different vegetation than that of the SDEF.

There are opportunities to interpret the research and history of the SDEF from nearby facilities of the ANF, including the San Gabriel River Ranger District office in Glendora.

### **Conclusion: Expanding Science and Technology**

There are no units in the national park system or areas managed by other entities that have the combination of resources as the San Gabriel Mountains has in its representation of the theme “Expanding Science and Technology.” Together, the Mount Wilson Observatory and the San Dimas Experimental Forest have provided decades of scientific information that is unmatched. There are no units in the national park system that represent astronomy and astrophysics. There are few NHLs that compare to the Mount Wilson Observatory. Likewise there are few national park units and other sites that represent chaparral ecology, and no other site contains the long record of research that has been collected at the SDEF.

### **OVERALL SUMMARY: SUITABILITY OF THE SAN GABRIEL MOUNTAINS**

The NPS has determined, based on the combination of resource values in the San Gabriel Mountains, that this area is suitable for inclusion in the national park system. The San Gabriel Mountains have resources that are outstanding representations of a wide range of both natural and cultural themes not found in other national park units or comparably managed sites. Represented within these themes are unique geological features and dramatic geologic processes, a wide diversity of rare habitats located in close proximity given the dramatic changes in topography, and technological advances in the areas of architecture, astronomy, chaparral ecosystems, and watersheds.

The significant natural and cultural resources of the San Gabriel Mountains are primarily managed by the U.S. Forest Service as part of the Angeles National Forest. A few smaller areas with resource significance are managed by other agencies and organizations including Los Angeles County Parks, which manages most of the Devil’s Punchbowl formation for public enjoyment and education, and the Friends of the Mount Wilson Observatory which provides interpretive and educational programs about the significance of the observatory. While many of the foothill areas in the San Gabriel and Antelope Valleys

are protected by various conservancies and local park districts, some areas remain unprotected.

Although the U.S. Forest Service’s resource management provides substantial resource protection, comprehensive education and interpretation of the significance of the San Gabriel Mountains is lacking in many areas (e.g., chaparral ecosystems, geologic processes, watershed resources and research), primarily due to funding and staffing limitations. National Park Service expertise and emphasis on interpretation and education and visitor management would expand and enhance the visitor experience in the San Gabriel Mountains and would allow for more comprehensive education and interpretation on all of the interpretive themes related to its national significance.

The overall combination of resource values represented by the San Gabriel Mountains is not comparable to any other existing national park unit. The national park unit that is closest in representation to the combination of themes represented by the San Gabriel Mountains is the Santa Monica Mountains NRA. However, based on the theme-based comparative analysis, there are outstanding qualities represented in the San Gabriel Mountains which are not comparatively represented in the Santa Monica Mountains. The unique geologic composition of the San Gabriel Mountains differs in rarity, quality and quantity from mountain systems at Santa Monica NRA. With its adjacency to the San Andreas Fault and long history of research, the San Gabriel Mountains is one of the best locations to observe and study active mountain building and plate tectonics. The highly erosive geologic processes taking place in the San Gabriel Mountains has created river systems quite distinct from those found in the Santa Monica Mountains. Additionally, the extreme elevation changes in the San Gabriel Mountains represent a wider diversity of habitats. The San Gabriel Mountains contain rare examples of southern California subalpine vegetation not represented by any other national park unit in the South Pacific Border or the Mojave-Sonoran Desert natural regions. Finally, the cultural resource representation of the San Dimas Experimental Forest architecture, science and technology and the significance of the Mt. Wilson Observatory to the study of astronomy are not represented in the Santa Monica Mountains.

The combination of themes represented in the San Gabriel Mountains and its close proximity to greater Los Angeles metropolitan region with over 15 million residents, means that this area has excellent potential for expanding opportunities for interpretation, education, and scientific study.

## Puente-Chino Hills

### NATURAL HISTORY THEMES REPRESENTED IN THE PUENTE CHINO HILLS

The Puente-Chino Hills contain significant resources that represent the “Land Ecosystems” natural history theme.”

### LAND ECOSYSTEMS THEMES

The following sub-themes related to Land Ecosystems are represented in the study area:

- **Chaparral (shrubs and evergreen forest trees):** Coastal sage scrub
- **Dry Coniferous Forest:** Walnut woodlands and forests.

### CHAPARRAL

Chaparral ecosystems include broad-leaved, mainly evergreen, species of shrubs or low trees, occurring as dense scrub or woodland. The Puente-Chino hills contain a high level of biodiversity and outstanding examples of California coastal sage scrub, one of the most endangered plant communities in California.

