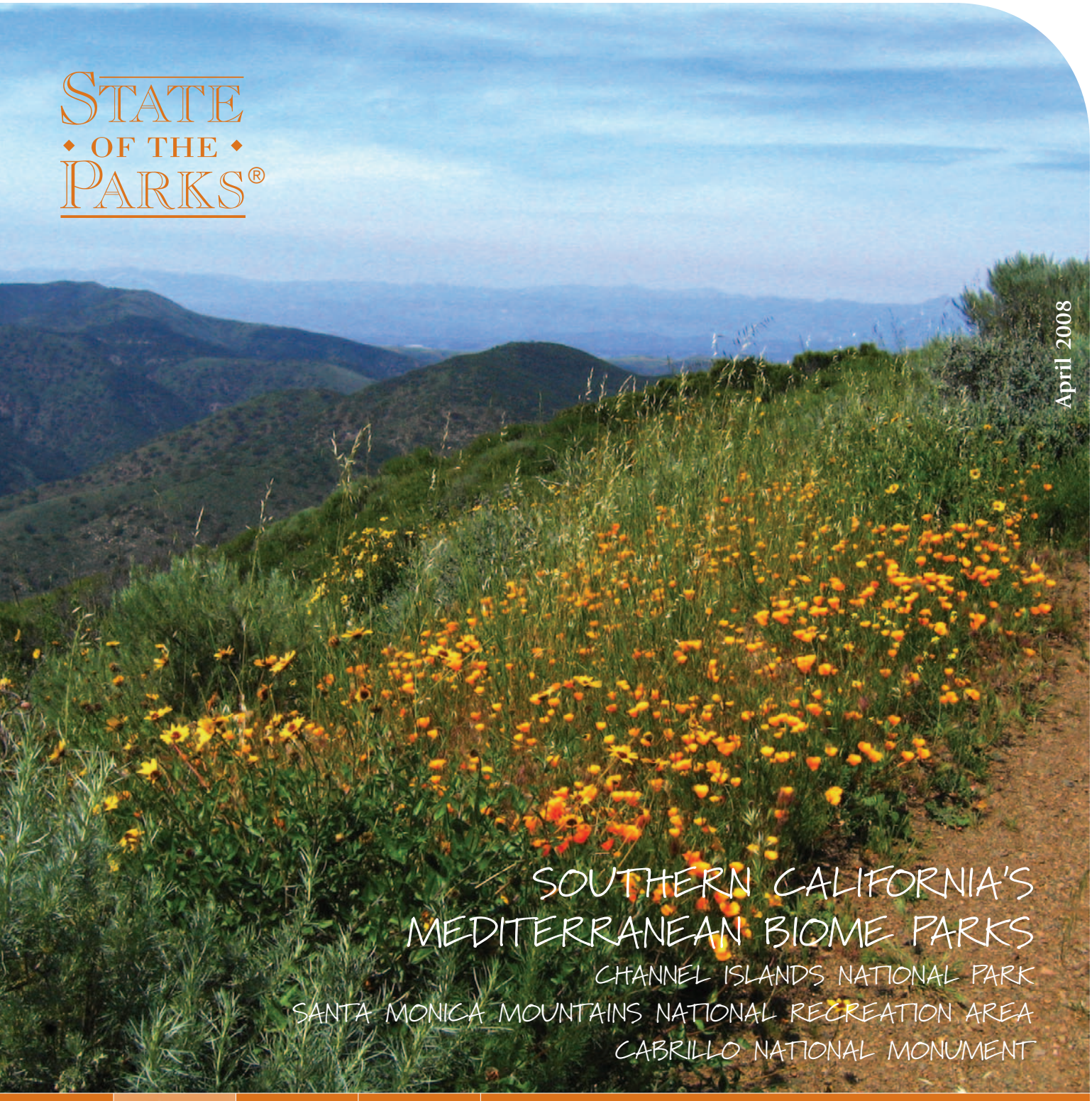
STATE OF THE PARKS®



April 2008

SOUTHERN CALIFORNIA'S MEDITERRANEAN BIOME PARKS

CHANNEL ISLANDS NATIONAL PARK
SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA
CABRILLO NATIONAL MONUMENT

A Resource Assessment

National Parks Conservation Association®
Protecting Our National Parks for Future Generations®

State of the Parks®

Center for State of the Parks

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

Today, Americans are learning that national park designation alone cannot provide full resource protection. Many parks are compromised by development of adjacent lands, air and water pollution, invasive plants and animals, and rapid increases in motorized recreation. Park officials often lack adequate information on the status of and trends in conditions of critical resources.

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

For more information about the methodology and research used in preparing this report and to learn more about the Center for State of the Parks®, visit www.npca.org/stateoftheparks or contact: NPCA, Center for State of the Parks®, P.O. Box 737, Fort Collins, CO 80522; Phone: 970.493.2545; E-mail: stateoftheparks@npca.org.

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

* More than 340,000 members
* 22 regional and field offices
* 35,000 activists

A special note of appreciation goes to those whose generous grants and donations made the report possible: MSST Foundation, Dorothy Canter, Ben and Ruth Hammett, and anonymous donors.

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COVER: PHOTO OF SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA, COURTESY OF TONY VALOIS

SOUTHERN CALIFORNIA'S MEDITERRANEAN BIOME PARKS

LANE CAMERON/NATIONAL PARK SERVICE

The Mediterranean biome is one of the rarest and most biologically diverse ecotypes on the planet, and because it has been favored by humans for thousands of years, it is one of the most highly altered as well. Covering a mere 2 percent of Earth's total land area in five distinct regions, this biome is characterized by evergreen or drought-resistant deciduous shrublands, located on western coasts between 30° to 40° latitude—north and south. These shrublands are called *matorral* in Chile, *fynbos* in South Africa, and *mallee* in Australia. In the Mediterranean regions, they are known as *maquis*. Americans know them as California's chaparral.

The climate of the Mediterranean biome includes rainy winters and dry summers. Because of the proximity to large bodies of water and the presence of fog, temperatures are moderate; the temperature in winter will rarely

Bigpod ceanothus blooms in the hills of Santa Monica Mountains National Recreation Area, which is within California's Mediterranean biome. This ecotype is known for harboring high biodiversity.

MEDITERRANEAN BIOMES

reach freezing, and snow almost never falls. Each of the world's Mediterranean biome regions expresses an island-like isolation, due to their limited size and the existence of geographical barriers that separate them from one another. This translates into high degrees of endemism—the existence of plant and animal species found in one place and no other. For this reason, the Mediterranean biome regions are considered "hot spots" of biodiversity.

In the United States, three national parks are part of the Park Service's Mediterranean Coast Network and exist entirely within the Mediterranean biome: Channel Islands National Park, Santa Monica Mountains National Recreation Area, and Cabrillo National Monument. While these three southern California Mediterranean biome parks share ecosystem traits, each has its own character and its own challenges. Channel Islands National Park, due to its relative isolation, has been described as "the North American Galapagos" for its wide variety of unique species. Santa Monica Mountains National Recreation Area, which encompasses thousands of acres of private lands, four state parks, and other public lands managed by more than 70 agencies, offers Los Angeles residents and visitors countless recreational opportunities and provides critical habitat for numerous species coping with encroaching urban development. Located at the tip of a peninsula in busy San Diego, Cabrillo National Monument, while small by many park standards, provides an oasis of wilderness for city dwellers and tourists. Visitors to these parks are treated to a wealth of cultural attractions as well. Southern California's prehistory and history are represented there, from American Indian subsistence on these coastal lands to Spanish incursion, America's westward expansion, and the golden age of moviemaking.

The National Park Service must manage and protect natural and cultural resources within this rare ecosystem, the Mediterranean biome, while dealing with surrounding development, non-native species, marine harvests, pollu-

tants, and rapidly expanding southern California metropolitan areas. Understanding the extent to which park resources are affected by various threats in the region is vital to their protection. The three parks comprise the Mediterranean Coast Network, a group identified by the National Park Service that has similar resource concerns and opportunities to work more efficiently together. Through the network, park scientists and cooperating researchers study the status and trends of marine and terrestrial ecosystems, the effects of urbanization on species and their habitats, and the effects of non-native species invasions. They are also involved in studies that evaluate restoration and other resource management actions. The Mediterranean Coast Network parks also share expertise and experiences in cultural resource identification, restoration, and protection, and they have combined efforts to more efficiently manage park archives and collections.

Recognizing the unique natural and cultural resources resident in the Mediterranean biome, the Center for State of the Parks has endeavored to determine the conditions of natural and cultural resources in Channel Islands National Park, Santa Monica Mountains National Recreation Area, and Cabrillo National Monument. Researchers used established, peer-reviewed methodologies to rate conditions of both natural and cultural resources at these parks. The following pages describe these parks and their significance and summarize resource conditions. Also noted are funding and staffing considerations, park planning efforts, resource education opportunities, and external support provided by volunteers and partner organizations.

NATIONAL PARK SERVICE

Southern California's Mediterranean biome parks provide critically important habitat for a host of wildlife species ranging from seals, whales, and sea stars to peregrine falcons, bobcats, and mountain lions.

THREE CALIFORNIA PARKS SHARE SOME SIMILAR OPPORTUNITIES AND CHALLENGES

NPCA's assessment of Channel Islands National Park, Santa Monica Mountains National Recreation Area, and Cabrillo National Monument brought to light a number of common themes shared among the parks. They include resource management successes, common resources, and similar resource threats. Following is an overview of some of these shared themes.

All three Mediterranean biome parks are known for providing excellent recreational opportunities for surrounding community members and visitors, many of whom reside in highly urbanized areas. Whale watching is popular at both Channel Islands National Park and Cabrillo National Monument, while birds, seals, and sea lions delight visitors at the Santa Monica Mountains National Recreation Area. All three parks offer a variety of educational programs that teach visitors of all ages about subjects such as archaeology, American Indian history, wildlife, and underwater ecosystems. A favorite educational site is the Satwiwa Native American Culture Center in Santa Monica Mountains National Recreation Area, which receives more visitors than the park's main visitor center.

CATHY NORRIS

Each park is also recognized for efforts to restore native ecosystems by removing non-native plants and animals and reintroducing native ones. Channel Islands National Park has targeted a host of non-native species such as horses, pigs, sheep, cows, cats, donkeys, European honeybees, rabbits, and rats, which were damaging park ecosystems. In 2002, the Park Service began a program to reintroduce bald eagles to the Channel Islands. At Santa Monica Mountains National Recreation Area, there are more than 800 native plant species and about 300 non-native plant species; park staff target the 19 non-native species that pose the greatest threat to native biodiversity. At Cabrillo National Monument, staff have planted native vegetation around the Old Point Loma Lighthouse and removed most of the aggressive ice plant from the park. Though each of the parks has achieved significant successes in combating non-native species, each suffers from staffing and funding shortfalls that limit what can be done. In some cases, the parks are unable to keep up with the spread of certain invasive plants and animals.

All three parks are affected by past and current land uses both within the parks and

adjacent to their boundaries. At Channel Islands National Park, a history of grazing by non-native species dramatically altered ecosystems, in part, by limiting native plant communities and contributing to erosion and the spread of non-native grasses. As noted, staff continue to work to repair this damage. Santa Monica Mountains National Recreation Area is within the Los Angeles metropolitan area, it is surrounded by private property, and more than 70,000 acres of private lands lie within its boundaries. Urban growth and development, with associated issues such as habitat fragmentation and human-caused fires, threaten the park's ecological integrity. At Cabrillo National Monument, adjacent development has isolated native habitat from other natural areas. As a result, some wildlife species are no longer found there.

Water quality is also a concern for Channel Islands National Park, Santa Monica Mountains National Recreation Area, and Cabrillo National Monument. Pollution from shipping vessels and urban, agricultural, and industrial runoff is a threat for all three parks. Water quality monitoring is minimal at these parks due to funding shortfalls, which makes it difficult for the Park Service to achieve a comprehensive understanding of conditions and the scope of threats.

The human history of each park also includes shared themes. Spanish exploration and settlement brought changes to the lifestyles of native peoples such as the Chumash, Gabrielino/Tongva, and Kumeyaay. Missionaries sought to convert many of these people to Catholicism, while foreign diseases brought by the settlers struck a severe blow to many native groups. Archaeological resources and historic structures in each of the parks document the span of human history, dating from prehistoric times to the present. At each of the three parks, funds are needed to support cultural research that would help guide preservation and interpretation of resources ranging from historic structures and museum collections to cultural landscapes and human connections.

ROBERT V. SCHWEMMER/NOAA

All three parks provide an array of recreational activities for visitors.

As indicated, all three parks suffer from funding and staffing shortfalls that affect the Park Service's ability to fulfill its mission of preserving and protecting the parks and providing enjoyment and educational opportunities to the public. Channel Islands National Park reported a shortfall of 24 full-time equivalent employees in its 2004 business plan. As a result of this shortfall, existing staff are burdened with additional duties. At Santa Monica Mountains, there are not enough staff to run the visitor center, so staff from other divisions must supplement, which takes them away from their other duties. Cabrillo National Monument might have to cancel two of its popular annual events—the Cabrillo Festival and the Whale Watch Weekend and Intertidal Life Festival—partly because it does not have funds to hire needed interpreters to serve visitors or to cover other expenses of hosting these events.

CHANNEL ISLANDS NATIONAL PARK

DEREK LOHUIS/NATIONAL PARK SERVICE

Beautiful displays of wildflowers greet visitors to Anacapa, which is made up of three islets. The U.S. Coast Guard currently owns East Anacapa and is in the process of transferring its holdings to the National Park Service.

REPORT SUMMARY

While often called "the North American Galapagos" because of their rich biodiversity, California's Channel Islands truly are like nowhere else on Earth. Though just 26 miles from Santa Barbara and about 60 miles from the Los Angeles area, the Channel Islands offer a rare opportunity to observe the effects of isolation on species and community evolution. The islands and marine waters also provide critical habitat for seabirds and marine mammals.

Recognizing the importance of protecting the islands, President Theodore Roosevelt designated Anacapa Island and Santa Barbara Island as Channel Islands National Monument in 1938. Because of its mosaic of ecological systems, diversity of species, and protected status, Channel Islands National Monument was designated an International Biosphere Reserve in 1976. Channel Islands National

Park, the 40th national park, was created by an act of Congress on March 5, 1980. The national park includes the lands within the national monument as well as three other islands—San Miguel, Santa Cruz, and Santa Rosa—and the marine environment surrounding them out to one nautical mile from their shores. On October 2, 1980, the ocean six miles out around each of the five islands was designated as the Channel Islands National Marine Sanctuary. In addition, certain waters off the coasts of all five islands have been designated as state marine reserves or state marine conservation areas. (See the map on pages 10 and 11.)

The islands and the surrounding ocean waters, which are at the interface of a cold arctic current and a warm tropical current, support more than 2,000 species of plants and animals. Ten percent of the terrestrial plants and 30 percent of the terrestrial animals found in the park are endemic to the islands—they are found nowhere else. In addition, the Channel Islands are the only remaining areas populated by some species that used to have home ranges spanning the coastline.

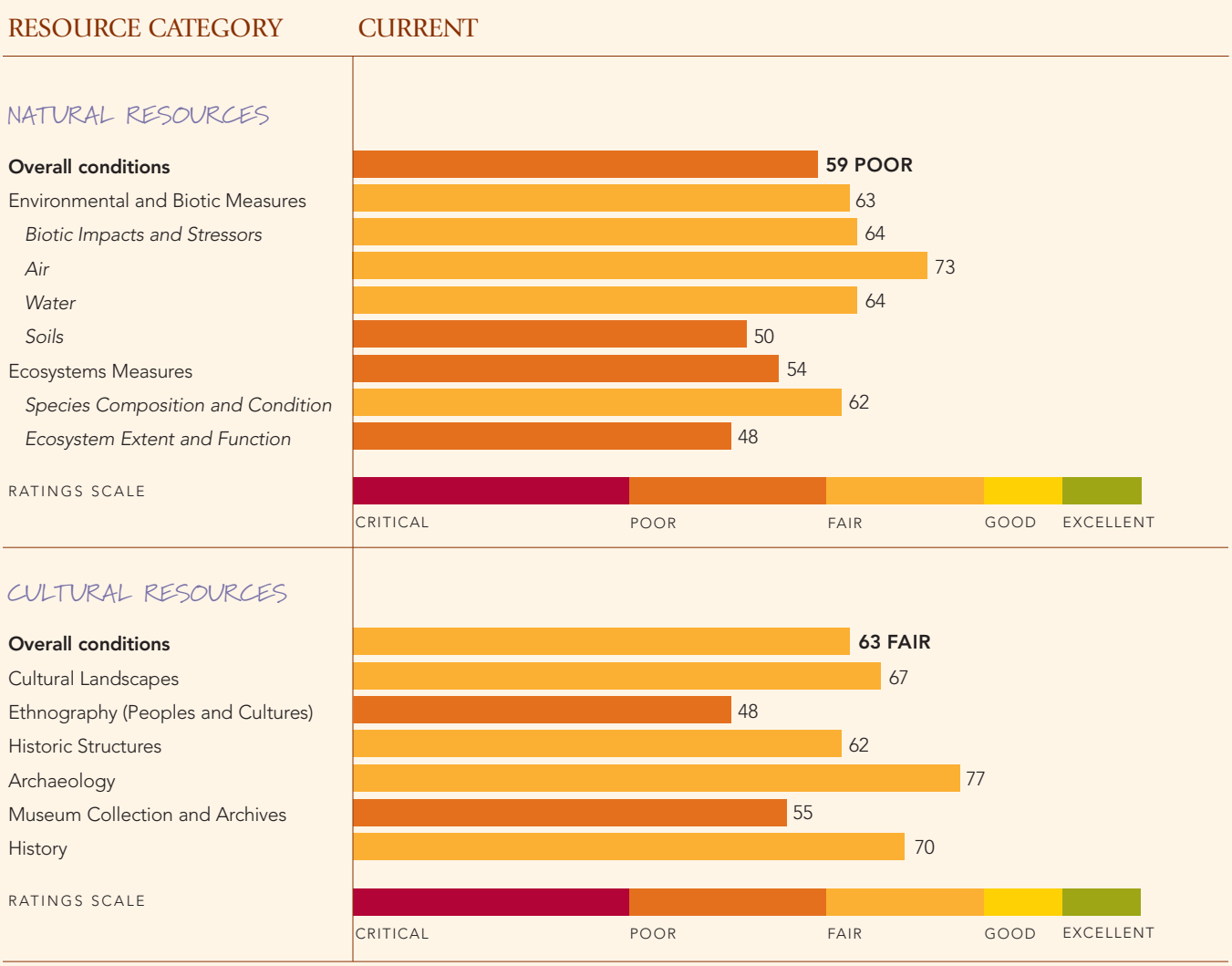
Opportunities to watch wildlife and explore their habitats abound. Whales, seals, and sea lions are popular with visitors. Bird watchers come to the Channel Islands to experience the largest breeding colonies of seabirds in southern California, while people from around the world can experience the return of bald eagles to Santa Cruz Island via webcams that broadcast the birds' nesting activities. Tide pools, which are heavily impacted on the mainland and more pristine on the Channel Islands, offer visitors the chance to explore a remarkable and often unseen world of marine life at the shore's edge. For those who wish to get into the water, sea caves and prolific kelp beds beckon to snorkelers, kayakers, and divers.

Cultural resources also distinguish the park and draw visitors. Channel Islands National Park is home to the most well-preserved archae-

ROBERT V. SCHWEMMER/NOAA

Kayaking is a popular way to explore the park and view wildlife.

Note: When interpreting the scores for natural and cultural resource conditions, recognize that critical information upon which the ratings are based is not always available. This limits data interpretation to some extent. For Channel Islands National Park, 77 percent of the natural resources information was available and 96 percent of the cultural resources information was available.



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

ological sites on the Pacific coast, with more than 10,000 years of continuous human occupation recorded. Over the past century, archaeologists and paleontologists have learned much about the islands' earliest inhabitants. The oldest human remains discovered in North America to date were found on Santa Rosa Island. The islands are rich in fossils of Columbian mammoths, island pygmy mammoths, giant mice, and other species that once roamed there. The five islands comprising the park boast a diverse collection of historic structures—a 1932 light station, shipwrecks, remains of military facilities, and historic ranching features have been preserved.

RATINGS

Current overall conditions of the known **natural resources** in Channel Islands National Park rated a "poor" score of 59 out of 100, primarily because habitats were negatively impacted by past land use. With work done by the Park Service and with the passage of time, it is expected that both the condition of habitats and the overall rating will improve. Ratings for the conditions of natural resources at Channel Islands National Park were assigned through an evaluation of park research and monitoring data using NPCA's Center for State of the Parks comprehensive assessment methodology (see "Appendix"). Habitat degradation caused by non-native species, overfishing, and complex land ownership issues are major concerns at the park. Since the national park's creation in 1980, the Park Service has done much to address these issues, and conditions of species and systems are improving.

Air and water quality rated in "fair" condition, while species composition and condition also received a "fair" rating, primarily as a result of work done by the Park Service (e.g., non-native species eradication and native species reintroduction). A history of grazing by non-native species such as cattle and sheep damaged numerous park habitats. NPCA's assessment found that habitats are in "poor" condition today (indicated through ecosystem extent and function), but the potential for recovery of terrestrial ecosystems over time is generally good, largely because of the park's relative isolation. The Park Service has eliminated most non-native animals and is making significant strides in repairing ecosystem damage.