### National Park Units

Existing national park units within the **South Pacific Border** include that represent the theme Chaparral include:

- Whiskeytown-Shasta-Trinity National Recreation Area
- Pinnacles National Monument
- Santa Monica Mountains National Recreation Area
- Cabrillo National Monument

Mojave-Sonoran Desert Region parks that represent the theme Chaparral do not contain coastal sage scrub habitat.

Three classifications of coastal sage scrub are typical of the Southwestern ecoregion of California as classified by Paleobotanist Daniel Axelrod: Venturan, Riversidian, and Diegan. The Puente-Chino Hills, which are a transition zone, contain Venturan and Diegan coastal sage scrub communities not typically represented in any one protected area in southern California. Over 10,000 acres of coastal scrub are located in the portion of the Puente-Chino Hills included in the study area (Puente Hills Landfill Native Habitat Preservation Authority 2007; Davis, et al. 1994, Axelrod 1978).

Pinnacles NM and Whiskeytown-Shasta-Trinity NRA

contain northern and central California affinities of coastal sage scrub habitat. Areas managed by the National Park Service that protect southern affinities of coastal sage scrub similar to those found in the Puente-Chino Hills include Santa Monica Mountains NRA (approximately 32,000 acres of Venturan coastal sage scrub) and Cabrillo NM (approximately 840 acres of Diegan coastal sage scrub) (Davis, et al. 1994).

The Puente-Chino Hills contain a significant portion of designated critical habitat for the federally listed threatened coastal California gnatcatcher, a species dependent on coastal sage scrub habitat.

The combination of resources values associated with coastal sage scrub within the Puente-Chino Hills is not represented in the existing southern California national park units. No other existing national park unit contains both Venturan and Diegan coastal sage scrub. Nor does any existing unit contain designated critical habitat for the California coastal gnatcatcher. Evolutionary studies completed for species in the Los Angeles Basin area indicate that species in the Puente-Chino Hills are evolutionarily different from species in the Santa Monica Mountains which represent the southern extent of northern species (Personal communication, Robert Fisher, USGS 2007).

### Comparably Managed Areas

Outside of the national park system other areas that represent chaparral (coastal sage scrub) in California include:

#### State and Local Parks

- Chino Hills State Park
- Crystal Cove State Park
- Puente Hills Landfill Native Habitat Preserve

#### Private Preserves

- Santa Rosa Plateau Ecological Reserve
- Starr Ranch Audubon Sanctuary

#### State and Local Parks

Chino Hills State Park (SP) and Crystal Cove SP both contain coastal sage scrub habitat. Chino Hills SP contains primarily Diegan coastal sage scrub, and Crystal Cove SP contains Venturan coastal sage scrub. Although just outside of the study area to the east, Chino Hills SP is a critical component of the larger Puente-Chino Hills biological corridor. The park primarily functions as an open space reserve. It contains almost 4,000 acres of coastal sage scrub and critical habitat for the California

coastal gnatcatcher. Recreational opportunities include hiking, biking, and wildlife observation.

While the Chino Hills State Park contains similar coastal sage scrub resources to the Puente-Chino Hills, protection of the study area coastal sage scrub would expand and enhance the protection of this habitat within the larger wildlife corridor. Numerous studies document the benefits of habitat connectivity to ensure healthy wildlife populations (Vandergast et.al. 2007). For example, 90% of the habitat in Chino Hills SP was damaged by the 2008 Freeway Complex fire. Having adjacent open space and habitat was critical for the recovery of wildlife in Chino Hills SP.

Crystal Cove SP is located in Orange County along the coast between the cities of Newport Beach and Laguna Beach. The park protects hundreds of acres of Venturan coastal sage scrub and provides numerous recreational opportunities on trails and beaches. Crystal Cove SP contains coastal sage scrub more similar in character to the Santa Monica Mountains NRA.

Located within the study area, the Puente Hills Landfill Native Habitat Preserve protects important coastal sage scrub habitat in the Puente Hills.

### **Private Preserves**

The Santa Rosa Plateau Ecological Reserve is located at the southern end of the Santa Ana Mountains in southwest Riverside County. Managed by Riverside County Regional Park and Open-Space District and the Nature Conservancy, the Reserve consists of 8,300 acres and protects unique ecosystems such as Engelmann oak woodlands, riparian wetlands, coastal sage scrub, chaparral, bunchgrass prairie and vernal pools. A very small area of the reserve is designated critical habitat for the California coastal gnatcatcher. The bunchgrass prairie is one of the finest examples remaining in California.