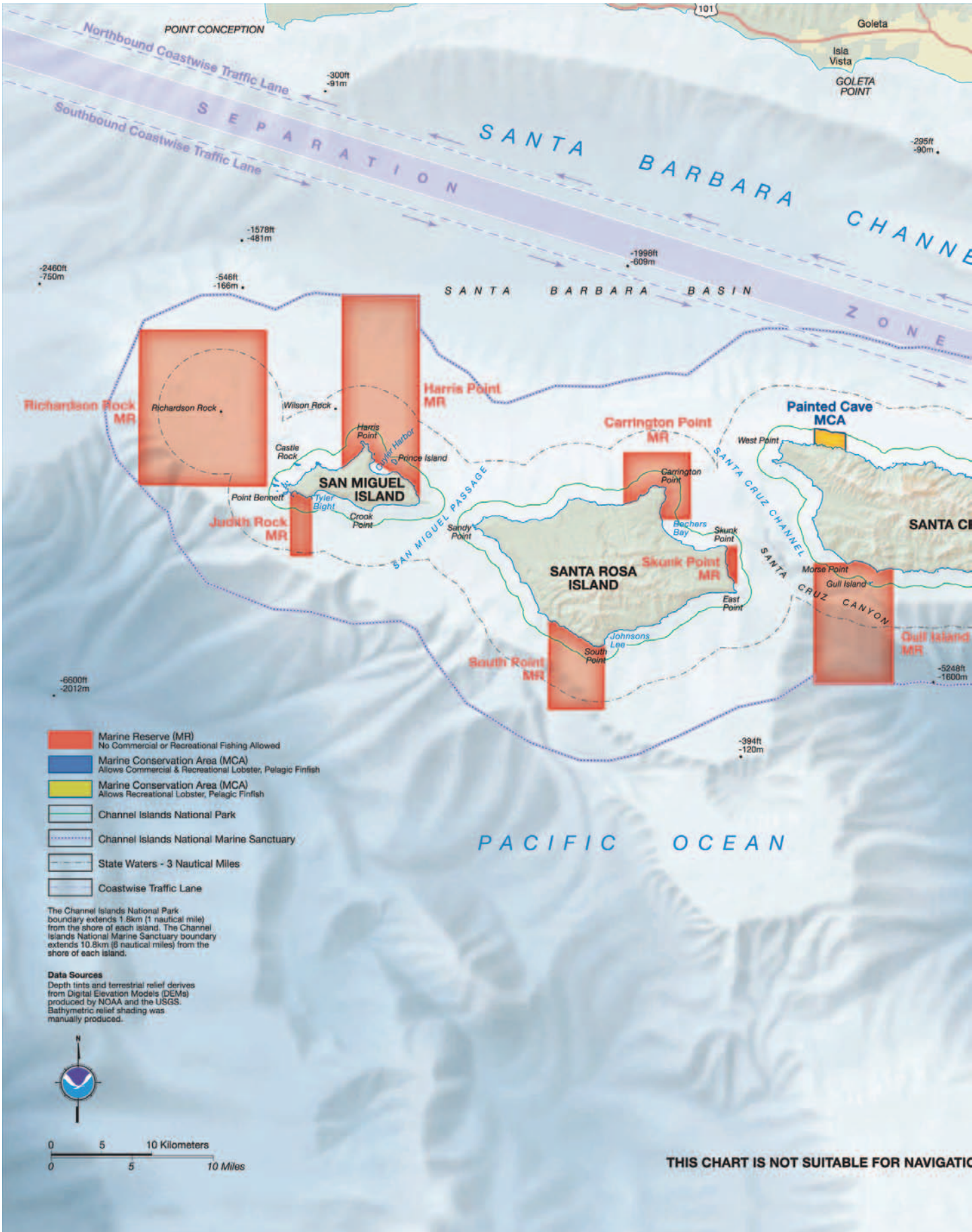
Overall conditions of the park's known **cultural resources** rated 63 out of a possible 100, indicating "fair" conditions. Half of the park's historic structures are in "poor" or "fair" condition, and erosion threatens many of the islands' archaeological sites. On a positive note, the park has inventoried and evaluated nearly all of its historic structures and landscapes, and it is making progress on repairing and rehabilitating historic buildings and landscape features as project funds are received. University researchers conduct small-scale archaeological surveys and data recovery of eroding sites, adding to the park's knowledge of its archaeological resources. The park recently completed a comprehensive review and updating of its accession records, bringing them into compliance with curatorial standards.

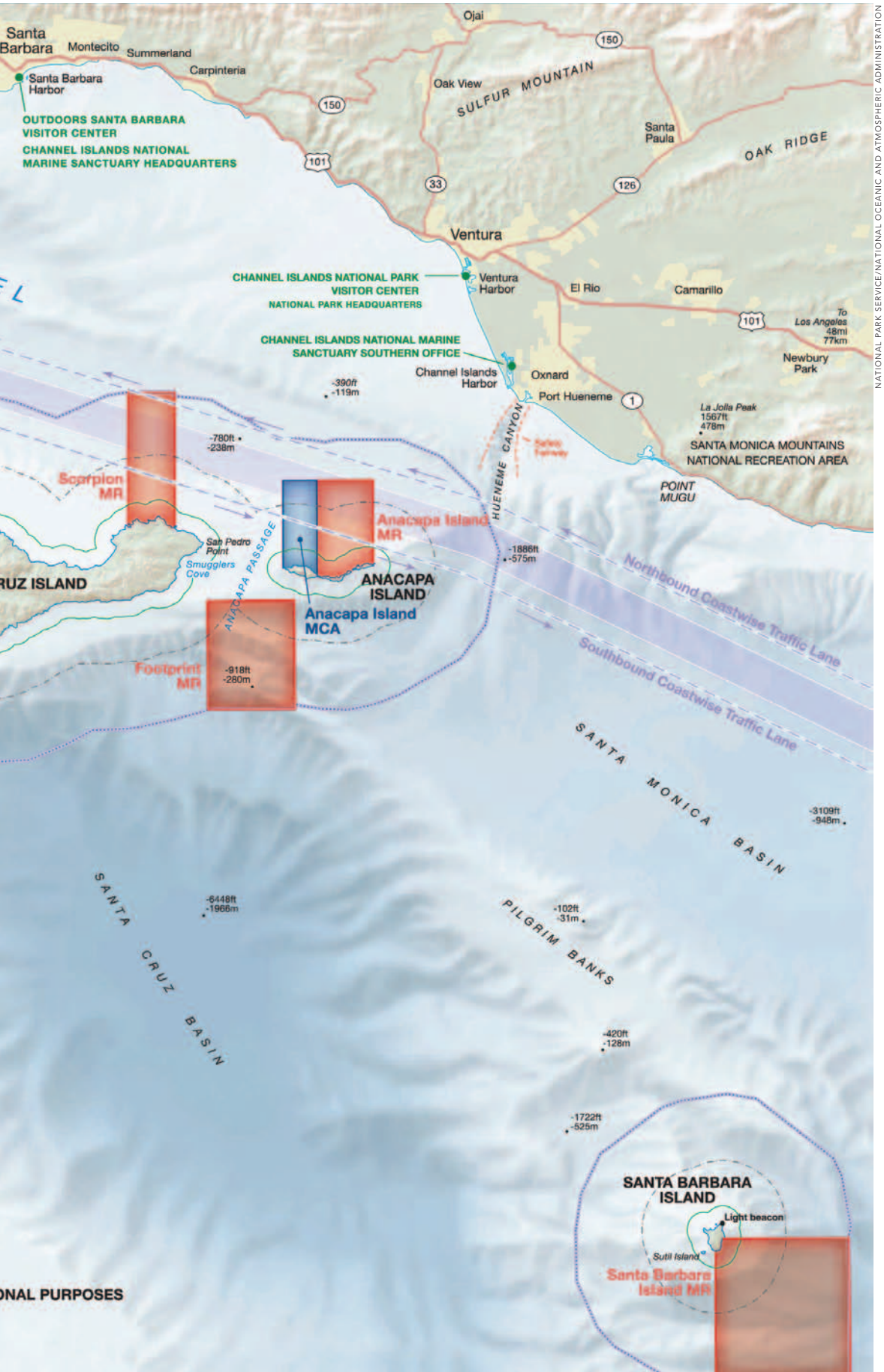
Funding and staffing shortfalls make it difficult for the park to provide the level of resource care staff feel is needed. For example, a lack of funds and staff hampers natural resources monitoring efforts, while the park requires additional cultural resource experts to protect irreplaceable resources.

NATIONAL PARK SERVICE

Biologists have been studying and monitoring seals and sea lions in the Channel Islands since 1968.

CHANNEL ISLANDS NATIONAL PARK





NATIONAL PARK SERVICE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

RESOURCE MANAGEMENT HIGHLIGHTS

- **Non-native animals removed.** Horses, pigs, sheep, cows, cats, donkeys, European honeybees, and rabbits—non-native animals that have damaged ecosystems of the Channel Islands—have been eradicated from the islands in the park. In addition, black rats have been eliminated from Anacapa, and the park plans to eliminate them from San Miguel as well. Removing cattle from Santa Rosa has significantly improved riparian system health, while removing rats from Anacapa has benefited nesting birds, including the Xantus's murrelet, and lizards. "Badlands" areas created by sheep grazing, soil erosion, invasive crystalline ice plant, and the roosting and nesting of gulls on Santa Barbara Island have been partially restored.
- **Bald eagle reintroduced.** Because the bald eagle had been locally extirpated from the islands, a reintroduction program was initiated in 2002. Since then, 62 captive-bred bald eagles have been released on the Northern Channel Islands. In spring of 2006, the first eagle chick to hatch unaided by humans on the Channel Islands in more than 50 years made headlines across the country. The Channel Islands National Park website broadcasts live footage of chicks and adults into the schools and homes of millions of Americans.
- **Island fox populations recovering.** With evidence that island foxes faced almost certain extinction on San Miguel and Santa Rosa Islands, the National Park Service convened an Island Fox Recovery Team in April 1999 and soon thereafter initiated emergency recovery actions. The team captured and removed golden eagles from the islands because the birds were preying on the foxes, and the team also began to breed island foxes in captivity to supplement critically low populations. In addition, feral pigs were removed from the islands and bald eagles, which feed on fish rather than foxes, were reintroduced to the islands. As of 2007, these efforts have resulted in small, recovering wild island fox populations of at least 50 and 100 foxes on Santa Rosa and San Miguel, respectively. On Santa Cruz, where the Park Service and The Nature Conservancy had established captive breeding in 2002, the island fox population has increased to more than 300 foxes.
- **Peregrine falcons re-established.** Between 1983 and 1998, the Santa Cruz Predatory Bird Research Group from the University of California, Santa Cruz's Institute of Marine Sciences released peregrine falcons on the Channel

With help from partner groups, the park's population of peregrine falcons has been re-established.

NATIONAL PARK SERVICE

NATIONAL PARK SERVICE

The park's populations of island foxes—which are found only on the Channel Islands—are making a comeback thanks to extensive recovery efforts initiated in 1999.

Islands. This species had declined precipitously because of DDT poisoning, which caused the birds' eggshells to thin and crack. Today, populations of peregrine falcons on the islands appear to be self-sustaining.

- **No-fishing zones expanded.** Portions of the park are included in the Channel Islands Marine Protected Areas (MPAs), which consist of ten state marine reserves (SMRs) and two state marine conservation areas (SMCAs). The SMRs exclude fishing or marine harvest of any kind, and the SMCAs limit fishing to recreational only and regulate the commercial lobster harvest. In August 2007, the no-fishing-zone SMRs were expanded by the National Oceanic and Atmospheric Administration into the federal waters of the Channel Islands National Marine Sanctuary, adding nearly 150 square miles of protected waters to existing reserves. This expansion more than doubled the no-fishing areas around the islands.
- **New historic resource study completed.** The park recently completed a nearly 1,000-page historic resource study. The study highlights each island's historical importance and includes information about ranching operations, prehistoric peoples, military use of the islands, shipwrecks, and terrestrial archaeological sites.
- **Cultural affiliation study completed.** A study identifying the cultural affiliation and lineal descent of Chumash peoples was completed in 1999, providing the park with information that helps it comply with the National Historic Preservation Act and Native American Graves Protection and Repatriation Act.
- **Rehabilitation of Scorpion Ranch House.** The park carried out seismic retrofit and rehabilitation of the masonry ranch house on Santa Cruz Island. A visitor contact center with exhibits will soon be in place on the ground floor of the building, while rangers will use the upstairs as office space.

Sea otters are missing from the marine ecosystem of Channel Islands National Park.

KEY FINDINGS

- Previous land uses and management practices dramatically altered the ecosystems of Channel Islands National Park. Grazing and browsing, primarily by cattle, sheep, deer, elk, pigs, and rabbits (Santa Barbara), has significantly affected many aspects of the landscape and biotic systems, limiting native plant communities to inaccessible areas and contributing to both erosion and the spread of non-native grasses. The Park Service has eradicated non-native horses, pigs, sheep, cows, cats, donkeys, European honeybees, and rabbits from the islands, which is resulting in the slow recovery of some of these damaged systems.
- Fishing and marine resource harvesting have reduced the biodiversity and productivity of park waters. For example, white abalone, which were overharvested in the 1970s, now face extinction. The Park Service works collaboratively with the State of California and the Channel Islands National Marine Sanctuary to monitor the marine reserves within and around the park to document ecosystem conditions and to enforce marine resource harvesting regulations.
- Santa Rosa Island continues to harbor herds of non-native mule deer and elk. Browsing by these animals affects chaparral and bishop pine forests, while the game trails they create fragment plant communities. The deer and elk herds are slated for removal by the end of 2011; however, the owners of the animals have indicated they want them to remain on the island in perpetuity.
- Invasive species management projects are grossly underfunded and understaffed. The park does not have adequate resources or procedures to ensure that non-native species are not introduced to the park or to respond in the case of an introduction. One park staff member with the aid of a second ecologist generally performs much of the ongoing control work, with short-term assistance from the California Exotic Plant Management Team stationed at Point Reyes National Seashore and volunteers. Grant funding often does not last long enough to complete eradication and control projects. This lack of follow-up often prevents the park from receiving additional grant money for new projects. Because only limited control efforts are possible due to staffing and funding shortfalls, the spread of invasive plant species outpaces control projects, and non-native species overtake native vegetation.
- Sea otters are missing from the marine ecosystem of Channel Islands National Park. The local extirpation of sea otters due to overhunting and the legal prohibition on sea otter reintroduction south of Point Conception have had dramatic impacts on the extent of all kelp forests in southern California. The absence of sea otters has also hurt eelgrass beds, which are important nurseries for a diverse array of fishes. Without sea otters to keep their populations in check, sea urchins overgraze kelp forests and eelgrass beds.
- Increasing traffic in the shipping lane that passes through the Santa Barbara Channel next to the islands and energy production off the coast have current and potential future effects on the park. Greater shipping activity has increased noise from engines and horns. Small fishing vessels, concessionaire and park ferries, passenger boats, airplanes, and helicopters also add to unwanted noise. Underwater sound pollution from boats is

a particular threat to migrating mammals such as whales, which rely on acoustical input to guide their movements. In addition, the park is threatened by increasing air pollutant emissions from boats and the risk of spills from both ships in transit and oil and gas platforms.

- Channel Islands National Park contains five identified cultural landscapes. Four of them encompass former ranches, while one includes the historic Anacapa Light Station. The light station is listed on the National Register of Historic Places, while the ranching districts have been determined eligible for listing on the National Register.

- Park staff have identified more than 2,000 archaeological sites that include prehistoric villages, camps, ceremonial sites, fishing camps, military sites, ranches, and shipwrecks. In addition, the oldest human remains yet discovered in North America were found on Santa Rosa Island. The archaeological resources on four of the park islands are listed on the National Register of Historic Places as archaeological districts. The inventory of archaeological resources is incomplete and condition assessments are needed for about half of the park sites. Inadvertent discoveries of human remains are common and require consultation with appropriate American Indian representatives. In spite of these vast and complicated resources, the park lacks full-time, permanent archaeological staff. Instead, the park employs a subject-to-furlough archaeologist and relies on help from cooperating institutions and agencies to accomplish most archaeological fieldwork. The number and significance of the park's archaeological resources make full-time archaeological staff essential.

- Channel Islands National Park's museum collection and archives include more than 400,000 items such as historic photographs, archaeological artifacts, a pygmy mammoth skeleton, and the original Fresnel lens from the Anacapa Light Station. The park lacks any staff specifically dedicated to museum and archive management. As a result, park items housed in other institutions (the bulk of the collection) have not been identified or cataloged, and park collections are not well maintained. Together with nearby Cabrillo National Monument and Santa Monica Mountains National Recreation Area, the park has requested funds to support full-time curatorial staff to serve all three parks.

- Some ethnographic research has been done to explore cultural connections with groups of people who have traditional associations with park resources, including a cultural affiliation and lineal descent study in 1999. Traditional use studies, oral histories, and in-depth ethnographies are needed to help the park better understand traditionally associated groups of people, but funding shortfalls prevent the park from gathering this information.

- The park reports a staffing shortfall of 24 full-time equivalent employees. This shortfall burdens existing staff with jobs for which they do not have the time or expertise. Critical unfilled or unfunded positions at Channel Islands include a database manager, full-time geographic information systems (GIS) specialist, biological technicians, compliance/planning specialist, a full-time archaeologist, a preservation specialist, and curatorial staff.

The absence of sea otters, which were extirpated by overhunting, has hurt kelp forests and eelgrass beds.

DAVID MENKE/U.S. FISH AND WILDLIFE SERVICE

PARK LANDS AND WATERS ENCOMPASS EXCEPTIONAL RESOURCES

Each of the five islands within Channel Islands National Park possesses special resources that are important to protect, as well as interesting features that draw visitors. Few of these visitors are aware that the park also protects extensive underwater ecosystems that are some of the most diverse marine environments in the world (see the "Marine Habitats" section for more information).

Anacapa Island

Anacapa Island is actually made up of three small islets: East, Middle, and West Anacapa, which are located 13 miles from Ventura. All three islets combined total 699 acres, making Anacapa the second smallest of the Channel Islands. The U.S. Coast Guard currently owns the islet of East Anacapa, including its lighthouse. At this writing, the Coast Guard was in the process of transferring all of its holdings on Anacapa Island to the National Park Service.

The visitor center on East Anacapa, overlooking the northern channel, is open year-round, as are the ranger station and seven campsites. This is the most accessible and most visited island area in the park, and ranger-led hikes are a popular activity. Staying on trails is important as this island's relatively high visitation has resulted in extensive trailing and soil compaction along coastal bluffs.

Arch Rock, a 40-foot high natural bridge formed by ocean forces, is a trademark of Anacapa and Channel Islands National Park. Frenchy's Cove offers a beach area for visitors to swim and snorkel. The waters surrounding the island include one marine reserve where fishing is not allowed and one marine protected area where fishing is limited.

The largest breeding colony of the endangered California brown pelican (*Pelicanus occidentalis californicus*) in the United States is located on West Anacapa, and seabirds in general are the most watchable wildlife on the islets. The number of nesting Xantus's murrelets (*Synthliboramphus hypoleucus*) is slowly increasing as a result of the elimination of non-native black rats.

Anacapa's museum houses the original

ROBERT V. SCHWEMMER/NOAA

The Channel Islands are home to endangered California brown pelicans. In fact, West Anacapa hosts the largest breeding colony of these birds in the United States.

CHANNEL ISLANDS NATIONAL PARK AT A GLANCE

- The park is located about 60 miles from Los Angeles, a metropolitan region with a population of more than 18 million people. Visiting Channel Islands National Park to observe its wonders requires travel by boat or plane. While a half million visitors officially spent time in the park in 2006, most of them were recorded at the mainland visitor center in Ventura. Visitation to the islands themselves is relatively low: About 60,000 people visit park waters by boat each year, while just 30,000 or so actually venture onto land.
- Half of Channel Islands National Park is a marine environment. The park's kelp forests, rocky reefs, crystal clear water, and deep-sea canyons make it one of the top scuba diving sites in the world. Kayaking the sea caves on Santa Cruz Island is a popular way to explore the marine wildlife. Visitors may also swim, dive, snorkel, or explore tide pools.
- Giant kelp forests encircle the islands, providing habitat for a wide variety of animal species, from tiny plankton to mammoth blue whales. One-third of southern California's kelp forests are located within Channel Islands National Park. About 10 percent of the global blue whale population gathers in the Santa Barbara Channel around the islands each summer, the largest aggregation of these mammals in the world.
- Wildlife species abound within the park. San Miguel Island hosts more species of pinnipeds (seals and sea lions) than any other place in the world. In addition, 16 species of seabirds are known to nest on the Channel Islands, including significant portions of the world's Xantus's murrelets, ashy storm-petrels, and western gulls. The park also hosts breeding colonies of endangered California brown pelicans.
- Underwater archaeological resources within Channel Islands National Park include a wide range of vessels, from Chinese junks to paddle boats and steamers. The most famous shipwreck within park boundaries is that of the *Winfield Scott*, a Gold Rush-era passenger steam ship that sank in 1853, after all passengers and its load of gold bullion were safely brought to shore.
- The world's most complete pygmy mammoth specimen was discovered on Santa Rosa Island in 1994. These miniature mammoths, only about four to eight feet tall, once roamed island grasslands and forests during the Pleistocene epoch. Santa Rosa is also the site of the oldest human remains yet found in North America, dating back 13,000 years.

DEREK LOHUIS/NATIONAL PARK SERVICE

Exploring tide pools is a favorite activity at Channel Islands National Park. To avoid damaging these fragile areas, visitors must take care not to remove organisms or step in the pools.

ROBERT V. SCHWEMMER/NOAA

San Miguel Island and the surrounding waters constitute important wildlife habitat. The island also harbors archaeological sites that tell of human habitation dating back more than 10,000 years.

crystal and brass Fresnel lens from its historic lighthouse. On December 2, 1853, the side-wheel steamer *Winfield Scott* crashed into the rocks off Middle Anacapa and sank. This shipwreck still lies at the sea bottom.