The Starr Ranch Sanctuary is a 4,000 acre preserve owned and operated by the National Audubon Society. It is located in Orange County in the foothills of the Santa Ana Mountains. The Starr Ranch contains Diegan coastal sage scrub and critical habitat for the California coastal gnatcatcher. Although not open to the general public, research and education are core components of the ranch mission and public education programs are regularly held for school, groups and the general public. Staff research is integrated into all public education programs.

Although both private preserves contain excellent examples of coastal sage scrub, neither location

contains the quantity and diversity of coastal sage scrub found in the Puente-Chino Hills.

### **Conclusion: Chaparral**

Of the national park units, Santa Monica Mountains NRA is most comparable to the Puente-Chino Hills. However, the Puente-Chino Hills differ considerably in character as they contain both a transitional area for coastal sage scrub and significant acreage of critical habitat for the California coastal gnatcatcher.

The Chino Hills SP and the Puente Hills Landfill Native Habitat Preserve manage coastal sage scrub resources in the Puente-Chino Hills. Management by the NPS could expand and enhance current protection efforts by California State Parks and the Puente Hills Landfill Native Habitat Preserve, particularly in the areas of coordinated resource management and education. Protected status for the Puente-Chino Hills within the study area would ensure long term protection of the larger corridor's biodiversity.

Although both of the private preserves analyzed contain excellent examples of coastal sage scrub, neither location contains the quantity and diversity of coastal sage scrub found in the Puente-Chino Hills.

### **DRY CONIFEROUS FOREST**

This sub-theme includes belts of coniferous forest and woodland dominated by Douglas-fir, ponderosa pine, and pinyon-juniper. At its lower limits these forests give way to steppe or chaparral ecosystems. California walnut woodlands and forests are included in this theme. As stated in the previous chapter, some of the best remaining stands of California walnut-dominated forests and woodlands south of Ventura County are located in the Puente-Chino Hills.

### **National Park Units**

The following national park unit within the **South Pacific Border Region** represents the theme dry coniferous forest:

- Santa Monica Mountains National Recreation Area

Mojave-Sonoran Desert Region parks that represent the theme Chaparral do not contain California walnut woodlands.

The historic distribution of California walnut woodlands and forests is limited to the areas between the Santa Clara River drainage in Ventura County on the north and the Chino Hills on the south. Outside of this range California walnut trees

tend to be interspersed with other tree species such as oaks. Therefore the only national park unit in the South Pacific Border region that contains California walnut woodlands is Santa Monica Mountains NRA. Approximately 450 acres of California walnut woodlands are located in the Santa Monica Mountains NRA.

The California Natural Diversity Database (CNDDDB) Inventory has on record approximately 17,000 acres of remaining California walnut woodlands and forests. Of these remaining woodlands, the best remaining stands south of Ventura County are those located in the Puente-Chino Hills. Approximately 1,700 acres, or 10% of the CNDDDB Inventory, are located in the study area in the Puente-Chino Hills (Quinn 1990, CDFG 2006).

### **Comparably Managed Areas**

Outside of the national park system other areas that represent dry coniferous forest (California walnut woodlands) include:

### **National Forests and Wildlife Refuges**

- San Bernardino National Forest
- Los Padres National Forest
- Hopper Mountain National Wildlife Refuge

### **State and Local Parks**

- Chino Hills State Park
- Puente Hills Landfill Native Habitat Preserve
- Debs Park

### **National Forests and Wildlife Refuges**

At the northern limit of distribution, the Los Padres NF contains approximately 660 acres of California walnut woodlands. Near the southern limit of distribution, the San Bernardino NF contains approximately 230 acres of California walnut woodlands (CDFG 2006).

The Hopper Mountain National Wildlife Refuge contains nearly 400 acres of California walnut woodland at its northern limit. Both the Hopper Mountain National Wildlife Refuge and Los Padres NF protect excellent examples of California walnut woodlands at their northern extent. These stands have adapted to their local site characteristics and differ from the Los Angeles County stands in morphology and canopy structure. Los Angeles and Orange County walnuts typically have multiple trunks. On mesic sites they often grow into more shrub-like habits (Quinn 1990).