San Miguel Island

San Miguel Island, at 26 miles from the mainland, is the farthest west of the Northern Channel Islands. It measures 9,325 acres, and its highest point is 830 feet above sea level. The U.S. Navy owns San Miguel, and while the Park Service has managed it since 1963, the Navy could revoke management rights at any time. Visitors to San Miguel are required, as agreed upon with the U.S. Navy, to hike with a park ranger due to the threat of live ordnances, or to hike alone on trails only after being briefed by a park ranger.

San Miguel is subject to harsh winds and heavy fog due to its location in the open ocean. Because of the dense fog and moisture on San Miguel, its wildflower displays are spectacular. Three marine reserves where fishing is not allowed are located around the island.

The San Miguel Island Research Center, operated by the National Marine Fisheries Service, is located at Point Bennett, on the island's western side. Point Bennett is famous for seal and sea lion spectacles: Five species of pinnipeds can be seen there. One subspecies of the island fox (*Urocyon littoralis*), a species found only on the Channel Islands, lives on San Miguel. The famous caliche forest also attracts many visitors to the island. This "ghost forest," a geological wonder, was formed by caliche (calcium carbonate) sand castings of plant roots and trunks. When the plants died and decayed, these castings were left behind, forming eerie stone replicas of what once was alive. San Miguel also features archaeological sites of human habitation more than 10,000 years old and a memorial to Juan Rodriguez Cabrillo, a 16th-century explorer of California.

Prince Island, off San Miguel Island and within the park, provides nesting habitat for thousands of seabirds and is the most important seabird colony in southern California.

Santa Rosa Island

Santa Rosa Island is the second largest of the Channel Islands at 53,051 acres. Its highest point is 1,589 feet above sea level.

The Vail & Vickers Company, former owner of Santa Rosa Island, has use and occupancy of 7.6 acres on Santa Rosa Island until 2011. The company conducts hunts of non-native deer and elk on the island under a special use permit. During the hunting season, which runs from August to December, about 90 percent of Santa Rosa is closed to the general public and to park staff. This hunting operation is scheduled to end in 2011, and all deer and elk must be removed by then; however, the former landowner is attempting to prolong the presence of deer and elk on the island.

Santa Rosa is famous for its fossils. In 1994, the world's most complete skeleton of a pygmy mammoth, a dwarf species related to the Columbian mammoths, was excavated on the island. The oldest human remains ever found in North America to date—dating back 13,000 years—were also discovered there.

Santa Rosa Island is home to one of only two naturally occurring stands of Torrey pine (*Pinus torreyana* var. *insularis*), the rarest pine in the United States. The other stand, which hosts a separate subspecies, is found in California's Torrey Pines State Reserve north of San Diego. Eight federally listed plant species also occur on the island, in addition to a second endemic, endangered subspecies of island fox. The waters surrounding Santa Rosa

DEREK LOHUIS/NATIONAL PARK SERVICE

Torrey pines—the rarest pines in the United States—dot the slopes above Water Canyon Beach on Santa Rosa Island.

include three marine reserves where no fishing is allowed.

Santa Cruz Island

Located 20 miles off the coast of Ventura and measuring 61,972 acres, Santa Cruz is the largest of the eight Channel Islands, as well as the largest island off the coast of California. It is rugged and topographically diverse, with a mountain peak of 2,470 feet. The island is split by a large central valley along the Santa Cruz fault. A third subspecies of the endemic island fox inhabits the island.

Though the entire Santa Cruz Island is part of the national park, The Nature Conservancy owns and manages 76 percent of the island, while the Park Service owns and manages the remainder. Cooperative management of The Nature Conservancy lands is authorized, thus federal funds may be used to support research, resource management, and visitor protection and use.

The waters around Santa Cruz include two marine reserves where fishing is not allowed, as well as a marine conservation area where fishing is limited. The largest and deepest known sea cave in the world, Painted Cave, is a popular attraction for divers. Kayakers regularly depart from the Scorpion Anchorage to explore more than 100 sea caves on the island. Bird watching and tide pool exploration are also favorite visitor activities.

Santa Barbara Island

Santa Barbara Island is the smallest of the islands in the park (644 acres, or about one square mile). It is also the furthest south and is considered part of the Southern Channel Islands. Santa Barbara Island is located 38 miles west of Palos Verdes Point on California's mainland, and its highest elevation is 635 feet. A marine reserve where fishing is not allowed surrounds part of the island.

Landing Cove is a popular snorkeling area, where visitors may observe species such as bright sea stars (e.g., *Asterias* spp.), spiny sea urchins (*Strongylocentrotus* spp.), and brilliant orange garibaldi (*Hypsypops rubicundus*). Bird watching is superb on the island and draws a steady stream of participants. Western gulls (*Larus occidentalis*), Xantus's murrelets, and brown pelicans nest on the island's plateaus and steep cliffs.

ROBERT V. SCHWEMMER/NOAA

Topographically diverse Santa Cruz Island is the largest island off the coast of California. The Nature Conservancy owns 76 percent of the island, and the Park Service owns the remainder.

ROBERT V. SCHWEMMER/NOAA

NATURAL RESOURCES—IMPRESSIVE BIODIVERSITY AT RISK

The park's habitats are still recovering from past land use, primarily grazing activities, while non-native species, overfishing, and pollution also affect natural resources. The Park Service has made strides in addressing these and other issues through management efforts such as eradication of a number of non-native animals, reintroduction of native species such as bald eagles, and habitat restoration projects. The prognosis for ecosystem recovery at Channel Islands is good due to these efforts and the park's isolated location.

ONE OF THE "WILDEST PLACES ON EARTH"—ANIMAL LIFE ON THE CHANNEL ISLANDS

Described in many tourist publications as "The Wildest Place on Earth," Channel Islands National Park is home to a vast array of remarkable animals. It is no secret that most visitors make the extra effort to reach the islands for the opportunity to observe wildlife in a natural setting.

Mammals

According to the Park Service's Inventory and Monitoring Program, Channel Islands National Park hosts 45 mammal species; nine of these are

A multitude of marine mammals inhabits Channel Islands National Park, including northern elephant seals.

protected under the Endangered Species Act. Many visitors travel to the park to watch seals, sea lions, and whales. San Miguel Island hosts five species of pinnipeds: northern elephant seals (*Mirounga angustrirostrus*), California sea lions (*Zalophus californianus*), harbor seals (*Phoca vitulina*), northern fur seals (*Callorhinus ursinus*), and federally listed threatened Guadalupe fur seals (*Arctocephalus townsendi*).

The Santa Barbara Channel is an important whale migration corridor, and whale watching is one of the most popular visitor activities. The park and sanctuary waters are home to the largest blue whale (*Balaenoptera musculus*) aggregation in the world. Each summer, about 10 percent of the world's blue whales gather in the Santa Barbara Channel. Sei whales (*Balaenoptera borealis*), fin whales (*Balaenoptera physalus*), humpback whales (*Megaptera novaeangliae*), and sperm whales (*Physter catodon*) can also be seen in the park.

A significant breeding colony of Townsend's big-eared bats (*Corynorhinus townsendii*), a California species of special concern, has been discovered in the bakery room of the Scorpion Ranch adobe building on Santa Cruz Island. Townsend's big-eared bats are very sensitive to disturbance and will often abandon roosting sites following human visitation. Cultural resource managers at Channel Islands would like to open the bakery, which was built in the early 1880s, for interpretive programs, but it is currently closed to visitors for the sake of the bats.

Island foxes are the smallest North American canids and occur only on the Channel Islands. Adult males weigh just five to six pounds and are about the size of a small house cat. Island fox populations in the park declined precipitously in the mid-1990s—dropping as much as 95 percent in five years—due to predation by golden eagles (*Aquila chrysaetos*). A lack of territorial, aggressive, and competitive bald eagles (*Heliaeetus leucocephalus*)—a species that had declined because of DDT poisoning—allowed golden eagles to thrive on an abundance of prey, such as feral pigs on Santa Cruz and mule deer fawns and carrion on Santa Rosa. The Park Service implemented an ecosystem-wide recovery program for the fox in 1999, involving captive breeding, removal of feral pigs, golden eagle relocation, and bald eagle introductions. Today, populations of all three island fox subspecies inhabit their respective islands of Santa Rosa, Santa Cruz, and San Miguel.

ROBERT V. SCHWEMMER/NOAA

Visitors to Channel Islands National Park may see some humpback, blue, sei, fin, or sperm whales.

NATIONAL PARK SERVICE

Channel Islands National Park provides important habitat for nesting seabirds such as the endangered California brown pelican. Kayakers, boaters, and light from fishing boats can disturb these birds.

Birds

Channel Islands National Park provides habitat for 354 bird species, 349 of which are native. Because the California mainland's sandy beaches are intensely used by humans, sandy beaches on the Channel Islands provide important refuges for birds. The islands serve as key areas for nesting seabirds such as western gulls, Cassin's auklets (*Ptychoramphus aleuticus*), Brandt's cormorants (*Phalacrocorax penicillatus*), Xantus's murrelets, and California brown pelicans. Santa Barbara Island supports particularly large populations of murrelets and pelicans, while Anacapa's rocky shoreline, sea stacks, and sea caves support large gull and brown pelican nesting colonies. Terrestrial access to the western two islets of Anacapa is restricted to protect the birds, but kayakers and boaters may disturb the colonies. Light from squid fishing boats also disturbs and confuses nesting seabirds.

Twenty-five percent of the 40 species of terrestrial birds that nest in the park are endemic species or subspecies. The island scrub jay (*Aphelocoma insularis*) is found only on Santa Cruz Island. Park staff believe that island scrub jay populations could be declining due to unknown factors; they are vulnerable to any major disturbance or avian disease such as West Nile virus or avian influenza. The loss of cover associated with declines in chaparral and scrub habitats has negative implications for nesting land birds. An endemic subspecies of song sparrow (*Melospiza melodia*) was driven to extinction on Santa Barbara Island due to habitat destruction and depredation by introduced animals.

Reptiles, Amphibians, and Other Species

Ten species of reptiles and three amphibian species, all of which are native, are present at Channel Islands National Park. Four of the reptiles are federally listed as threatened or endangered, including the endemic island night lizard (*Xantusia riversiana*) and loggerhead

Threatened island night lizards, which are endemic to the Channel Islands, are found on Santa Barbara Island as well as San Clemente and San Nicolas Islands, which are not within the park.

NATIONAL PARK SERVICE

ROBERT V. SCHWEMMER/NOAA

Giant kelp forests in the waters around the Channel Islands support nearly 1,000 species of marine life.

(*Caretta caretta*), green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) sea turtles. Though the turtles do not breed at the park, they occasionally visit park waters.

Little information exists regarding terrestrial invertebrates present at Channel Islands National Park.

MARINE HABITATS—REFUGIES OF RICH BIODIVERSITY SURROUND THE ISLANDS

Nearly half of Channel Islands National Park—about 125,000 acres—is found in the waters that extend one nautical mile around each island. There are nearly 180 miles of dramatic interface between land and sea along park shorelines. The ocean masks the topographic relief of the park. From the top of Diablo Peak on Santa Cruz Island, to the bottom of the nearby submarine canyon, is equivalent to going from the top to the bottom of the Grand Canyon. The park's underwater seascapes include broad sandy plains, ancient inundated shoreline terraces, rocky reefs, and abyssal submarine canyons.

The Channel Islands are located at the convergence of cold arctic and warm tropical currents, which results in an upwelling of nutrients. Cold water from the California Current sweeps down the North American coast from the Gulf of Alaska and surrounds San Miguel Island and Santa Rosa Island. The assemblages of fish, invertebrates, and plants in this western part of the park resemble those found off the coast of Oregon. A counter current brings warm water up from Baja California along the mainland coast, swirling around Santa Barbara and Anacapa Islands and the eastern side of Santa Cruz Island, which supports biological communities reminiscent of northern Mexico. Between these extremes, along the western coast of Santa Cruz

Island, a dynamic transition zone provides a unique place for those plants and animals tolerant of widely varying environmental conditions.

A region of persistent upwelling lies just north and west of the park, off of Point Conception. This brings nutrient-rich waters from the deep sea up into bright sunlight. Photosynthesis by microscopic phytoplankton combines the nutrients and sunlight to form the base of a massive food web that supports the largest animals on earth, blue whales, and apex predators such as white sharks, orcas, and elephant seals. A series of interconnected deep ocean basins and ridges lie south and west of the park islands. These deep basins provide additional sources of nutrients during winter winds that cause upwelling along the southern shores of the northern islands.

Perhaps the most famous marine environments within the Channel Islands National Park are the giant kelp (*Macrocystis pyrifera*) forests that surround the islands in relatively shallow rocky reefs to depths of 100 feet or more. These ecosystems, which are temperate equivalents of tropical rainforests and coral reefs, shelter nearly 1,000 species of marine life. Many scuba divers and snorkeling tourists are drawn there for the incredible array of sea creatures the forests support, making Channel Islands National Park one of the world's premiere diving destinations. The park encompasses one-third of southern California's kelp forests.

Coastal wetlands in the park provide important habitat for certain species. Small wetlands at the mouths of streams on Santa Cruz and Santa Rosa are populated by a mixture of native and non-native vegetation. Wetlands in Prisoner's Harbor and Scorpion Bay on Santa Cruz are cut off from marine systems for most of the year by gravel bars, and they have been degraded by past ranching activities. Some were filled to create corrals and level ranch sites; sheep grazed on others. Since sheep removal in 1999, these areas have been recovering.

NO-FISHING ZONES EXPANDED

Channel Islands National Park's boundaries extend one nautical mile out from each island and include rocky cliffs, small islets, the rocky intertidal zone, soft-bottom habitats, and deeper marine environments. The Park Service's jurisdiction covers the entire marine environment within the park's perimeter, though the State of California retains ownership over the submerged lands and waters, and the marine resources therein. Other entities, including the National Oceanic and Atmospheric Administration (NOAA), also have mandates that extend into marine waters within the park's boundaries.

New regulations, promulgated by NOAA, that went into effect in August 2007 more than doubled existing no-fishing zones, adding nearly 150 square nautical miles to existing protected waters. No fishing of any kind is allowed in these areas. The park has been monitoring 16 sites in kelp forests at the Channel Islands for more than 20 years. The data from this program were instrumental in the establishment of these marine reserves because they documented the decline in the marine ecosystem in spite of the efforts of managers to sustain fisheries. Resource managers use the marine reserves as a baseline for comparative studies and hope these reserves will allow underwater ecosystems to begin to recover from overfishing in the coming decades. An interdisciplinary scientific panel recommended that additional waters be protected, however, to ensure that the natural biodiversity of the marine environment is preserved.

ROBERT V. SCHWEMMER/NOAA

Rocky shoreline makes up the majority of the water's edge at Channel Islands National Park. The rocky intertidal zone is an extremely harsh environment. Organisms living there must cope with desiccation, changes in salinity and temperature, and wave pressure. Still, the rocky intertidal zone is very important habitat for some species. For example, most of the remaining black abalone (*Haliotis cracherodii*) in southern California inhabit the rocky intertidal zone of the Channel Islands. Tide pools, which are often in a degraded condition on the mainland, are better protected on the islands and are a popular feature for tourists to explore. Treating them with care is critical because these delicate areas are easily damaged by visitors who remove souvenirs (e.g., shells and starfish) or walk through the pools.

About 20 percent of Channel Islands National Park's shoreline is sandy beach, which is found primarily on Santa Cruz, Santa Rosa, and San Miguel Islands. Sandy beaches, severe environments with little stability, provide important habitat for many arthropods and other invertebrates such as worms, crustaceans, snails, and clams. Marine debris (including organic matter such as fish carcasses) and kelp and seaweed that wash up on shore are important food sources for beach inhabitants. Shorebirds such as the threatened western snowy plover (*Charadrius alexandrinus nivosus*) use sandy beaches to forage and rest. Birds such as gulls, ravens (*Corvus corax*), and bald eagles feed on carcasses that wash ashore. For seals and sea lions, sandy beaches provide breeding habitat. More than 125,000 seals and sea lions breed and haul out on San Miguel's sandy beaches each year.

Sandy bottom habitat is present in submerged areas off the beaches and is home to a variety of burrowing organisms such as clams and worms. This substrate can support eelgrass (*Zostera marina*) beds at depths of 20 to 40 feet. Eelgrass beds provide habitat and food for nearly twice the number of species that nearby sandy intertidal and subtidal habitats do, and they are important nurseries for a diverse array of fishes. Frenchy's Cove on Anacapa Island had

ROBERT V. SCHWEMMER/NOAA

Eelgrass beds, which sustain a diversity of marine species, are susceptible to overgrazing by sea urchins. Without sea otters to keep populations in check, urchins can multiply and devastate areas, creating what are called barrens.

supported an eelgrass bed until the 1980s, when the bed was decimated by the overgrazing of white urchins (*Lytichinus anamesus*), a native species whose populations were no longer controlled by sea otter predation (sea otters, *Enhydra lutris*, were extirpated). The Santa Barbara Channelkeeper organization is engaged in a pilot project to re-establish the eelgrass beds by transplanting eelgrass from nearby populations at Santa Cruz Island. This project began in 2002 and has experienced initial success: The eelgrass meadow continues to expand and seedlings have been found beyond the initial transplant zone.

The park also contains deep-water habitats, which extend to a depth of more than 1,000 feet. Little is known about these ecosystems below 150 feet, though many marine birds, seals, and sea lions hunt in deep-water habitat.

UNDERWATER SPECIES—ABALONE, KELP FORESTS, AND FISH IN JEOPARDY

Park ecosystems once supported valuable and productive marine fisheries, but those fisheries have been depleted over the past 25 years. Seven species of abalone have historically populated the Channel Islands, and several are now at risk. For instance, white abalone (*Haliotis sorenseni*), federally listed as endangered, once occupied the Channel Islands' rocky reefs. Highly prized for its tender meat, the white abalone suffered from overharvesting in the 1970s, leading to a major population decline. Virtually no reproduction has occurred in the past three decades; most of the white abalones found today were actually spawned in the late 1960s or early 1970s. Due to this lack of larval exchange, the white abalone now faces extinction. The prognosis for recovery of this species is not good.

Red abalone (*H. rufescens*) populations have also been decimated by overharvesting throughout most of their range. Populations of red abalone continue to decline everywhere in central and southern California except around San Miguel Island, where the populations are at

ROBERT V. SCHWEMMER/NOAA

SHIPPING ACTIVITY THREATENS WHALES

One of the primary international shipping routes between southern California and Asia crosses the Santa Barbara Channel. Because of the location of these two-mile-wide shipping lanes—one a north lane, one a south—dozens of ships pass through the channel near the park each day. The Santa Barbara Channel is also heavily used by migrating whales. About 10 percent of the global blue whale population gathers in the Santa Barbara Channel around the islands each summer, the largest aggregation of these mammals in the world.

Shipping activity in the Santa Barbara Channel has increased noise from engines and horns. Underwater sound pollution from boats is a particular threat to migrating marine mammals such as whales that use sound to locate prey, navigate, and communicate. Distinguishing between natural and artificial sound is important to these animals. Unnatural noise can confuse some species. Certain frequencies of sound may cause whales to become silent or avoid areas altogether. Increased shipping has led to an increase in underwater noise pollution, which is up by at least 10 decibels. In 2005, ships made 7,086 transits along the Santa Barbara County coast. Use of the shipping lanes is expected to increase to 13,000 vessels by 2020.

Ships may also strike and kill whales. During September 2007, four dead blue whales were found along the Santa Barbara Channel, all victims of boat strikes. In the previous 24 years, only five blue whales washed ashore in the same area. Scientists are concerned about what this rise in mortality could mean and are looking for explanations.

DAVID MENKE/US FISH AND WILDLIFE SERVICE

Oil and gas platforms off the coast of Santa Barbara and Ventura Counties release contaminants such as hydrocarbons, heavy metals, and chemical additives into the Santa Barbara Channel.

their highest density. However, the minimum viable abundance listed in the State of California Abalone Recovery Plan is not met at this location.

Black abalone is listed as a species of special concern in California. In the absence of sea otters, it once dominated the rocky intertidal zone at the park, but overfishing and disease (possibly facilitated by the high densities) have caused population declines. In the mid-1980s, withering syndrome attacked the Channel Islands populations, and the majority of them collapsed to near extinction by the early 1990s. Pink and green abalone (*H. corrugata* and *H. fulgens*, respectively), which had suffered from overharvest, were also devastated by withering syndrome.

Recovery of white and black abalone, already a challenging prospect, may be further hampered by oil and gas operations. Nineteen oil and gas platforms are located on the continental shelf off the coast of Santa Barbara and Ventura Counties. One of these platforms is a mere six miles north of Anacapa Island. Oil and gas platforms release "produced water," a by-product of oil and gas production, into the Santa Barbara Channel. Each platform generates about 330 million gallons of produced water each year, which contain contaminants such as hydrocarbons, heavy metals, and chemical additives. Studies have found that produced water has negative effects on bivalves and sea urchins.

Oil and gas platforms also pose the risk of a catastrophic oil spill. In 1969, more than 80,000 barrels of oil spilled from a platform about six miles south of Santa Barbara. Eight hundred square miles of ocean and 35 miles of coastline were contaminated, with tragic consequences for animals in the vicinity. Incoming tides brought the bodies of dead seals and dolphins to shore, and contact with oil from this spill was blamed for the deaths of at least 3,686 birds. An additional 843 small-scale spills have occurred in the region since 1969. Another large oil spill could be disastrous to already stressed marine ecosystems in the park. Seabirds such as brown pelicans and Xantus's murrelets breed in large numbers in the park. An oil spill affecting their rookeries could cause populations to crash.