Walnut woodlands in the San Bernardino NF are in small quantity and do not represent the best examples of this species at its southern distribution (Quinn 1990; CDFG 2006).

### **State and Local Parks**

State and local parks that contain excellent examples of walnut woodlands include Debs Park, Chino Hills State Park, and the Puente Hills Landfill Native Habitat Preservation Authority (Habitat Authority).

Debs Park in the Arroyo Seco/Monterey Hills area of Los Angeles contains extensive stands of walnut woodlands. Recreational uses and facilities in this portion of the park are minimal. The emphasis is on the enjoyment of nature.

Chino Hills State Park contains the largest acreage of California walnut woodlands stands protected by a conservation agency, approximately 1,100 acres (Quinn 1990, CDFG 2006). However, the 1,700 acres found in the Puente-Chino Hills in the study area are also of the highest quality and would enhance and expand protection of this rare habitat.

While many of the study area stands are protected by the Habitat Authority, most are located on private lands. Additionally, other sites that protect walnut woodlands do not have the quality of walnut woodlands found in the Puente-Chino Hills. The quality of walnut woodlands and forests is measured by extensiveness. Although there are important walnut woodlands and forests at Debs Park and in other areas of the study area such as California State Polytechnic University at Pomona and the San Jose Hills, these woodlands are scattered for considerable distances. The area of Brea between Los Angeles and Orange County has not been urbanized and has an extensive stretch of woodlands and forests thus having the highest quality of this type of habitat (Quinn 2009).

### **Conclusion: Dry Coniferous Forest**

No other national park unit in the South Pacific Border Region contains the quantity and quality of California walnut woodland habitat found in the Puente-Chino Hills. Although the Chino Hills SP and the Habitat Authority protects California walnut woodlands similar in quality and quantity, the rarity and quality of this habitat type requires protection of the remaining significant stands, most of which are located in portion of the Puente-Chino Hills within the study area.

## OVERALL SUMMARY: SUITABILITY OF THE PUENTE-CHINO HILLS

The NPS has determined, based on the character, quantity and quality of resource values in the Puente-Chino Hills, that this area is suitable for inclusion in the national park system. The Puente-Chino Hills have resources that are outstanding representations of habitat types not widely found in other national park units or comparably managed sites. Represented within these themes are coastal sage scrub habitat and California walnut woodlands, both of which support rare and endangered plants and wildlife.

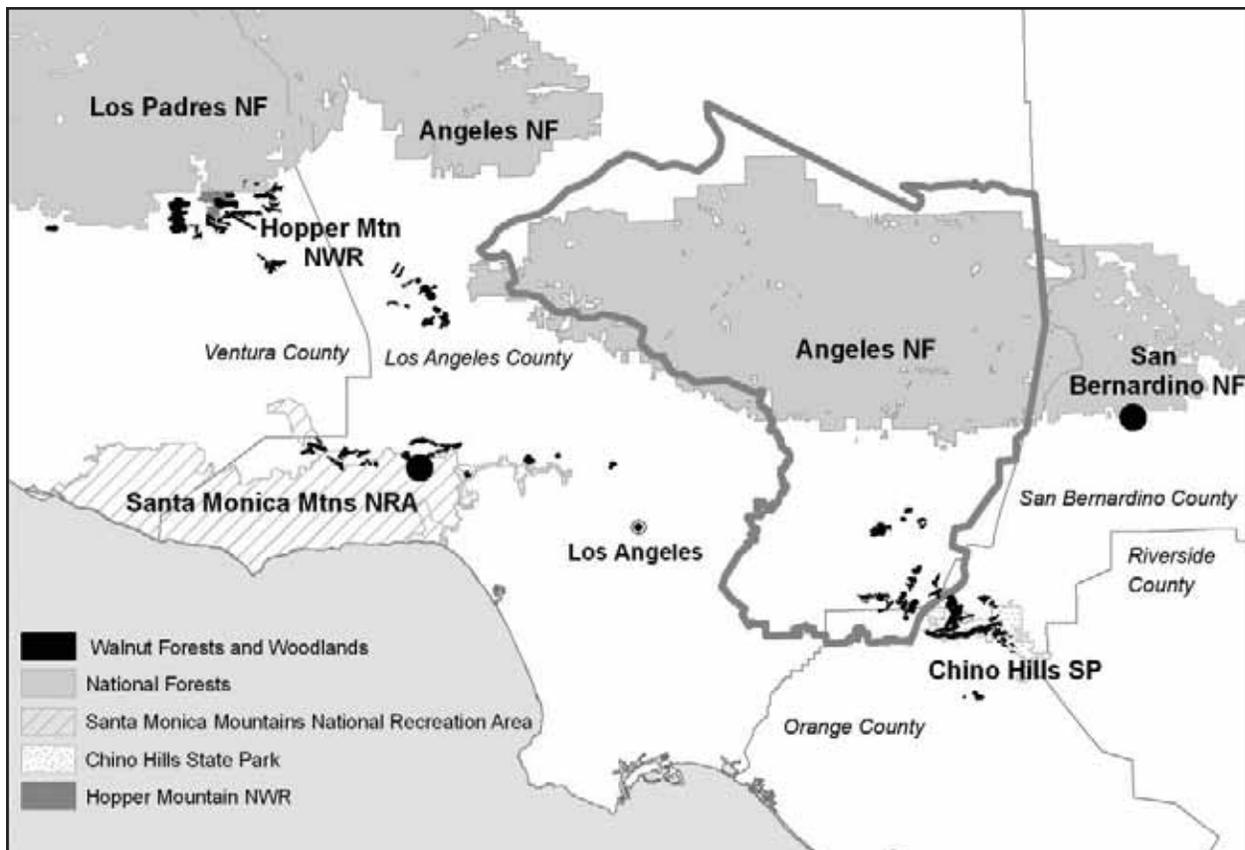
Lands suitable for coastal sage scrub habitat (lands below 500m in elevation) account for nearly half of the southwestern ecoregion, yet the proportion of these lands managed for protection of biodiversity is relatively small (Davis et.al. 1994). Higher elevations tend to have more protection (e.g. national forest lands). Although coastal sage scrub is protected at several national park units, no other unit protects a significant amount of the rare California walnut woodlands.

Of the comparably managed sites, the Chino Hills State Park is the closest in resource quality and

character to the Puente-Chino Hills portion of the study area. Although many similar resources are protected, Chino Hills State Park is part of the larger biological corridor of the Puente-Chino Hills. Protected status for the Puente-Chino Hills within the study area would expand existing resource protection and ensure long term protection of the larger corridor's biodiversity.

Additionally, recent studies have found that areas which retain adequate genetic variability are more likely to facilitate both adaptive and non-adaptive evolution as the environment changes. The Los Angeles Basin was identified as an evolutionary hotspot in need of based on its high levels of genetic diversity (Vandergast et.al. 2008).

Located in close proximity to urban populations of the Los Angeles Basin, universities and colleges, the Puente-Chino Hills provide excellent opportunities for interpretation, education and scientific study.



Statewide California Walnut Woodland and Forest Distribution (Source: CDFG 2006)

## Summary: Suitability

Based upon evaluation of the study area resources and their relative quality, character, and rarity, the National Park Service has determined that the San Gabriel Mountains and Puente-Chino Hills portions of the study area are suitable for inclusion in the national park system. Together, the two areas contain a combination of themes and resources not found in any national park unit or comparably managed area.

<b>Table 7: Summary of Areas Suitable for Inclusion in the National Park System</b>	
<p><b>San Gabriel Mountains</b></p>	<p>The overall combination of cultural and natural resource values and themes represented by the San Gabriel Mountains is not comparable to any other national park unit or comparably managed areas. Represented within these themes are unique geological features and dramatic geologic processes, a wide diversity of rare habitats located in close proximity given the dramatic changes in topography, and technological advances in the areas of astronomy, chaparral ecosystems and watersheds.</p> <p>The close proximity of the San Gabriel Mountains to urban areas of the Los Angeles Region means that this area has excellent potential for interpretation, education and continued scientific study.</p>
<p><b>Puente-Chino Hills</b></p>	<p>The Puente-Chino Hills have resources that are outstanding representations of habitat types not widely found in other national park units or comparably managed sites. Represented within these themes are coastal sage scrub habitat and California walnut woodlands, both of which support rare and endangered plants and wildlife. Although coastal sage scrub is protected at several national park units, no other existing national park unit or comparably managed area protects a significant amount of the rare California walnut woodlands. Protected status for the Puente-Chino Hills within the study area would expand and enhance existing resource protection and ensure long term protection of the larger Puente-Chino Hills corridor biodiversity.</p> <p>Located in close proximity to urban populations of the Los Angeles basin, universities and colleges, the Puente-Chino Hills provide excellent opportunities for interpretation, education and scientific study.</p>