The expansion of sea urchin (*Strongylocentrotus* spp.) populations in rocky reef environments at the park is another concern. Sea urchins are algae grazers, and in healthy kelp forests they feed on pieces of vegetation shed from kelp. When kelp forests are removed by storms, harvest, or warm water El Niño events, sea urchins forage on young kelp recruits, preventing the re-establishment of new kelp forests and creating sea urchin barrens—areas without any vegetation or associated animals. Urchin populations were historically kept in check by predatory fish, lobsters, and sea otters. The local extirpation of the sea otter due to overhunting and

the legal prohibition on sea otter reintroduction south of Point Conception have had dramatic impacts on the extent of all kelp forests in southern California.

Reductions in other top predators such as spiny lobsters (*Panulirus interruptus*) and predatory fish have led to reduced kelp extent and species diversity in the kelp forests. El Niño events have also reduced kelp forest coverage at Channel Islands because the kelp cannot tolerate the associated increases in water temperature and salinity. Between 1980 and 1998, 80 percent of the giant kelp in Channel Islands National Park perished. As a consequence, sea urchin barrens continue to dominate the area. However, kelp forests within the protected marine reserves have fared better than their unprotected, fished counterparts.

Overfishing is responsible for regional declines in the stocks of many fish and invertebrates that are harvested within Channel Islands National Park waters. Fishing is also responsible for a shifting baseline; individual fish size has been decreasing. Poaching in the no-fishing areas may be a problem, particularly among sport fishermen, who tend to be less educated about restrictions than commercial fishing companies.

PARK PLANTS—RARE SPECIES PROTECTED ON CHANNEL ISLANDS

The Channel Islands support about 800 species of vascular plants, of which 584 are native. Many of the native plants found on the islands also occur on the mainland, but a significant number of endemic plants also exist. These endemic plants—which are found nowhere else—account for nearly 10 percent of total park flora, or 75 species. Of the endemics, 54 occur on multiple islands and 21 are limited to a single island. Fourteen species are federally listed as threatened or endangered, and more than 70 are considered rare or species of special concern in California.

In 1996, the Park Service, U.S. Fish and Wildlife Service, and U.S. Geological Survey-Biological Resources Division prepared a conservation strategy for native plants. The strategy presents interim and long-term restoration goals for species and habitats, as well as standards to evaluate progress towards those goals. Long-term goals include increasing native habitats and restoring distribution, range, structure, and function of species within all plant communities in the park. Planned future habitat restoration efforts will involve noxious weed eradication, landscape-level treatments to encourage the spread of native plants, and reintroduction of native species.

ROBERT V. SCHWEMMER/NOAA

Spiny lobster populations have declined around the Channel Islands, while sea urchin populations have grown, leading to barren areas lacking vegetation and associated marine animals.

LANDSCAPES CHANGED BY GRAZING

Plants on the Channel Islands evolved without large herbivores, so introduced grazers and browsers severely affected the landscape.

In the late 1840s, Anglo-Americans, Europeans, and other immigrants flooded California, heading westward in the famous "Gold Rush." At this time, island ranching operations began in earnest on the Channel Islands. Evidence of these activities is found on every island in the park. On Santa Cruz, the largest island in the chain, island ranching operations produced a variety of goods, including wool, meat, wine, fruits, nuts, grains, and hay. Sheep ranching continued on Santa Rosa Island until the early 1900s and was followed by cattle ranching. The Vail & Vickers Company operated one of California's biggest cattle ranches on the island for almost 100 years. The company continues to operate a controversial game farm there today, which includes non-native deer and elk (see sidebar "Fate of Santa Rosa Island Spurs Controversy").

Plants on the Channel Islands evolved without large herbivores, so introduced grazers and browsers severely affected the landscape. Ranching (sheep and cattle) and the introduction of non-native herbivores (deer, elk, pigs, donkeys, and rabbits) reduced native plant species cover, density, and biomass; eliminated the soil litter layer; and resulted in a lack of recruitment of native woody plants and the loss of native seed banks. In addition to consuming leafy vegetation, grazers trampled small plants and ate seeds and small shoots.

As a result of grazing and browsing, landscapes in the park, which were once largely composed of native scrub, chaparral, grassland, and woodland, became, in some areas, grassland dominated by non-native annual grasses. In other areas, native opuntia cactus (*Opuntia* spp.), which is not edible to grazing animals, formed thickets. Chaparral, a habitat characterized by thickets of small shrubs and trees, once occurred widely on Santa Cruz, Santa Rosa, and San Miguel, but it was greatly diminished by grazing. Chaparral was eliminated altogether on San Miguel due to sheep grazing and browsing, but this habitat shows signs of recovery in some areas on Santa Rosa where certain non-native animals have been removed. In other areas on Santa Rosa, chaparral has been transformed into open areas riddled with game trails created by non-native deer and elk. The lower branches of shrubs have been grazed and browsed, creating unnatural treelike shapes. A lack of seedlings and young trees has reduced structural complexity in these systems and greatly diminished the water input to the island because of the lack of trees to capture moisture from fog.

Riparian areas on Santa Cruz, Santa Rosa, and San Miguel Islands also suffer the effects of grazing, and bishop pine (*Pinus muricata*) forests on Santa Rosa that have been grazed have only recently shown signs of recruitment with the removal of cattle and decrease in deer and elk. The endemic island manzanita (*Arctostaphylus confertiflora*) has little or no seed bank. Coastal sage scrub, too, has been heavily affected, although there are some relatively large intact areas on Santa Cruz Island. The removal of grazers from Anacapa, Santa Barbara, Santa Cruz, and San Miguel Islands was followed by an increase in coastal sage scrub, coastal bluff scrub, and coastal dune scrub habitat. Most of the island oak groves on Santa Rosa Island have been eliminated and are not able to regenerate due to the lack of soil and grazing and trampling by deer and elk.

Grazing is also responsible for altering microclimates. Fog drip, an important water source that occurs when fog condenses on vegetation, has been reduced as shorter,

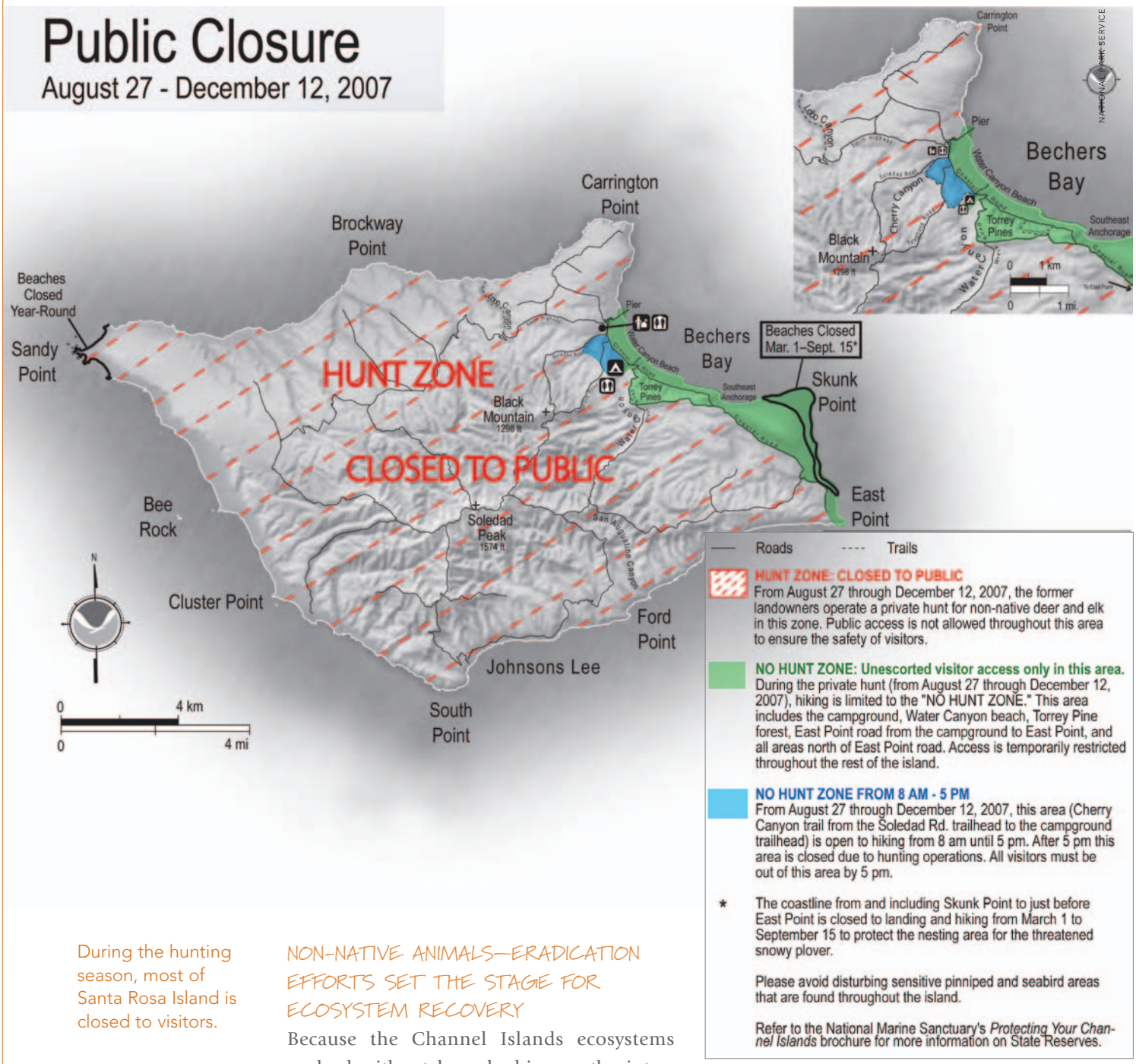
ELISE FERRARESE

non-native grasses have replaced taller, native species. In addition, top layers of soil have been lost because of grazing, leading to reduced nutrient supplies, widespread erosion, and landslides. Ideally, biological soil crusts—living associations of cyanobacteria, lichens, and mosses—should cover soil surfaces throughout the islands, making them more stable, fertile, and able to absorb water. These delicate soil crusts take hundreds of years to develop, but disturbance caused by the foraging of non-native mammals can destroy them almost instantaneously.

Finally, grazing has led to widespread species and plant community isolation. Large non-native grasslands hinder native plant dispersal, and some non-native species prevent native plant recolonization.

Prospects for recovery of island plant communities from grazing are good. In 1989, The Nature Conservancy (TNC) constructed a fence between its portion of Santa Cruz and the eastern portion owned by the Park Service. After the fence was built, TNC removed 37,171 feral sheep. Within a decade, vegetation on the TNC side of the fence was well on the road to recovery. In 1999 and 2000, the Park Service removed 9,270 sheep from the eastern portion of the island. The last sheep were removed from Channel Islands National Park in 2004, and the islands are currently in the process of recovering from sheep grazing.

Grazing and browsing by non-native animals disturbed native ecosystems and facilitated the spread of non-native, invasive plants such as fennel. The park has eliminated most of the non-native mammal species, but it does not have enough staff and funds to keep pace with certain invasive plants.



During the hunting season, most of Santa Rosa Island is closed to visitors.

NON-NATIVE ANIMALS—ERADICATION EFFORTS SET THE STAGE FOR ECOSYSTEM RECOVERY

Because the Channel Islands ecosystems evolved without large herbivores, the introduction of non-native animals and domestic livestock severely damaged landscapes unprepared for the grazing that occurred. Removing non-native mammals to help restore terrestrial ecosystems has been a long-term priority for the park. Donkeys were eliminated from San Miguel and cats were eliminated from Santa Barbara prior to the formation of the national park. Rabbits that were introduced to Santa Barbara Island by the U.S. Navy as an emergency food source in the 1940s were eliminated in 1981; since their removal, the Santa Barbara Island liveforever (*Dudleya traskiae*), a federally listed endangered plant,

FATE OF SANTA ROSA ISLAND SPURS CONTROVERSY

Walter L. Vail and J.V. Vickers of the Vail & Vickers Company began to acquire portions of Santa Rosa Island in 1901 by purchasing parcels from heirs of the More family, which had operated sheep ranches on the island for four decades. Over the next 30 years, Vail and Vickers acquired additional shares of the island and replaced the sheep with cattle, which were brought to the island prior to being shipped to market. They also introduced elk and Kaibab mule deer for private hunts. In 1978, Vail & Vickers Company contracted Multiple Use Managers, Incorporated (MUM) to conduct commercial hunts on Santa Rosa Island to both manage the growing elk and deer populations and provide additional revenue to the Vail family. Every year since then, hunters have pursued elk and deer.

Although hunting is allowed in national preserves, it is typically prohibited in national parks; Santa Rosa Island is the only location within a national park where hunting is occurring. Because of this activity, most of the island (about 90 percent) must be closed to visitors during hunting season. When the national park was created in 1980, the Vails worked with Congress to insert a requirement in the park's legislation that Santa Rosa Island would be the federal government's highest priority for acquisition in the park. Though Santa Rosa Island was within the park's authorized boundary, the federal government did not acquire the island until 1986, when it was purchased from Vail & Vickers for $29.5 million. As part of the purchase, Vail & Vickers retained a 25-year use and occupancy permit for 7.6 acres and were given three months to continue commercial operations. In late 1987, the Park Service gave Vail & Vickers a five-year permit to continue their operation; the Park Service renewed this permit in 1992.

In 1997, largely due to concerns raised about harm to endangered species by the Vail & Vickers operations, the Park Service, NPCA, and Vail & Vickers agreed to a court-sanctioned settlement that included the removal of cattle from Santa Rosa Island by 1999 and the removal of non-native mule deer and elk by the end of 2011. The removal of these herds is key to fulfilling the Park Service's vision for the island, which includes the maximum protection of endangered species and enhanced visitor recreational opportunities. Since 1997, the Park Service has given Vail & Vickers five-year permits that have allowed the company to continue its commercial hunting operation on the island. The current permit runs through 2008; the company must terminate all activities by the end of 2011.

Non-native elk and deer were introduced to Santa Rosa Island before Channel Islands National Park was established.

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is responding positively, though it has been affected by expanded pelican breeding on that island.

Black rats (*Rattus rattus*) most likely arrived on the islands with shipments for the ranching industry, on ships, or in the case of Anacapa, with construction traffic for the light station. Black rats have been implicated in 40 to 60 percent of recorded bird and reptile extinctions worldwide since the 1600s, so their presence on islands where birds and reptiles evolved without mammalian predators is a serious conservation concern. Black rats were successfully eradicated from Anacapa in 2002 using rodenticides. This eradication process required extensive mitigation actions to ensure native rodents and predatory birds were not harmed. For example, Anacapa's islets were treated sequentially, mice and predatory birds were held in captivity when rodenticides were applied, and the rodenticide bait was specially formulated for this application. The park plans on implementing a similar eradication program on San Miguel. On Anacapa, the deer mouse population has recovered substantially since the rats were removed. Xantus's murrelet nests were monitored prior to and following rat removal, and results have shown that the number, extent, and success of nests is increasing since rat removal. Lizard population density has also increased.

Feral pigs were removed from Santa Rosa in 1993 and cattle were removed in 1998. Monitoring results indicate that plants and vegetation communities are responding favorably. A feral pig eradication program was implemented on Santa Cruz in 2005 as part of a larger island restoration plan. The program successfully eliminated pigs by 2007.

Though feral pigs are no longer a problem, Santa Rosa has a larger non-native mammal concern. The island continues to harbor herds of introduced Kaibab mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*), which are part of a private hunting ranch that still operates on the island. Deer and elk threaten the ecosystems of Santa Rosa Island, primarily by feeding on endangered, endemic, and other native plants.

Efforts to remove feral introduced European honeybees (*Apis mellifera mellifera*) on Santa Cruz Island have been successful. Native bee abundance began to increase shortly after the removal program began. Highly invasive Argentine ants (*Iridomyrmex humilis*), which are a problem throughout California, are still present on Santa Cruz Island, however, and continue to be a cause for concern. They displace or kill native ants, eat native plant seeds, and can even kill newly hatched birds. The park needs funds to eliminate the ants.

Funds are needed to support additional water monitoring and marine pollution studies.

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WATER RESOURCES—MORE MONITORING AND STUDIES NEEDED

According to a 2006 assessment of coastal water resources and watershed conditions at Channel Islands National Park, marine water pollution is virtually unstudied in the park, despite plentiful evidence showing that the marine food web contains PCBs, DDT, and PAHs. These toxins likely originate from mainland sources and ocean sites not within the park's boundaries. Studies of mussels within park and sanctuary waters by the National Oceanic and

Atmospheric Administration and the State of California reveal that the park water column contains trace metals, biocides, and other organic compounds.

Sources of human-caused water contamination include runoff from the mainland, ocean outfalls for wastewater, ocean chemical dumps, produced water discharge from oil and gas platforms, oil spills, and discharges from marine shipping vessels. Some of these activities are legal, according to state or federal regulations. Some water pollution also occurs within park boundaries when private and commercial boats intentionally or accidentally discharge wastes into park waters. On busy weekends, heavily used waters surrounding park anchorages are contaminated with bacteria from sewage discharge.

The California Cooperative Oceanic Fisheries Investigations and University of California at Santa Barbara measure temperature, dissolved nutrients, salinity, and other basic oceanic parameters at various stations near several of the islands. The park has recorded water temperatures as part of the kelp monitoring program since 1985. Additional monitoring is needed to gain a comprehensive understanding of water quality.

Minimal information is available on freshwater resources in the park. A water quality baseline report was completed in 1999. Basic water quality parameters were measured at three streams on Santa Rosa Island in the 1990s to assess the effects of livestock on the watersheds. These measurements revealed high turbidity, fecal coliform, and total coliform, and low dissolved oxygen concentrations. As a result of these findings, a cleanup and abatement order was issued under the Clean Water Act. Not surprisingly, water quality in these streams improved drastically following the removal of cattle from the island. Physical measurements, including water depth, turbidity, salinity and temperature are routinely taken at three coastal lagoons on Santa Rosa, but no chemical measurements are made. Santa Rosa is the only island that is regularly monitored, though data are occasionally gathered from Santa Cruz.

AIR QUALITY—REMOTE LOCATION BENEFITS PARK

At Channel Islands National Park, air quality rated in "fair" condition, according to NPCA's Center for State of the Parks methodology. But the park no longer has any monitoring stations to measure air quality parameters, so there is little data available to comprehensively characterize air quality. Ozone was monitored until 2005 at a monitoring station on Santa Rosa that was part of the Clean Air Status and Trends (CASTnet) and Gaseous Pollutant Monitoring (GPMN) networks, and a 2005 Park Service air quality progress report indicated an improving ozone trend at Channel Islands National Park. The risk of plant injury from ozone was assessed in 2004 and determined to be low, although four plant species sensitive to ozone in the park will require additional management if ozone exposure increases. Currently, the park has no direct way of measuring ozone levels.

Santa Ana winds during the fall and winter affect the air quality of the islands closest to the mainland. These high-velocity onshore winds have the potential to carry air pollutants several hundred miles offshore. The Catalina Eddy air current also carries pollutants from the Los Angeles airshed, which threatens park air quality. In addition, vessels in the Santa Barbara Channel are sources of pollutants such as nitrogen oxides and sulfur oxides. The nearest air quality stations that monitor levels of these pollutants are located on the mainland, so the data they collect do not truly reflect island air quality. To obtain air quality data that more accurately reflect conditions at Channel Islands, monitoring stations are needed on the islands.

ROBERT V. SCHWEMMER/NOAA

A monument on San Miguel Island commemorates explorer Juan Rodriguez Cabrillo. Scholars believe he wintered on one of the Channel Islands in 1542.

CULTURAL RESOURCES—LACK OF STAFF AND FUNDING HAMPERS PROTECTION

Channel Islands National Park scored an overall 63 out of 100 for cultural resource conditions, including archaeology, cultural landscapes, history, historic structures, museum collection and archives, and ethnography (peoples and cultures). This score indicates that the park's cultural resources are in "fair" condition. The scores for cultural resources are based on the results of indicator questions that reflect the National Park Service's own *Cultural Resource Management Guideline* and other policies related to cultural and historical resources.

The park is the site of some 13,000 years of human history, evidenced in thousands of archaeological sites, as well as shipwrecks, ranch complexes, a light station, remains of military facilities, and historic landscape features. Funding and staffing shortfalls make it difficult to care for these and other cultural resources in the manner they deserve.

HISTORY—SECLUDED ISLANDS HAVE A LONG HUMAN HISTORY

About 13,000 years ago, seafaring humans established their homes on the Channel Islands. The Chumash people (a name derived

from the word *Michumash*, meaning "makers of shell bead money") are considered by many to be the first inhabitants. The term "Chumash" actually refers to a common language spoken by more than 150 different, sovereign groups of American Indians distributed across the Channel Islands and the central coast of California. These people were able to survive the harsh island environment by relying heavily on the sea for food. The Chumash produced shell bead money, had advanced basket-weaving technology, and used seafaring plank canoes called *tomols*, which allowed them to develop vast trading networks on the mainland. Chumash villages exhibited a highly developed system of social hierarchy, with an upper class comprised of chiefs, shamans, boat builders, and artisans; a middle class of workers, fishermen, and hunters; and a lower class of the poor and outcast. San Miguel, Santa Cruz, and Santa Rosa Islands harbor all of the park's Chumash village sites. By the time European explorers reached California, some 21 Chumash villages existed on the three main islands.

Juan Rodriguez Cabrillo is credited as the first European to set foot on the coast of California. Scholars believe that Cabrillo and his crew anchored and wintered on one of the Channel Islands in 1542, though the exact location of this anchorage is debated. During this time, the Chumash and the Spanish explorers were involved in combat. At one point in the hostilities, Cabrillo came ashore in an attempt to rescue some of his men and was injured; varying accounts claim that Cabrillo sustained a shattered shinbone or an arm injury. Gangrene eventually set in. Cabrillo died on January 3, 1543, and his crew reportedly buried the explorer on one of the islands. Cabrillo's grave has never been discovered, but a monument placed in 1938 on San Miguel Island overlooking Cuyler Harbor commemorates him.

When California and the Channel Islands came under control of the Spanish crown in 1769, Chumash populations had already been greatly reduced by introduced diseases. Spanish missionaries sought to convert the surviving Chumash to Christianity. By 1815, most of the remaining island Chumash had been relocated to missions on the mainland at Santa Ynez, San Buenaventura, and Santa Barbara. The reorganization of the Chumash society caused an erosion of the previously established base of power. High rates of disease and mortality at the missions also took their toll on the Chumash, resulting in a remnant population by 1930. Today, descendants of these Chumash groups still live throughout southern California.

During the late 1700s and into the 1800s, Russian, British, and American trappers used the Channel Islands as a base for trapping and hunting sea otters. When otter populations crashed, trappers targeted sea lions and seals, which too became threatened. Elephant seals were harvested for their blubber, while California sea lions were captured for zoos until the 1970s. Populations of otters, sea lions, and seals only began to recover from overhunting after the cessation of hunting and the additional protections put in place by the Marine Mammal Protection Act of 1972. Listing under the Endangered Species Act has also benefited otters, though they are not allowed in the park, as indicated in the species recovery plan, to minimize conflicts with shellfish fisheries.

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Ranching was an important activity on Santa Cruz Island during the 19th and 20th centuries. Historic ranching structures still remain on the island.

The rich history resident in Channel Islands National Park warrants detailed study and interpretation.

Interest in ranching on the Channel Islands began with the influx of speculators during the California Gold Rush of the 1840s. On Santa Rosa, huge sheep ranching operations existed until the turn of the 20th century. Vail & Vickers, a privately owned company, replaced the sheep on Santa Rosa with cattle and operated one of the biggest ranches in the state for almost 100 years. On Santa Cruz, the largest island in the chain, ranches included both sheep and cattle. The three smaller islands of Anacapa, San Miguel, and Santa Barbara each were used for small sheep ranching operations in the early 20th century. Ranches were able to prosper for many years, supplying large amounts of meat and wool to California and the nation.

Channel Islands National Park also has a rich maritime history. Chinese abalone fishing camps have been identified on the islands. In addition to terrestrial resources, the park's boundaries include all of the shipwrecks and underwater resources within one nautical mile off the coast of the islands. A wide range of vessels—from Chinese junks to paddle boats and steamers—met their ends in the waters surrounding the Channel Islands. Perhaps the most famous shipwreck within park boundaries is that of the *Winfield Scott*, a passenger steam ship that sank in 1853, after all its passengers and load of gold bullion were ferried safely to shore.

The rich history resident in Channel Islands National Park warrants detailed study and interpretation. The park employs a full-time historian who also serves as the park's cultural resources manager. A wide variety of cultural resources duties and few other cultural resources personnel means that this staff member is only able to dedicate an estimated 1 percent of her time to actual historical research. Most work hours are spent on daily administrative needs.

A historic resource study, including all available information on the park's cultural resources and their historical context, was completed in 2006. The report chronicles the historical development and use of the islands by fishermen, whalers, ranchers, smugglers, the military, the U.S. Coast Guard, and others, and it describes the historic resources associated with these uses. This study is a valuable reference tool for volunteers, interpreters, and researchers.

Though the historic resource study includes much information, other reports and studies such as an administrative history and updated interpretive plan are also needed. Beyond these reports and studies, the park will also need finding aids to help researchers locate cultural resources information. The park's cultural resources manager/historian is currently the only resource available for those seeking information resident in the park's files.

Archaeology—More Staff Needed for Fieldwork

Archaeological resources rank high among the cultural treasures within Channel Islands National Park, and the park represents a valuable opportunity to protect and learn from these resources. Many archaeological sites on the mainland of California have been looted, damaged by development, or disturbed by ground burrowing animals. The Channel Islands sites are mostly undisturbed, and the absence of ground-burrowing animals ensures that many sites retain their context and stability.

Santa Cruz, Anacapa, Santa Barbara, and San Miguel Islands each host an archaeological district on the National Register of Historic Places. These archaeological districts represent the park's prehistoric landscapes. Although Santa Rosa Island is eligible for the National Register as an archaeological district, funds are needed to prepare the nomination. Ancient sites of national significance include Daisy Cave and Arlington Springs. Phil Orr, the curator of anthropology and paleontology at the Santa Barbara Museum of Natural History, discovered the bones of a human on Santa Rosa Island in

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Though archaeological sites within Channel Islands National Park are mostly undisturbed, erosion threatens some sites.

1959. Recent radio-carbon dating indicates the bones are 13,000 years old. This find is significant for at least two reasons: It represents the oldest human remains discovered in North America to date, and it gives credence to the coastal migration theory that ancient peoples first entered North America by following the Pacific coast from Alaska.

In addition to human remains, the park also harbors important fossil remains. During the Pleistocene Era, the islands of Santa Cruz, Santa Rosa, and San Miguel were home to Columbian and pygmy mammoths. The four- to eight-feet-tall pygmy mammoths evolved on the island, having descended from their larger mainland relatives. Scientists believe the mammoths swam across the Santa Barbara Channel some 20,000 to 40,000 years ago, when sea levels were lower. The world's most complete skeleton of a pygmy mammoth was found on Santa Rosa Island in 1994.

To date, archaeologists have identified more than 2,000 archaeological sites on the Channel Islands, including prehistoric villages, camps, ceremonial sites, fishing camps, military sites, ranches, and shipwrecks. The sites identified at present are only a fraction of those that potentially exist on the islands. All identified sites have been recorded and listed in the Archeological Sites Management Information System (ASMIS), a Park Service database for organizing archaeological information. Conditions of most of the sites have not been evaluated recently; in fact, a majority of the condition reports in ASMIS were completed more than five years ago, and many were done in the 1960s.

Other archaeological work is also outdated. The park's archaeological overview and assessment dates to 1976; a new overview currently being prepared will assist in guiding future research and protection efforts. Further inventory and monitoring of underwater archaeological sites could uncover additional sites and would provide documentation needed for monitoring locations that are at risk for looting.

Channel Islands National Park employs an archaeologist, but this staff member was hired on a subject-to-furlough basis, which means that the position is securely funded only six months of the year. With more than 2,000 sites across five islands, there is insufficient staff to survey for additional sites, monitor known sites, undertake site stabilization, carry out compliance with historic preservation laws and regulations, and assist in interpretation of the island archaeology. Making the archaeologist position full-time rather than subject-to-furlough and hiring an archaeological technician would allow the park to better preserve and protect sites.

Administrative responsibilities limit the amount of time that the current archaeologist actually spends in the field, but university researchers help accomplish necessary fieldwork. The park's underwater archaeological sites are monitored and documented with the help of volunteers from Coastal Maritime Archaeology Resources, in cooperation with the Channel Islands National Marine Sanctuary. Only one of the park's shipwrecks, *Winfield Scott*, is currently listed on the National Register of Historic Places. The significance of other wrecks needs to be evaluated and National Register nominations prepared.

Threats to the park's archaeological resources include erosion, looting, and damage caused by the natural elements. Several cases of looting have been successfully prosecuted; one resulted in a felony conviction. With at least two more law enforcement officers, the park would be better able to address looting and other resource protection problems. Surrounded on all sides by the Pacific Ocean, many archaeological sites are constantly bombarded with saltwater spray and face erosion from tidewaters and wind. It is estimated that at least 3,280 cubic feet of midden (mounds of debris from prehistoric human use) are lost each year on Santa Rosa Island alone. Park staff combat this process by placing fabric matting over the sites to halt soil erosion and encourage plant growth to help anchor the soil on lands that were once overgrazed.

In 1994, archaeologists excavated a 12,000-year-old pygmy mammoth skeleton on Santa Rosa Island.

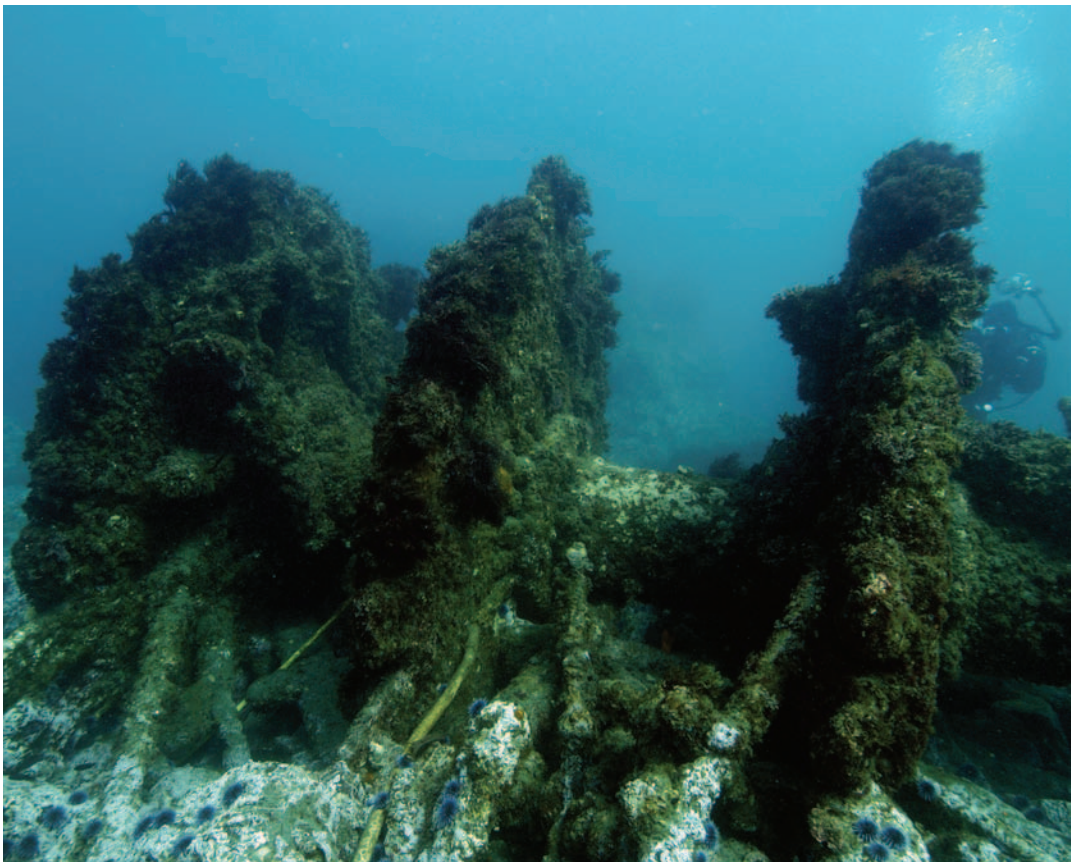
BILL FAULKNER/NATIONAL PARK SERVICE

HISTORIC STRUCTURES—DEFERRED MAINTENANCE COSTS TOP $4.06 MILLION

Buildings and other structures within Channel Islands National Park are physical reminders of the islands' previous uses and include military installations, navigational lighthouses, ranch houses, and ranch support buildings. Sixty-one structures are included on the park's list of classified structures, a list of all prehistoric and historic structures that have historical, architectural, or engineering significance. Of these, 19 are in good condition, 36 are in fair condition, and six are in poor condition. The Anacapa Light Station is listed on the National Register of Historic Places. The ranches on Santa Rosa and Santa Cruz Islands have been determined eligible for the National Register, but they have not yet been listed.

Ranching operations lured people of many different nationalities and ethnic heritages to the islands, such as Italians, French, Mexicans, American Indians, and others. As a result of these diverse cultural influences, varied architectural styles are evident in the ranch houses, barns, storage warehouses, and other buildings on the islands.

Hundreds of vessels are known to have wrecked within park waters and are evidence of



ROBERT V. SCHWEMMER/NOAA

The wreck of the *Winfield Scott* lies within park waters. The ship sank in 1853, though its passengers and load of gold bullion made it safely ashore.

mariners who were unsuccessful in their attempts to navigate the narrow channels between the islands. Only about 20 of these have been located. The 1853 wreck of the *Winfield Scott* highlighted the need for a lighthouse. Congress approved plans for a mainland light in 1874, but it proved ineffective as wrecks continued around the Channel Islands. In 1911, the Bureau of Lighthouses erected a 50-foot metal structure on Anacapa Island. This light, in clear conditions, was visible 20 miles away, but it proved ineffective in fog. In 1921, the steamer *Liebre* wrecked directly beneath the light station. This prompted Congress and the Bureau of Lighthouses to build a permanent lighthouse, equipped with fog signal, radio equipment, and support buildings. It featured a third-order Fresnel lens, the most advanced lighthouse beacon in the world at that time. The lighthouse was first lit in 1932; it was taken over by the U.S. Coast Guard in 1939. Fifteen to 25 personnel lived on the island, maintained the lighthouse, and monitored weather conditions for ships until 1960, when the U.S. Coast Guard automated the lighthouse. In 1989, a solar-powered acrylic lens replaced the original Fresnel lens.

Channel Islands' historic structures face a variety of threats, including lack of maintenance, high winds, seismic activity, outdated electrical systems, lack of fire suppression systems, salt infiltration, termites, mice, dry rot, and general deterioration. Park staff are able to address these issues only with project funding. Funding for all levels of maintenance and preservation is needed, from routine and cyclic maintenance, to seismic retrofit and rehabilitation of structures.

The Nature Conservancy (TNC) owns 76 percent of Santa Cruz Island, including historic ranch complexes related to the 19th- and 20th-century ranching history of the island. Because

The Fresnel lens from the Anacapa lighthouse is displayed in the island's visitor center.

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TNC's focus is on natural resources conservation, the significance of the historic ranching structures may not be fully recognized, and the structures may not be appropriately preserved. The Park Service works cooperatively with TNC to protect the island's natural resources by restoring natural habitats, protecting native species, and controlling or removing troublesome non-native species. Staff hope to extend this cooperation to include cultural resources.

Channel Islands does not employ a full-time historical architect or preservation specialist; instead, the cultural resource manager oversees the preservation and maintenance of historic structures with assistance from contractors, Park Service preservation specialists, and park maintenance staff. The erosion of the staff base in all areas at Channel Islands and a lack of project funding have caused deferred maintenance needs to accumulate. Deferred maintenance costs for structures on all five islands now top $4.06 million.

CULTURAL LANDSCAPES—CROSS-DISCIPLINARY COOPERATION IMPORTANT

Cultural landscapes encompass natural and built features, and they illustrate how people have altered and adapted to their surroundings through time. Within the Channel Islands to date, park staff have identified five major cultural landscapes: Anacapa Light Station, Santa Rosa Island Ranching District, Santa Cruz Island Ranching District, Caire-Gherini Ranch, and the Del Norte Ranch. Anacapa Light Station, considered to be in "good" condition, is the only cultural landscape listed on the National Register of Historic Places. The remaining four landscapes, considered to be in "fair" condition, have been determined eligible for listing.

The park lacks a cultural landscape specialist; instead, the park's cultural resource manager works closely with other natural resource, cultural resource, and maintenance staff to care

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The cultural landscape that includes the Anacapa Light Station is in good condition and is listed on the National Register of Historic Places.

ROBERT V. SCHWEMMER/NOAA

The *tomol*, made of redwood planks and held together with tar and pine pitch, was the traditional watercraft of the Chumash people. Every year since 2004, local Chumash have piloted a *tomol* across the Santa Barbara Channel to Santa Cruz Island.

for historic landscape features. Four of the five identified cultural landscapes (all but the light station) relate to the park's ranching history and include features such as stone walls, wells, and dams, as well as groves of eucalyptus, cypress, walnut, and olive trees. These species are not native to the islands and they have the potential to significantly affect natural resources. But they are important parts of the cultural landscapes, so park staff are working to determine how best to address their management.

Cultural resource staff and the park botanist work together to propagate Monterey cypress from island stock, which are then used to replace dead and dying historic trees. Natural resources staff also help to control the spread of olive trees from the historic grove on Santa Cruz to other locations on the island, and they assist in controlling Italian stone pine (historic, but invasive) and kikuyu grass (overgrowing historic corrals and historic ranch equipment). Managing these non-native species requires continuous effort and may not be possible in all cases. Moreover, existing staff and funds are not sufficient to keep invasive species in check. Park staff continue to grapple with the challenge of preserving historic cultural landscapes while protecting natural resources.

ETHNOGRAPHY (PEOPLES AND CULTURES)—FURTHER STUDIES AND INTERPRETATION WOULD BENEFIT PARK RESOURCES

For thousands of years, different groups of people lived on or visited the Channel Islands and made use of the abundant resources. The Park Service is charged with identifying these traditionally associated people and protecting park resources that are important to them. American Indian groups with connections to the Channel Islands include both the Chumash and the Tongva (also called Gabrieleno). These names encompass many autonomous groups of people who shared a language.

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The park's mainland visitor center in Ventura houses an exhibit that teaches visitors about Chumash shell middens.

The seafaring Chumash made their homes on the islands as far back as 13,000 years ago. Spanish missionaries relocated the Chumash to the mainland in the 1820s. The Tongva people, while based primarily on the mainland, regularly visited and inhabited the Southern Channel Islands of Santa Barbara, San Nicolas, Santa Catalina, and San Clemente. The Tongva, like their Chumash neighbors to the north, were removed from the islands and relocated to missions on the mainland near present-day Los Angeles.

Channel Islands National Park maintains a relationship with the Santa Ynez band of the Chumash, the only federally recognized tribe associated with the islands, and with Chumash individuals in the community. The park historian and archaeologist regularly meet with the Chumash to address issues and concerns such as the treatment of human remains that are exposed by erosion on the islands. The Chumash work with the archaeologist to ensure the remains are properly treated and re-interred on the islands.

Aside from ongoing compliance with the Native American Graves Protection and Repatriation Act (NAGPRA), the park has not engaged in much ethnographic work. A cultural affiliation study is currently the only ethnographic study in place. Island interpreters discuss the traditionally associated peoples and cultures on island hikes, and Chumash storytellers occasionally visit the park and share traditional Chumash songs and stories with visitors. From 2004 to 2007, local Chumash have made an annual crossing of the Santa Barbara Channel to Santa Cruz Island in a *tomol*, their traditional watercraft made from redwood planks held together by tar and pine pitch. The 2007 crossing marked only the fourth time that the Chumash people have crossed the channel in a *tomol* in the past 150 years—a significant event that helps keep alive Chumash traditions.

The park would benefit from increased ethnographic studies, not only of the Chumash and Tongva cultures, but also of the other ethnic groups who hunted and fished around the islands and worked on the island ranches.

MUSEUM COLLECTION AND ARCHIVES—ARTIFACTS NEED ORGANIZATION

Channel Islands National Park maintains a museum collection and archives of more than 400,000 artifacts such as historic photographs, archaeological artifacts, a pygmy mammoth skeleton, and the original Fresnel lens from the Anacapa Light Station. The bulk of the collection (about 300,000 items) is archival. Of the total holdings, an estimated 361,324 items (86 percent of the collection) have not been cataloged, partly because the park does not have a full-time curator, museum technician, or archivist. A regional curator was assigned to the park for one year in 2006 to help organize and update the collection information.

Together with nearby Cabrillo National Monument and Santa Monica Mountains National Recreation Area, the park has requested funds to hire full-time curatorial staff

to serve all three parks. The request calls for funds to upgrade the current curatorial position at Santa Monica Mountains, hire two museum technicians to accession and catalog items, and hire an archivist/librarian to curate and catalog park administrative records.

Most of the objects and artifacts within Channel Islands National Park's museum collection are housed in off-site repositories such as the Santa Barbara Botanic Garden, Santa Barbara Museum of Natural History, Museum of Natural History of Los Angeles County, and University of California at Santa Barbara. This allows them to be professionally curated and accessible to researchers. The park is working to identify and catalog the items in those institutions that are part of the park's collections. In 1991, Channel Islands National Park purchased a modular storage building to house some of its collection on site. This building provided some climate control and security, but maintaining an optimum storage environment was challenging. Insects, natural disasters, humidity, seismic activity, and the marine environment of the park all threatened the collection. The archives and museum collection were recently moved to new leased space in an office building in Ventura Harbor, which provides more space and better climate control.

Display and exhibit space is limited at Channel Islands National Park. The park's mainland visitor center in Ventura displays a plaster cast of a pygmy mammoth skeleton and a cutaway view of a Chumash shell midden site. A visitor center on Anacapa Island houses the Fresnel lens from the island's light station, an item valued at $750,000. The remote location of the island and the difficulties of climate control in the visitor center hamper efforts to care for the lens. To display more of the park's collection and provide better display conditions, the park would need an addition to the existing mainland visitor center.

A plaster cast of a pygmy mammoth skeleton gives visitors a sense of the excitement archaeologists must have felt when they uncovered the fossil remains of one of the islands' prehistoric inhabitants.

RYAN GRAHAM

RYAN GRAHAM

Thousands of students visit Channel Islands National Park each year. Educational materials help them get the most out of their visit by teaching them about aspects of the park's natural and cultural history.

STEWARDSHIP CAPACITY

FUNDING AND STAFFING—SUPPORT NEEDED FOR RESOURCE PROJECTS AND ADDITIONAL STAFF

Stewardship capacity explores how well equipped the Park Service is to protect the parks. The most significant factor affecting a park's ability to protect its resources is the funding a park receives from Congress and the administration.

A 2004 business plan summarizes Channel Islands National Park's funding history, the state of current park operations and funding, and an outline of priorities and funding strategies. The information in this business is reflective of the park's financial situation today.

Appropriated base funding for the park was $4.96 million in 2004, and it has been increasing an average of 5.6 percent per year (adjusted for inflation) since 1985. About 80 percent of the park's appropriated base funding is used to cover fixed costs such as salaries and benefits for permanent staff, utilities, required travel, mandated trainings, and contract services. The remaining portion of the base budget covers park operations, including transportation and logistics. Channel Islands spent more than $6 million on operations in 2004 when the base budget and all non-base appropriated

funds received by the park are taken into account. The park relies on non-base appropriated funds, reimburseables, and revenues to perform basic operations.

In 2004, the park employed 62.5 full-time equivalent staff (FTEs), which reflected a loss of about seven FTEs between 1996 and 2004. The reported staffing shortfall in 2004 was 24 FTEs. This shortfall continues today and burdens remaining staff with jobs for which they do not have the time or expertise.

Resource protection received more than one-third of the park's staffing resources and more than $2.5 million (about 41 percent of park expenses) in 2004. Still, this program lacked about $776,000 in required funding and was short about 8.9 FTEs needed to properly protect resources. Critical unfilled or unfunded positions at Channel Islands include a database manager, full-time geographic information systems (GIS) specialist, biological technicians, compliance/planning specialist, a full-time archaeologist, a preservation specialist, and curatorial staff.

According to the business plan, the park does not have adequate funding and personnel to conduct its own vital signs monitoring. Due to budget limitations, some of the monitoring that was planned is not being done.

Planning—Revised General Management Plan Needed

Park staff are in the process of revising the Channel Islands National Park General Management Plan (GMP), which was last completed in 1985. The GMP directs future management of the park, and it is a valuable tool for resource managers charged with the difficult task of preserving, protecting, and restoring park ecosystems for the next 15 to 20 years. The new GMP is scheduled to be released in 2009.

An updated resource management plan (RMP) for the park was released in 1999. The RMP serves as the park's strategic plan for long-term management of its resources and as a tactical plan for identifying short-term projects. The RMP identifies actions that are currently in place or are needed to protect park resources, while setting priorities. Long-term goals identified in the RMP include inventorying, monitoring, and identifying indicators of natural resource health; restoring terrestrial ecosystems; managing marine resources; maintaining natural ecosystem elements; protecting natural resources; and educating the public.

The Final Environmental Impact Statement for the Santa Cruz Island Primary Restoration Plan was completed in 2002. It details resource protection and recovery through feral pig eradication and non-native fennel (*Foeniculum vulgare*, an invasive plant) control. The five directives of the plan, all of which have been addressed (or completed) by the park, are: restore island foxes, relocate golden eagles to the mainland, re-establish bald eagles to their historic range on the northern Channel Islands, eliminate feral pigs, and control the spread of invasive weeds.

The park's fire management plan was completed in 2006. Goals of the plan are to provide for firefighter and public safety, protect natural and cultural resources, and protect human developments from wildland fire. The plan calls for all wildland fires to be suppressed, due to the vulnerability of the damaged terrestrial ecosystems in the park. The plan also calls for the use of prescribed fire to attain resource management goals.

Resource Education—Visitors Learn the Significance of Park Resources

The Robert J. Lagomarsino Visitor Center is located on the California mainland in Ventura Harbor. It features a museum, a living tide pool exhibit, scaled-relief models of all park islands, an interactive touch screen exhibit, a tower with telescopes for viewing the islands, a bookstore, a picnic area, and an outdoor native plant

Park staff are in the process of revising the Channel Islands National Park General Management Plan.

garden. An auditorium features an introductory movie that plays on a large screen throughout the day. Free natural and cultural resource interpretive programs are offered every weekend. Other programs and school visits can be arranged throughout the week.

The park's website, well designed and easy to navigate, provides each visitor with an introduction to the Channel Islands. It is a valuable educational tool, providing information and research findings to teachers worldwide. The website also contains updates on educational programs available at the visitor center and information about ranger visits to schools.

Visitor contact stations are located on Santa Barbara and Anacapa Islands, offering exhibits and information on the resources of each island. An additional contact station will open at Scorpion Ranch on Santa Cruz Island this year.

Few visitors to Channel Islands National Park are aware that almost half of the park's resources are beneath the sea. The underwater part of the park encompasses one of the most diverse marine environments in the world. Traditionally, this unseen yet crucial marine ecosystem has suffered from an out-of-sight, out-of-mind philosophy. In 1984, the park began using technology to offer visitors a chance to journey into the marine world. Park rangers outfitted with video cameras dive into Landing Cove on East Anacapa. Through video monitors on the island or in the mainland visitor center, visitors can see what the divers see—bright sea stars, spiny sea urchins, iridescent abalone, slow-moving sea cucumbers, and brilliant orange garibaldi. From underwater, the divers explain what their cameras are revealing.

Channel Islands National Park offers a wide range of educational programs. About 20,000 students and teachers take part in visitor center and in-class programs each year. Park staff and volunteers participate in educational fairs, teacher workshops, and Junior Ranger programs. Interpretive offerings on the mainland include talks at the visitor center, off-site community presentations, and media such as displays, signs, and pamphlets. On the islands, interpretive programs include orientations, guided walks, and campground presentations. Sometimes volunteers visit the park and relate traditional Chumash stories and songs.

According to Channel Islands National Park's 2004 business plan, the park needs several additional staff to meet the needs of visitors, including a full-time education coordinator, an additional park guide, and an interpretive media specialist. The park currently relies on volunteers to help staff visitor centers and provide interpretation. An updated interpretive plan would assist staff in training volunteers and identifying topics within the park that need interpretation. Through more frequent and standardized interpretive training, park staff and volunteers would be better informed, and tours would become more standardized, assuring consistent quality.

External Support—Partners and Volunteers Provide Valuable Services

Faced with significant funding and staffing shortfalls, Channel Islands increasingly relies on partners and volunteers to bridge the gap between what is needed and what the park can afford. These partners and volunteers contribute a variety of services and assist with countless tasks—donating storage space, guiding tours, conducting research—that would not be possible given current funding.

Natural resources assistance comes from university researchers, other federal agencies, and private institutions. Volunteers from the Exotic Plant Management Team at Point Reyes National Seashore assist with non-native plant removal and habitat restoration. A researcher from the University of California–Santa Barbara completed a comprehensive assessment of Channel Islands National Park's coastal water resources in 2006. This assess-

ROBERT V. SCHWEMMER/NOAA

Rangers provide a variety of educational programs for students.

ment provides an overview of park freshwater and marine aquatic resources.

The United States Geological Survey operates the Channel Islands Field Station in Ventura in cooperation with the Park Service and University of California–Santa Barbara. Channel Islands Field Station scientists study the ecology and conservation biology of sensitive plants and animals of the Channel Islands and surrounding waters.

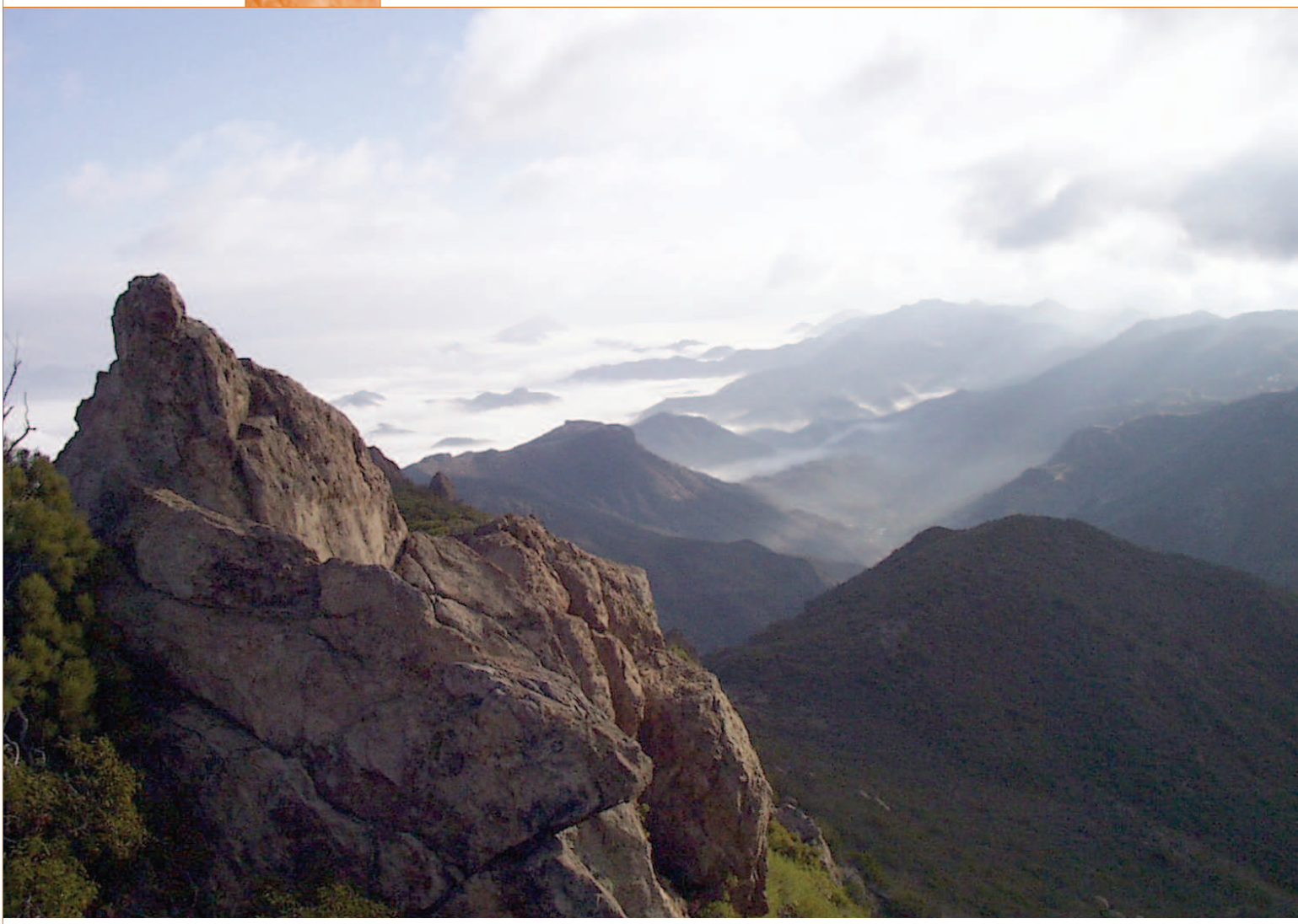
The National Oceanic and Atmospheric Administration conducts research in the Channel Islands National Marine Sanctuary on ecosystem health, focusing on living marine resources, the impact of human activities, and the effects of resource management activities. The Partnership for Interdisciplinary Studies of Coastal Oceans works in Channel Islands National Park and integrates long-term ecological and oceanographic monitoring with experimental work on individuals, species, populations, and communities.

Researchers from institutions across the nation and around the world have conducted hundreds of scientific studies in the park. Research themes include general ecological monitoring, terrestrial and marine ecology, oceanography, and geological investigations.

Universities assist Channel Islands National Park with the study and monitoring of cultural resources such as terrestrial archaeological sites. The park's underwater archaeological sites are monitored and documented with the help of Coastal Maritime Archaeology Resources, in cooperation with the Channel Islands National Marine Sanctuary. The Santa Cruz Island Foundation also provides support for a variety of cultural resource needs.

SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA

NATIONAL PARK SERVICE



Santa Monica Mountains National Recreation Area provides an escape from the city and suburbs to natural areas that sustain a host of wildlife and harbor an array of cultural resources.

REPORT SUMMARY

Los Angeles is the second-largest city in the United States, and it is a sprawling one. It is also home to the world's largest urban national park, Santa Monica Mountains National Recreation Area. At 154,095 acres in size, this park, just north of the Los Angeles Basin, extends east to west across the metropolitan area. Areas within the park boundary include Cheeseboro and Palo Comado Canyons north of the mountains, as well as a finger of land east of the mountains following the canyons along Mulholland Drive to the towns of Beverly Hills and Hollywood. The park encompasses the city of Malibu and portions of other cities, particularly along the California State Highway 101 corridor. Santa Monica Mountains National Recreation Area offers residents and visitors alike an escape from the city and suburbs to a playground of beaches, rugged backcountry,

cool canyons, and scenic mountain vistas.

For thousands of years, the Santa Monica Mountains have been home to native peoples such as the Chumash, an assemblage that is comprised of more than 150 different groups who shared a language. European settlement of present-day California began with visits by Spanish explorers in the 16th century. Native populations were heavily influenced by the Spanish by the late 18th century, when missionaries arrived, erected mission ranches, and began to convert native peoples to Catholicism. In the 19th century, land granted to soldiers by Mexican governors ushered in the *rancho* period. After California achieved statehood in 1850, existing and new ranches flourished, fostered by newly arrived investors and immigrant workers. At the onset of the 20th century, the film industry was born in Los Angeles, a sunny location of varied landscapes.

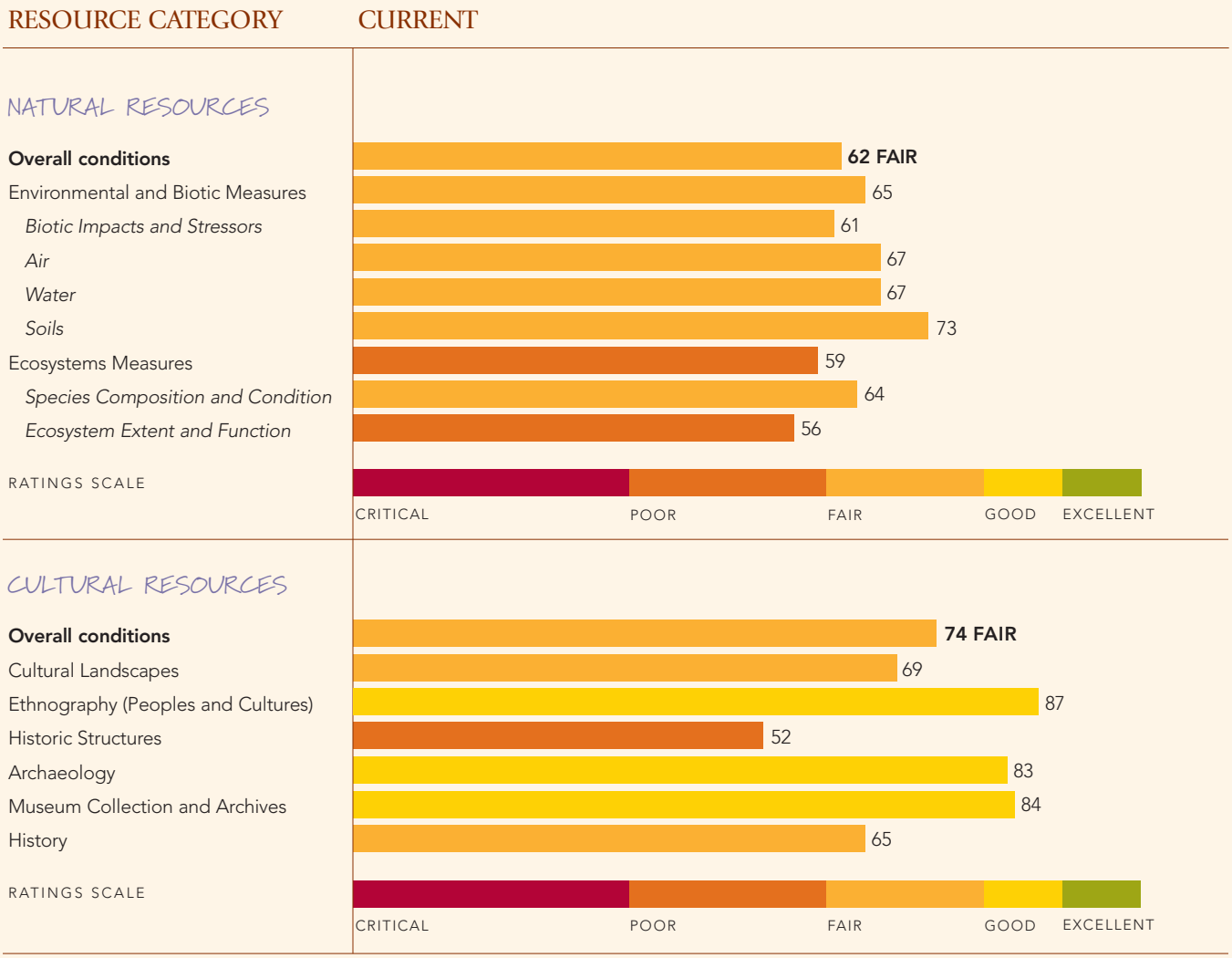
As city growth accelerated in the mid-1900s, residents realized the need to set land aside for nature and recreation. A small but devoted group of activists was instrumental in the formation of Santa Monica Mountains National Recreation Area, and after years of collaboration among various private individuals and entities, the park was established in 1978.

While Santa Monica Mountains National Recreation Area is primarily managed by the National Park Service, its boundaries, which roughly follow the Santa Monica Mountain Range and the Pacific Ocean, encompass a mosaic of federal, state, and private properties. (See map on pages 54 and 55.) More than half of the land within the park boundary is public land; the Park Service owns about 28 percent of this public land and about 15 percent of the total land within the boundary. Four California state parks (Point Mugu, Leo Carillo, Malibu Creek, and Topanga) make up more than 35,000 acres. The Park Service works with the

NATIONAL PARK SERVICE

The park has provided the backdrop for a number of films over the last decades.

Note: When interpreting the scores for resource conditions, recognize that critical information upon which the ratings are based is not always available. This limits data interpretation to some extent. For Santa Monica Mountains National Recreational Area, 70 percent of the natural resources information was available and 99 percent of the cultural resources information was available.



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

California Department of Parks and Recreation, the Santa Monica Mountains Conservancy, and an additional 70 public agency partners to administer the public lands. Although there are about 70,000 acres of private land within the park's boundaries, about 90 percent of the total national recreation area land remains undeveloped.

Santa Monica Mountains National Recreation Area is home to more than 1,000 archaeological sites and 450 animal species, and it is considered by many to be the best mainland example of a Mediterranean biome in the entire National Park System. For many residents, the park is the heart and soul of outdoor activities in the city, providing places to celebrate with family members, recreate, observe nature, and attend festivals. Like many parks, the recreation area is understaffed and underfunded, resulting in the need for outside financial support and volunteers to accomplish management objectives.

RATINGS

Current overall conditions of the known **natural resources** in Santa Monica Mountains National Recreation Area rated a "fair" score of 62 out of 100. Ratings were assigned through an evaluation of park research and monitoring data using NPCA's Center for State of the Parks comprehensive assessment methodology (see "Appendix"). Habitat fragmentation from residential and commercial development, air and water pollution from nearby urban areas, and complex land ownership issues are major concerns.

Overall conditions of the park's known **cultural resources** rated 74 out of a possible 100, indicating "fair" conditions. A lack of funding and personnel contributes to work backlogs, most notably with regard to the nomination of sites to the National Register of Historic Places.

SANTA MONICA MOUNTAINS NATIONAL RECREATIONAL AREA AT A GLANCE

- Established in 1978, the park spans 46 miles across Los Angeles, from Point Mugu's beaches in the west to the city's famous Griffith Park in the east. The park spans 26 zip codes—more than any other unit of the National Park System. In addition to the National Park Service, there are more than 70 other agencies and stakeholders with jurisdiction over various lands within the park's boundaries.
- Considered "young" in geological time, the Santa Monica Mountains were formed 70 to 200 million years ago from seismic activity along the San Andreas Fault. This mountain range is one of the few in the country to run east to west. A combination of steep slopes and poorly cemented sedimentary rocks makes it particularly susceptible to landslides and erosion.
- Because of the varied landscapes in the park and an ideal climate that rarely delays shooting, Hollywood studios have used this setting for hundreds of productions, from westerns to surfer movies. Paramount Ranch, the last working movie set in the park, offers visitors a chance to see filmmaking in action.
- The Santa Monica Mountains are considered a "biodiversity hot spot," supporting about 400 bird, 50 mammal, 35 reptile and amphibian, and more than 1,000 plant species. Of these, more than 100 species receive special protection or are considered rare, threatened, or endangered.
- More than 1,000 archaeological sites are located within the recreation area, as well as 26 known Chumash pictograph sites and three structures listed on the National Register of Historic Places.

The park supports threatened *Dudleya cymosa* ssp. *ovatifolia*.

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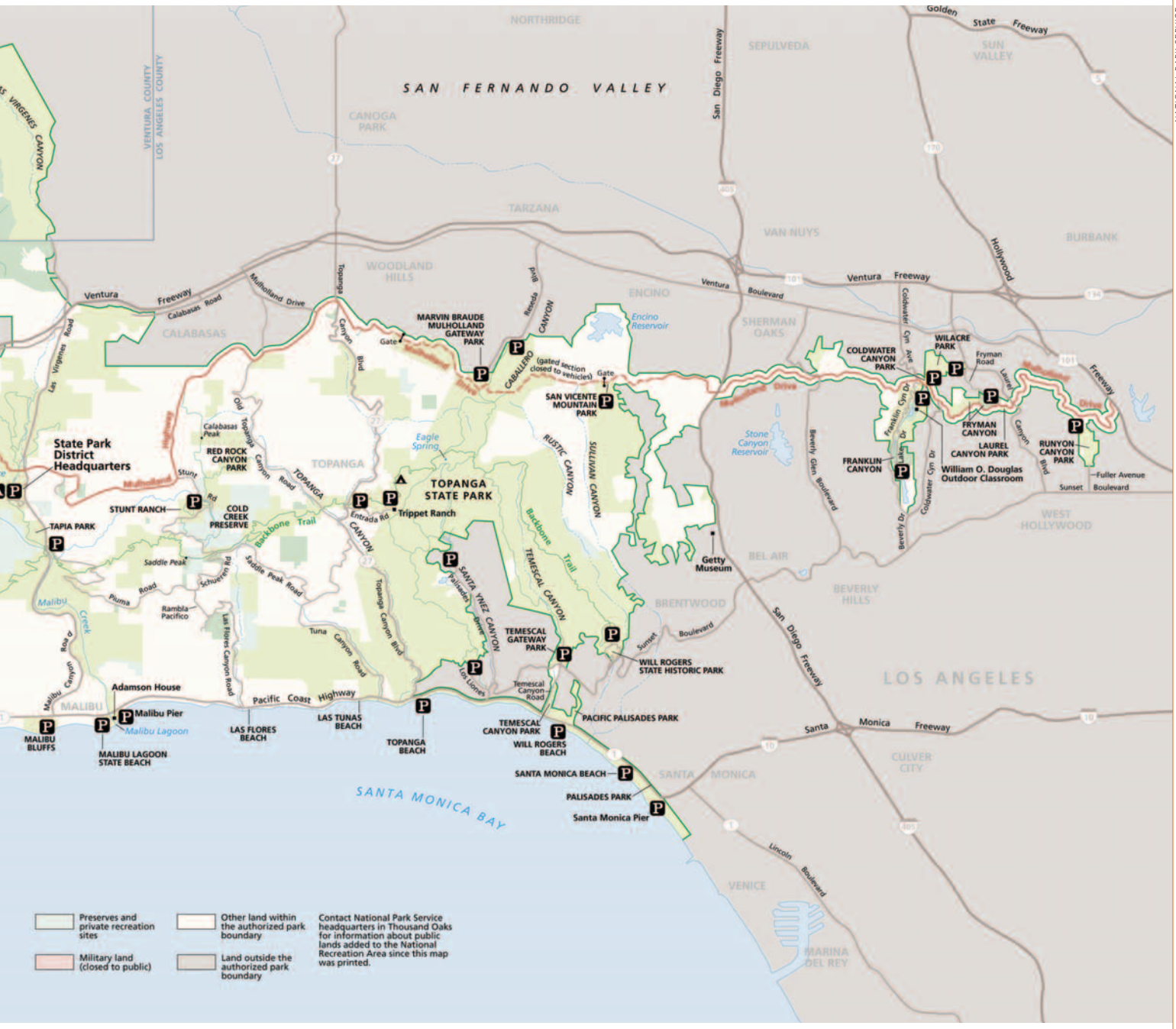
SANTA MONICA MOUNTAINS NATIONAL RECREATIONAL AREA



TONY VALOIS/NATIONAL PARK SERVICE

KEY FINDINGS

- Urban growth and development, habitat fragmentation, invasive species, and human-caused fires threaten the ecological integrity of Santa Monica Mountains National Recreation Area. The park is surrounded by private property, and close to 70,000 acres of privately owned land are contained within the park's boundaries. At the present time, about 78 percent of the private land in the national recreation area is undeveloped—yet potentially developable. On average, 1,300 acres of private land within the park are developed each year. Although the park has the right to review and comment on permit applications, the number received overwhelms park staff. This complicated system of land ownership means that the Park Service is unable to manage the ecological health of the park on a landscape level.

- Invasive species management projects are grossly underfunded and understaffed. One park staff member with the aid of a technician generally performs much of the ongoing control work, with short-term assistance from the California Exotic Plant Management Team and volunteers. Grant funding often does not last long enough for staff members to complete eradication and control projects. This lack of follow-up can affect the ability of the park to receive additional grant money for new projects. Because only limited control efforts are possible due to staffing and funding shortfalls, the spread of invasive species outpaces control projects and non-native species overtake native vegetation.

There are about 300 non-native plants in the park; staff focus management efforts on the 19 species that pose the greatest threat to native biodiversity. In this photo, staff are spraying non-native grass at Rancho Sierra Vista.

FRANK OBREGON/NATIONAL PARK SERVICE

- Development and nearby water treatment facilities are primary threats to water resources at Santa Monica Mountains National Recreation Area. Runoff from roadways washes a variety of contaminants and trash into park waters. Disposal of large quantities of water tainted by urban, suburban, industrial, and agricultural processes also adds chemicals to park waters. All of these pollutants flow through the many coastal drainages of the Santa Monica Mountains to the Pacific Ocean where they contaminate marine environments in Santa Monica Bay. The Park Service would like to take the lead in coordinating water resource information, but a lack of funds has prevented the park from collecting water quality data and has prohibited any significant direct park involvement in water quality research. Recent funding made available through the Park Service's Natural Resource Challenge will allow the park to conduct some water quality monitoring, but only at selected sites and with limited frequency.

- The park is working to complete a historic resource study, which is needed to help staff determine the extent of cultural resources resident at Santa Monica

JULIE CHRISTIAN/NATIONAL PARK SERVICE

Urban development, both surrounding the park and within its borders, threatens the ecological integrity of Santa Monica Mountains National Recreation Area.

Mountains National Recreation Area. The study will guide prioritization of resource management, research, and interpretation of park resources, and it will facilitate the process of nominating landscapes and structures to the National Register of Historic Places.

- Santa Monica Mountains National Recreation Area has an exceptional ethnography program. A variety of ethnographic research has been completed, and relationships with traditionally associated groups of American Indians are strong.
- As personnel costs increase and budgets remain steady or decrease, the park is not always able to fill vacated positions, and new positions deemed crucial remain vacant as well. Needed staff include an outdoor recreation planner, permanent biological technicians, cultural resource program manager, historian, archaeologist, compliance specialist, and two cultural resource technicians. Current staff handle many duties not in their official job descriptions, leaving these employees with less time for their primary job responsibilities.

RESOURCE MANAGEMENT HIGHLIGHTS

- **Interagency GIS database assembled.** The park has compiled a comprehensive interagency geographic information systems (GIS) database that enables managers to assess a multitude of land areas within and around the park's boundaries. This database is used for many purposes, from identifying possible areas for native plant restoration to locating potential wildlife corridors. It has also helped to identify and map cultural and archaeological sites in the area.
- **Large carnivore research conducted.** Park Service scientists and other partners (e.g., University of California–Los Angeles (UCLA), University of California–Davis, University of Massachusetts, California State Parks, Santa Monica Mountains Conservancy, California Department of Fish and Game, and The Nature Conservancy) conduct internationally recognized research on the effects of urbanization and habitat fragmentation on carnivores, including bobcats, coyotes, and mountain lions. Through this work, researchers discovered that poisons applied by nearby residents and contractors to control rodent pests were harming other species such as the carnivores that ate the rodents. This evidence of secondary poisoning of nontarget wildlife has far-reaching implications: The U.S. Environmental Protection Agency (EPA) has proposed more restrictive regulations based, in part, on these research findings. The EPA has proposed that certain anticoagulant rodenticides would not be available over-the-counter and only could be applied by certified pesticide applicators. The EPA has also proposed more restrictive guidelines on how these rodenticides can be applied (e.g., only in sealed bait boxes, etc.).
- **New fire management plan completed.** Santa Monica Mountains National Recreation Area has a new fire management plan that has been recognized as a model within the Park Service. It incorporates updated research findings from southern California ecosystems studies and focuses on making surrounding communities safer while protecting natural resources.
- **Youth program reaches diverse audiences.** The park's SAMO Youth program trains urban high school students for careers in the National Park Service. The program, which teaches natural resource principles through hands-on management techniques, is in its seventh year.
- **American Indian cultures well interpreted.** The Satwiwa Native American Culture Center, which receives more visitors than the visitor center at park headquarters, teaches guests about traditional and contemporary American Indian cultures through exhibits and a variety of interpretive programs.

Students with the park's SAMO Youth program help maintain a restored site at Zuma Lagoon.

CHRISTY BRIGHAM/NATIONAL PARK SERVICE

SCOTT STORY/NATIONAL PARK SERVICE

NATURAL RESOURCES—A BIODIVERSITY "HOT SPOT"

The assessment rated the overall condition of natural resources at Santa Monica Mountains National Recreation Area a 62 out of 100, which ranks park resources in "fair" condition. Prominent factors influencing the ratings are water and air pollution, adjacent land use pressures, and invasive species. All have negatively affected the park's ecosystems.

Multiple governmental agencies co-exist within the boundaries of Santa Monica Mountains National Recreation Area, and historical land use information has not been shared efficiently, nor does it exist in a central location. Information from city, county, and state records remains to be collected and recorded to complete a sufficient land use history. There is also no historic record of plant and animal species.

PARK ECOSYSTEMS—VEGETATIVE COMMUNITIES VARY BY LOCATION

Santa Monica Mountains National Recreation Area is home to a wide diversity of plant life. Because of marked differences in climate from one area of the park to another, ecosystems vary due to topography, aspect, elevation, and proximity to the coast. Housing developments,

The park's ecosystems vary according to differences in climate, topography, aspect, elevation, and proximity to the coast.

TARJA SAGAR/NATIONAL PARK SERVICE

The lands within Santa Monica Mountains National Recreation Area typify the Mediterranean biome, with much of the park covered in chaparral.

roads, livestock grazing, and fires also affect the distribution of these communities. A variety of vegetation types is supported, and six federally listed plant species and 35 sensitive plant species (i.e., those that could become threatened or endangered if management action is not taken) exist within the Santa Monica Mountains.

Most of the park is covered in chaparral. Chaparral is characterized by deep-rooted, drought-resistant, and fire-adapted evergreen shrubs that form a nearly impenetrable wall of stiff stems and leathery leaves. Underneath the dense shrub cover, the ground is devoid of herbaceous vegetation except for the occasional clump of foothill needlegrass (*Nassella lepida*) or cluster of wildflowers.

Coastal sage scrub occupies a narrow band of land along the lower slopes of the mountains in the park. Characteristic plants include purple sage (*Salvia leucophylla*), California sagebrush (*Artemisia californica*), and California buckwheat (*Eriogonum fasciculatum*). Larger shrubs include laurel sumac (*Malosma laurina*) and lemonadeberry (*Rhus integrifolia*).

Less common plant communities within Santa Monica Mountains National Recreation Area include coastal live oak woodlands found on north-facing slopes and in shaded ravines or canyon bottoms, and riparian woodlands that occur along canyon and valley bottoms with perennial or intermittent streams. The park also harbors valley oak savannah, a type of native grass community that has been nearly destroyed throughout California by invasive species and agricultural and residential development. These native grasslands once covered 20 percent of the state; today they cover less than 0.1 percent.

Coastal wetlands also have all but disappeared from southern California. Only 10 percent of the wetlands that existed before settlement by Europeans are found in the state today. Shorelines from the Mexican border extending north to Santa Barbara once had an estimated 26,000 acres of wetlands, yet today only 8,500 acres remain, due to extensive development of this sought-after real estate. This decline has made the coastal salt marshes found in Malibu and Mugu Lagoons, both within the park's boundaries, even more valuable for plants and wildlife. Mugu Lagoon is owned by the U.S. Navy and is a 1,400-acre federally protected wildlife area, one of the largest coastal wetlands in California. Malibu Lagoon, part of Malibu Creek State Park, covers 58 acres. Both lagoons provide important habitat for many birds.

The park's 41 miles of coastline include exposures ranging from sandy beaches to rocky tide pools. Characterized by strong winds, salt spray,

fog, intense solar radiation, drought conditions, and sand, the coastal strand community occupies the area around the high tide zone. Plants include sand verbena (*Abronia maritima*), silver beach bur (*Ambrosia chamissonis*), saltbush (*Atriplex* sp.), beach morning glory (*Calystegia soldanella*), and non-native ice plant (*Mesembryanthemum* sp.).

INVASIVE PLANTS—MORE STAFF NEEDED FOR PROJECTS AND FOLLOW-UP

Habitat loss due to the spread of invasive plants is of particular concern at Santa Monica Mountains National Recreation Area, where historic grazing, urbanization, fire, and recreation have all contributed to the introduction and spread of non-native species. Many of these non-native species interrupt processes such as pollination and seed dispersal, suppress the establishment of native species, and reduce local biodiversity.

There are about 300 non-native plant species that exist in the park; staff focus management efforts on the 19 species that pose the greatest threat to native biodiversity. An invasive plant survey concluded that there are about 4,500 separate infestations of these 19 invasive plants. About 75 percent of these infestations are small enough to control. Graduate students from the University of California–Santa Barbara recently developed a protocol to prioritize these infestations for control purposes. This is especially important because invasive species control work in the recreation area is drastically underfunded, and existing staff cannot handle the workload. Typically, just one or two staff are available to perform this work, in addition to their other duties. A lack of staff for project follow-up can affect the ability of the park to receive grant funding to initiate new eradication and control projects, and when grant funding is available, it often does not last long enough to complete these projects.

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Funding and staffing shortfalls prevent the park from controlling the spread of invasive non-native plants such as cape ivy, which has overwhelmed this riparian woodland.

CONCERNS CENTER ON DEVELOPMENT WITHIN AND SURROUNDING THE PARK

More than half of the land within Santa Monica Mountains National Recreation Area is public land, though the Park Service owns only about 28 percent of this, while the rest of the land within the park's boundaries (about 70,000 acres) is private land. The potential for urban development (e.g., homes, roads, businesses) of private land within park boundaries looms large, as speculators target unspoiled sites with scenic views. Agricultural development within park boundaries also occurs; small vineyards now exist in the central parts of the park. The current rate of development is about 1,300 acres per year. Such urban and agricultural development results in increased habitat fragmentation and a host of other ill effects, such as traffic congestion and air pollution within the park. Several major transportation corridors surround and bisect the park, including the Pacific Coast Highway and Ventura Freeway (Highway 101). Human-caused pressures take their toll both directly and indirectly on the recreation area, and they will only increase as the region continues to grow.

To guide future development within park boundaries, the Park Service works with

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Scenic views at Santa Monica Mountains National Recreation Area often include urban development that occurs right up to the park's borders and throughout the park itself.

numerous agencies, organizations, and private landowners in a cooperative effort to establish land use plans. To guide acquisition of private lands within the park's boundaries, the Park Service has a land protection plan that identifies candidate land areas for acquisition, using various criteria for making selections. Highest priority sites contribute to existing protected core habitat, serve as a movement corridor for wildlife, or contain critical habitat for sensitive species. Sites with significant cultural resources also receive higher priority, as do sites that show a high potential for resource-based recreation.

Even with a land acquisition program, growth and development of the residential and commercial sectors continues to fragment park habitats and threaten resources. High land prices and limited funding for land acquisition hamper Park Service efforts to acquire property within the park's boundary. To ensure the Park Service is able to purchase and protect important areas within the park's boundary, Congress must appropriate sufficient funds for land acquisition at Santa Monica Mountains National Recreation Area. Unfortunately, the Park Service has not received a land acquisition appropriation from the Land and Water Conservation Fund since fiscal year 2000, despite the need to acquire about 25,000 acres to complete land protection plan recommendations. Some funds have been secured through congressional earmarks from Representatives Henry Waxman (D-CA) and Brad Sherman (D-CA) in recent transportation bills (1998 and 2006) to purchase lands necessary to complete the 60-mile Backbone Trail. But significant acquisition needs remain. Protection of the remaining lands is critical to protecting watersheds and connections between existing parks for recreation trails and wildlife corridors.

Recently, legislation titled America's Historical and Natural Legacy Study Act (H.R. 3998) was passed by the House of Representatives. This bill directs the Park Service to analyze the feasibility of significantly expanding the boundary of the Santa Monica Mountains National Recreation Area, potentially doubling its size. The bill responds to the important need to secure habitat connectivity between the Santa Monica Mountains and the surrounding Rim of the Valley region, and it acknowledges the abundant natural and cultural resources that exist in proximity to but still outside the current recreation area boundary. A significantly expanded area of responsibility would likely necessitate increased funding and personnel for the Park Service, although some of this could be met through cooperative arrangements and partnerships with local agencies and jurisdictions.

TONY VALOIS/NATIONAL PARK SERVICE

Development within Santa Monica Mountains Recreation Area affects natural and cultural resources, as well as visitor experience. The park needs funds to acquire key pieces of land within its borders to ensure wildlife have corridors to move through, sensitive species retain critical habitat, and significant cultural resources are protected.

NATIVE FAUNA—WATER, AIR, AND LAND TEEM WITH WILDLIFE

Santa Monica Mountains National Recreation Area, though located in the heart of the Los Angeles metropolitan area, hosts a wide array of wildlife that includes 50 mammal (both terrestrial and marine), at least 400 bird, 25 reptile, and 13 amphibian species. The park also harbors at least 26 fish species, though a number of them are not native to the area.

Mammals

Most of the park's mammals live on land, but several such as harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) inhabit marine areas within park boundaries.

Mule deer (*Odocoileus hemionus*) are the park's largest herbivores. Their distribution is affected by the availability of water and vegetation. The Audubon's cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit (*Lepus californicus*) inhabit park meadows and grasslands, while the brush rabbit (*Sylvilagus bachmani*) is restricted to shrublands. Other common herbivores include the California ground squirrel (*Spermophilus beecheyi*), dusky-footed woodrat (*Neotoma fuscipes*), and brush mouse (*Peromyscus boylii*).

The park provides important habitat for wildlife species that are being squeezed by encroaching human development. Among the park's predators is the long-tailed weasel.

DONALD NAPIER/NATIONAL PARK SERVICE

Bat diversity is rich and varied within the Santa Monica Mountains—at least 20 species have been confirmed in the park. Bats have been surveyed using various techniques, and studies have identified key roosting and foraging areas that require protection by managers. At the present time, there are no studies on the effects of urbanization and fragmentation on bat populations in the park.

The park's cast of carnivores includes mountain lions (*Felis concolor*), bobcats (*Felis rufus*), coyotes (*Canis latrans*), gray foxes (*Urocyon cinereoargentus*), badgers (*Taxidea taxus*), ringtails (*Bassariscus astutus*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), spotted skunks (*Spilogale putorius*), and long-tailed weasels (*Mustela frenata*). The continued survival of the larger predators is in jeopardy, however, as their habitat is fragmented or lost to human development. Highways are particularly difficult barriers for bobcats, coyotes, and mountain lions to cross. Through radio-collar research, park scientists have found that mountain lions will disperse across major secondary roadways within park boundaries, but no mountain lion under study has been observed crossing Highway 101, the major route that separates the Santa Monica Mountains from adjoining open space areas and mountain ranges. Groups of bobcats and coyotes that inhabit different natural areas separated by Highway 101 (e.g., the Santa Monica Mountains and the Simi Hills) have differentiated genetics, meaning that in the short time that the highway has existed, genetic changes have occurred in animals on either side of the road. Also, genetic differences are greater than those expected based on observed movements by animals across the highway, suggesting that the few animals that do make it across rarely reproduce.

Habitat fragmentation, urbanization, and recreational use of the lands within the park result in increased human-wildlife interactions. Of concern are the release of non-native species,

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Park scientists, in partnership with researchers from a host of other agencies and educational institutions, have been studying large carnivores such as bobcats, mountain lions, and coyotes. Data gathered shows that barriers such as highways inhibit the movement of these animals.

including unwanted pets; wildlife feeding on handouts and trash; behavioral changes in wildlife; pet predation and disturbance; lethal control of perceived animal "pests"; attacks on wildlife; vehicle collisions; disease; exposure to anticoagulant rodenticides; and pollution.

Birds

To the delight of local bird enthusiasts, at least 400 avian species reside within, migrate through, or breed within the Santa Monica Mountains. Nests of ten species of raptors such as red-tailed hawks (*Buteo jamaicensis*) and red-shouldered hawks (*Buteo lineatus*) have been recorded there; songbirds such as American goldfinches (*Carduelis tristis*) and lark sparrows (*Chondestes grammacus*) are plentiful; and many shorebird species such as western gulls (*Larus occidentalis*) and California least terns (*Sterna antillarum browni*) nest and feed along park beaches.

Due to habitat loss in southern California, preserved natural areas such as those at Santa Monica Mountains National Recreation Area are vital to the survival of bird species. However, various threats leave this important habitat vulnerable. Fire can decrease the size of suitable bird habitat and kill offspring in nests, while visitors may disturb birds by approaching too closely to active nests. Other threats include habitat fragmentation, particularly for species with little ability or tendency to disperse or migrate such as songbirds that require chaparral habitat. Urban-associated bird species may also be increasing, which could result in population declines or behavioral changes in species that are more sensitive to human presence. Anticoagulant exposure from rodenticides, while documented in mammalian carnivores, is also likely a significant threat to raptors.

Reptiles and Amphibians

Twenty-five species of reptiles inhabit the recreation area, including 16 snakes, seven lizards, and two turtles. Commonly seen species include western fence lizards (*Sceloporus occiden-*


SETH RILEY/NATIONAL PARK SERVICE

The park provides habitat for the arboreal salamander, identified the by the California Department of Fish and Game as a species of special concern. Park scientists are concerned about declining amphibian numbers and the effects of non-native species and urbanization on these species and their habitats.

talis), side-blotched lizards (*Uta stansburiana*), alligator lizards (*Elgaria multicarinatus*), and gopher snakes (*Pituophis catenifer*). The western pond turtle (*Clemmys marmorata*), the park's only native turtle species, is very rare and likely declining.

The park hosts 13 species of amphibians, though their numbers are decreasing, which causes concern among park managers. The decline is likely due to multiple causes, including predation and competition between native and non-native species.

Through comprehensive amphibian monitoring and stream surveys, park scientists have determined that urbanization is also affecting amphibians and reptiles because it changes the physical characteristics of watersheds, significantly alters stream habitats, and increases pollution concentrations.

Fish

At least 26 species of fish are present in the park; seven of these are not native to the area. Steelhead trout (*Oncorhynchus mykiss*), Pacific lamprey (*Lampetra tridentate*), and California grunion (*Leuresthes tenuis*) are among the native species. Some other natives, found specifically in Malibu Lagoon, include killifish (*Aphyosemion bivittatum*), tidewater goby (*Eucyclogobius newberryi*), topsmelt (*Atherinops affinis*), and long-jawed mudsucker (*Gillichthys mirabilis*). Non-native fish within the park include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis machrochirus mystacalis*), and goldfish (*Carassius* sp.).

Steelhead trout, federally listed as endangered, has been extirpated from much of its former habitat in the park. Optimal conditions for steelhead migration and spawning include clean water, seasonally appropriate water temperatures, minimal stream sediment, and water depth of at least seven inches. Park staff hope to reintroduce the trout to Solstice Creek, which had supported a steelhead population before human-made dams and other barriers prevented the fish from accessing spawning

habitat. Extensive efforts are under way by the National Park Service, City of Malibu, and California Department of Transportation to remove steelhead migration barriers and restore steelhead habitat in anticipation of reintroducing this species to Solstice Creek within the next few years.

The park has already experienced success with the 1991 reintroduction of tidewater goby, also federally listed as endangered, to the Malibu Lagoon. This was made possible through the combined efforts of Heal the Bay (an activist group) and the Resource Conservation District of the Santa Monica Mountains. Fifty-four individual fish were initially introduced; today the population is well established and stable.

NON-NATIVE ANIMALS—WIDESPREAD AND INVASIVE

A multitude of non-native species inhabits Santa Monica Mountains National Recreation Area, from ants to parakeets to mud snails. The most invasive among them share a common trait—the ability to "win" in competitions with native species for habitat and food.

Argentine ants (*Linepithema humile*) are most widespread in fragmented coastal scrub habitats. Native ant populations declined in the presence of Argentine ants and as a result of habitat fragmentation.

New Zealand mud snails (*Potamopyrgus antipodarum*) were found in Malibu Creek in 2006. This species was first found in Idaho in the 1980s and has since spread to every western state except New Mexico. Although these individual snails are small in size (less than an 1/8 inch), their populations can grow rapidly. New Zealand mud snails consume most of the food resources available in the areas that they have overtaken, resulting in reduction or outright elimination of native mollusks and insects. This leads to a decline in fish species that eat the native mollusks and insects. Continued monitoring of Malibu Creek and other waterways is essential to protecting park resources from these invaders.

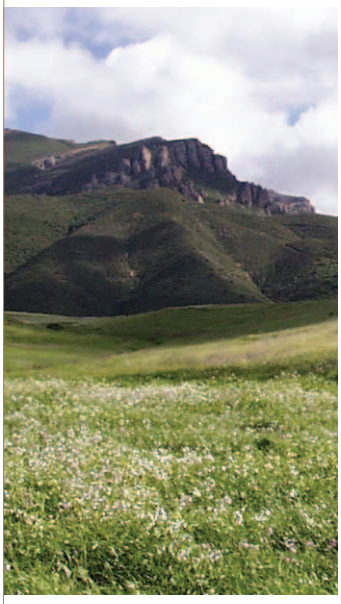
Other aquatic invaders include crayfish (*Procambarus clarkii*) and mosquitofish (*Gambusia affinis*), which feed on larvae of the California newt (*Taricha torosa*) and Pacific treefrog (*Hyla regilla*). Crayfish have been controlled in Topanga Creek since 2002, through a volunteer network of the Resource Conservation District of the Santa Monica Mountains. Mosquitofish are more difficult to manage because some agencies still use them to control mosquitoes. The fish are removed from water bodies within National Park Service and state park boundaries.

Also alien to the Santa Monica Mountains, bullfrogs (*Rana catesbeianna*) invade stream habitats, not only outcompeting native species for resources, but also preying upon native amphibians. Another invasive species, the red-eared slider turtle (*Trachemys scripta*), probably found its way to the park as a released pet. This omnivorous turtle eats everything from dragonflies and their larvae to bird eggs and chicks.

The park also hosts populations of feral parrots and parakeets that were introduced as either released or escaped pets. These non-

GARY BUSTEED/NATIONAL PARK SERVICE

Non-native species such as this crayfish are harming native species such as California newts and Pacific treefrogs. Volunteers help the park control crayfish in Topanga Creek.



MIKE MALONE/NATIONAL PARK SERVICE

The steep slopes of the Santa Monica Mountains are naturally prone to landslides. Development and human changes to regional hydrology increase the risk of landslides.

native species may compete with native birds for nesting areas.

LANDSLIDES—DEVELOPMENT HAS INCREASED RISKS

The Santa Monica Mountains are naturally prone to landslides due to the combination of steep slopes, intense rainfall events, earthquakes, fires, and poorly cemented sedimentary rock. The last significant earthquake in the area, the Northridge Earthquake in 1994, triggered about 1,400 landslides in the Santa Monica Mountains. Human-caused hydrologic changes have increased the likelihood of landslides. As more area becomes covered by impermeable surfaces such as concrete and asphalt, the amount and velocity of runoff during rainstorms increases. The soil's ability to absorb water has decreased in areas that were historically farmed and grazed, as repeated burning and tillage have left behind denser soils. Many rural housing developments and the entire city of Malibu increase the risk of landslides by using septic and irrigation systems that add water to expansive clay soils. Private development (e.g., houses, roads, and fire breaks) on steep slopes in the park increases the potential for landslides by removing vegetative cover that holds soils in place.

PARK AIR AND WATER—THREATENED BY POLLUTION

Both fire and pollution significantly affect air quality within Santa Monica Mountains National Recreation Area. Because the park is next to the city of Los Angeles, emissions from industry and millions of vehicles contribute to unhealthy smog. Car fumes and tire wear are the main sources of lead and cadmium pollution, respectively; both are poisonous heavy metals. Vehicles, power plants, and industry are responsible for increased nitrogen levels in the air. Wildfires also contribute to air quality concerns. Late summer through early winter, warm, dry Santa Ana winds gust through canyons and down mountainsides, increasing the danger of fire.

Air quality is the worst during the summer months when atmospheric circulation patterns inhibit the vertical mixing of air, creating inversions. These inversions trap pollutants close to the ground, which combine with intense solar radiation to produce ground level ozone and smog. Atmospheric circulation improves in the winter, bringing improvements in air quality.

Weather can dictate how long pollution remains in the park, and ozone standards are often exceeded in southern California. The park continually monitored ozone at a station in Franklin Canyon from 1985 to 1992, but National Park Service monitoring at this station was stopped due to staff and funding limitations and higher priority needs. In Los Angeles County, the Park Service obtains air quality data from the many stations located across the Los Angeles Basin. Further to the north and west, monitoring stations in Ventura County have found that federal standards for daily 8-hour levels of ozone were exceeded 106 days between 1996 and 2000.

Nitrogen levels are unnaturally high throughout much of the recreation area, due to deposition from air pollution. Of all the plant communities in the park, coastal sage scrub is likely the most sensitive to changes in soil nitrogen: Increased soil nitrogen has been implicated in the widespread conversion of coastal sage scrub to invasive grasslands in other areas of southern California. Fortunately, major impacts have not yet been detected in coastal sage scrub in the Santa Monica Mountains. However, increased soil nitrogen is likely responsible for the decline of several rare lichen species that exist in thin-soiled habitat within the park.

Overall, air quality information is extrapolated from data collected from locations in and around the recreation area, but outside national or state park boundaries. Ideally, to better understand potential air quality concerns and certainly to conduct more

HUMAN-CAUSED FIRES DEGRADE PARK LANDSCAPES

Human-caused fires result in habitat loss and degradation throughout Santa Monica Mountains National Recreation Area. Naturally ignited fires are historically uncommon in southern California, and the normal length of time between fires in this area ranges from 50 to 80 years. When fires do strike, they are often of high intensity because most plant communities in the Santa Monica Mountains have dense structure, low moisture content, flammable chemical compositions, and available dead fuels. Santa Ana winds, which blow from late summer until early winter, increase fire danger.

While fire is a natural component of ecosystems, the number of human-ignited fires has fundamentally changed the fire regime within Santa Monica Mountains National Recreation Area. Studies show that humans are responsible for starting all of the fires that have occurred in the park going back as far as 1925. All the land within the park has burned at least once in the last 100 years, and some of it has burned as many as ten times.

Increased fire frequency has caused some native plant communities (e.g., mixed chaparral and coastal sage scrub) to be taken over by invasive grassland species more tolerant of frequent fire. These impacts are especially severe where shrub species require several years to mature prior to reproducing. High fire frequencies can completely eliminate these species from the community, converting previous shrublands to hillsides dominated by non-native annuals.

Because of the ecological consequences associated with increased fire, the park does not use fire as an ecological restoration tool, except in limited experimental circumstances to control invasive non-native species. Instead, all fires within the park's boundaries are suppressed because this is considered the most ecologically beneficial fire management action. The park's recently updated fire management plan emphasizes treatments to limit fire spread, such as modifying fuel at strategic locations or creating defensible space where lives and property are directly protected.

LOS ANGELES FIRE DEPARTMENT

Fires are natural components of ecosystems, but humans have increased the frequency of fires in the Santa Monica Mountains. This has resulted in negative effects on plant communities and associated wildlife.

detailed studies, monitoring stations are needed on protected parklands.

Within the boundaries of Santa Monica Mountains National Recreation Area are three perennial streams—Malibu, Medea, and Calleguas Creeks—and 11 artificial lakes. Medea Creek, the only perennial stream that flows on land owned by the Park Service, has attracted interest because its continued flow is significantly augmented by urban runoff.

Development and associated water treatment facilities have altered regional hydrologic cycles, and they remain the primary threats to the park's water resources. Streams that were once intermittent are now perennial, altering critical aspects of their natural flow regime (seasonal differences in volume, periods of no flow, and stream velocity, for example) and negatively affecting species that depend on these flow dynamics. Fertilizers have polluted ground and surface waters with nitrates. Trash is common in streams that flow through urban watersheds, most notably Malibu Creek. Runoff from roadways washes nitrogen, phosphorous, trash, and metals into park waters. Disposal of large quantities of water tainted by urban, suburban, industrial, and agricultural processes also adds chemicals to the park's hydrologic systems. Water from the Tapia Wastewater Treatment Plant in Malibu Canyon, which treats 7.7 million gallons of water each day, flows through Malibu Creek. Discharge waters from this plant contain high levels of nitrates, sulfates, and chlorides. All of the above pollutants flow through the Santa Monica Mountains to the Pacific Ocean where they contaminate marine environments in Santa Monica Bay.

Watersheds that drain into the Pacific continue to be a concern to water-quality monitoring groups. Heal The Bay, a nonprofit environmental organization, recently produced a *State of the Bay* report and report cards for water quality. Parameters that were measured include enterococcus, fecal coliform, and total coliform. According to the *2005–2006 Annual Beach Report Card*, Los Angeles County had the top five "Beach Bummer" locations, the sites in the program with the poorest dry weather water quality: Will Rogers State Beach, Avalon Beach at Catalina Island, Surfider Beach at Malibu, Santa Monica Municipal Pier, and combined sections of north Santa Monica Bay. Will Rogers, Surfrider, and Santa Monica Pier are all within the boundaries of Santa Monica Mountains National Recreation Area. In general, water-quality or beach advisories are issued by the Los Angeles County Department of Beaches and Harbors or by California State Parks. The National Park Service does not directly manage any beach sites.

While nearby cities, counties, agencies with regulatory authority, and stakeholders all collect specific water-related data, the Park Service only recently began work to coordinate these efforts and to develop a water-quality monitoring protocol that would complement this work. With funds from the National Resource Challenge, the Park Service hopes to take the lead in coordinating water resource information, and to initiate additional water-quality monitoring in key locations. Even with these new funds, however, water quality monitoring by the Park Service will be quite limited in scope.

SCOTT STORY/NATIONAL PARK SERVICE

Emissions from industry and millions of vehicles contribute to unhealthy smog within and around the Santa Monica Mountains.

NATIONAL PARK SERVICE

CULTURAL RESOURCES—ADDITIONAL STAFF REQUIRED TO BOOST PROGRAMS

Santa Monica Mountains National Recreation Area scored an overall 74 out of 100 for cultural resource conditions (archaeology, cultural landscapes, history, historic structures, museum collection and archives, and ethnography), indicating that the resources are in "fair" condition. The scores for cultural resources are based on the results of indicator questions that reflect the National Park Service's own *Cultural Resource Management Guideline* and other policies related to cultural and historical resources.

Cultural resources at Santa Monica Mountains include people (i.e., stakeholders), archaeological sites such as villages and pictographs, a popular American Indian cultural center, an assortment of famous ranches, and a working movie set. Funding has been requested for a cultural resources program manager to provide overall direction and oversight. Three other professionals—historian, archaeologist, and compliance specialist—as well as two technicians are needed to meet standard legal and policy requirements for cultural resource management.

A number of historic structures at the Peter Strauss Ranch within the park date to the time when Henry Miller, inventor of the modern carburetor, lived on the property.

This historic photo, taken during the 1940s, shows ranching activities within Point Mugu State Park.

NATIONAL PARK SERVICE

HISTORY—HIGHLY PRIZED LAND IN THE GOLDEN STATE

For at least 10,000 years, the Santa Monica Mountains have sustained human inhabitants. Gabrielino/Tongva and Chumash groups historically valued the area as a site of ceremony, spiritual renewal, and plant gathering. Spanish explorers "discovered" California in the mid-1500s. In the 1770s, Spanish Franciscans began to erect missions in the area, seeking to convert indigenous peoples to Catholicism. The 19th century ushered in an era of livestock grazing, as large portions of land within and surrounding the mountains were allotted to Spanish army veterans for ranching operations (*ranchos*). Later, early homesteaders and "Gold Rush 49ers" arrived in the area to pursue mining, agriculture, and ranching.

In the late 1880s, the Santa Monica Mountains became a popular resort area, hosting recreation and sports clubs, as well as churches and other organizations. Large, private estates were constructed by the 1920s, and Los Angeles and other nearby communities grew in and around the Simi Hills and the Santa Monica Mountains. With metropolitan Los Angeles and Hollywood in close proximity, the Santa Monica Mountains were destined to become a backdrop for the movie industry. Hundreds of movies have been filmed in this area, and remnant film and movie sets are found in some parts of the park.

Although attempts to create parkland in the Santa Monica Mountains date back to the early 1900s, aggressive development in the Santa Monica Mountains in the 1970s spurred residents and conservation organizations to clamor for preservation. Lacking the needed funds, they looked to the federal government for support. Santa Monica Mountains National Recreation Area was created by an act of Congress on November 10, 1978, in order to preserve "significant scenic, recreational, educational, scientific, natural, archeological, and public health benefits provided by the Santa Monica Mountains and adjacent coastline area."

An oral history transcript on park creation was produced in 2004, funded by the National

Park Service and the Santa Monica Mountains and Seashore Foundation. Titled *A Touch of Wilderness: Oral Histories on the Formation of the Santa Monica Mountains National Recreation Area*, this document includes interviews with 14 individuals involved in the creation of the national recreation area.

With such a diverse history of human occupation and land use, the park would benefit from the services of a full-time historian and a full-time compliance specialist to assist the current cultural resources department where needed and ensure compliance with federal laws such as the National Historic Preservation Act. A staff historian is also needed to implement recommendations of the historic resource study, which is currently under way. When completed, this document will guide resource management, research, and interpretation of the park's cultural resources, as well as facilitate nominations of landscapes and structures for the National Register of Historic Places.

ARCHAEOLOGY—MANY SITES ON PRIVATE LAND AT RISK

Santa Monica Mountains National Recreation Area and the surrounding region are replete with archaeological sites. While some 1,000 sites exist within park boundaries, only 218 are on land owned by the National Park Service. According to information in the Archeological Sites Management Information System, a database of archaeological information, 176 sites are in "good" condition, 28 are in "fair" condition, and nine are in "poor" condition, while conditions are unknown for the remaining five sites. Within the Santa Monica Mountain Zone, an area established by the park's 1978 legislation that encompasses the entire Santa Monica Range and 75,000 additional acres, there are 1,400 more archaeological sites that are closely related in context to sites within the park. The park's land protection plan and geographic information systems (GIS) program allows staff to identify and map cultural sites; aerial images help find possible new areas of archaeological interest.

The Chumash and Gabrielino/Tongva people actively assist park researchers in understanding clues to their ways of life in the form of Spanish and American historical records and archaeological sites such as pictographs and villages that may include dwellings, storehouses, dancing and game areas, cemeteries, communal structures, ovens used to roast yucca and other foods, and stone quarries. One of southern California's premier archaeological sites is the Humaliwo site in Malibu Creek State Park. The Chumash town of Humaliwo, once located on a high point next to Malibu Lagoon, served as this people's southern capital. It is within the national recreation area's boundary, but it is on land that is part of the state park.

Within the park's boundaries is a variety of other significant archaeological sites. The inland Chumash village of Talepop is located on land jointly owned by the National Park Service, California Department of Parks and Recreation, and Santa Monica Mountains Conservancy. The Saddlerock Pictograph Site contains unique Chumash polychrome elements as well as four depictions of armored men on horseback, widely believed to represent the Anza expedition. This expedition, led by Juan Bautista de Anza in 1775-1776, was focused on finding a new overland route for moving settlers, livestock, and supplies from Sonora, Mexico, to Spanish outposts in California. The solstice alignment site at Burro Flats, which includes a rock formation and patterns etched onto a rock surface, was once used to predict the summer and winter solstices and possibly other seasonal events. This site is located on land once used by Rocketdyne and NASA to test rockets and conduct other related experiments. The land is now owned by Boeing and the Department of Energy. Security at the site over the years has protected the solstice alignment features from potential vandalism. The park's general management plan (2003) notes that Burro Flats

THE PARK WOULD BENEFIT FROM THE SERVICES OF A FULL-TIME HISTORIAN AND A FULL-TIME COMPLIANCE SPECIALIST.

could become a destination site where the history of the American space program is interpreted, starting with Chumash astronomy.

Both the solstice alignment site and the Saddlerock Pictograph Site are listed on the National Register of Historic Places, but neither are on land owned by the National Park Service. According to the park's general management plan, 73 additional archaeological and historic sites are potentially eligible for the National Register of Historic Places but have not been nominated because the park lacks the staff and funds needed to complete nominations.

Development on private lands is the largest threat to the park's archaeological resources. Vandalism, recreational use, wildfires, and erosion also jeopardize these sites. While illegal collection has been a problem in the past, park staff note that collection is more episodic and opportunistic, not organized or systematic. Park interpreters protect sites by teaching visitors not to disturb sites or artifacts they come across, and visitors are not formally escorted to any sites. Archaeological resources on private land within the park's boundaries are at greater risk of being intentionally or unintentionally destroyed.

Currently, the park relies on outside consultants and contractors to meet its needs for archaeology. An archaeological overview and assessment is under way at the park but is not yet completed because existing staff have limited time to devote to the project. Recognizing the need for day-to-day assistance at the park level, staff have submitted a request for funds to support an archaeologist.

In 1937, Carlton Beal purchased property toward the western end of the Santa Monica Mountains and developed a ranch named Rancho Sierra Vista. Today this ranch is one of three landscapes the park has documented in the Cultural Landscape Inventory database.

NATIONAL PARK SERVICE

CULTURAL LANDSCAPES—MULTIPLE SITES NEED NATIONAL REGISTER NOMINATION

Cultural landscapes, which illustrate how people have adapted to and changed their surroundings, are the largest and most visible resources at Santa Monica Mountains National Recreation Area. According to the park's cultural landscape inventory, 29 of its cultural landscapes are eligible or potentially eligible for listing on the National Register of Historic Places. Only three of the landscapes are documented in the Cultural Landscape Inventory, a Park Service database of cultural landscape information: Rancho Sierra Vista, Peter Strauss Ranch, and Paramount Ranch. These landscapes have recently been listed on the National Register. Only the Peter Strauss Ranch has a complete cultural landscape report, a document that expands the historical record, identifies treatment opportunities, and provides direction for management.

The park does not have a cultural landscape professional on staff. Instead, a historical landscape architect from the Park Service's Pacific West Regional Office assists the park as needed. A historic maintenance plan for both landscapes and structures has been under discussion, but it cannot be implemented until the recreation area has sufficient cultural resource staff.

Most of the cultural landscapes reflect the park's indigenous, ranching, agricultural, and moviemaking history. Some of the most famous are ranch sites such as Paramount Ranch. Purchased by Paramount Pictures in 1927, it comprises 2,700 acres of the old Rancho Las Virgenes, land granted to Mexican soldier Jose Maria Dominguez in 1837. For 25 years, the property was used as a "movie ranch," where its diverse landscapes served as backdrops for famous movies directed by the likes of Cecil B.

NATIONAL PARK SERVICE

King Gillette, inventor of the Gillette razor, lived on this ranch between 1926 and 1935. The site will soon house a new integrated national and state park headquarters.

Demille and starring such beloved performers as Bob Hope and Claudette Colbert. In 1953, William Hertz, a western movie fan, bought the southeast portion of the ranch and built a western town from Paramount's old prop sheds. In 1955 and 1956, the Paramount Racetrack was considered one of the nation's most challenging auto-racing tracks, but a fatal accident led to its closure in 1957. While the site changed ownership several more times before the Park Service bought it in 1980, the area consistently served as a film location and continues in that capacity. The Park Service restored the old movie ranch, and today visitors can watch productions being filmed there.

Other notable ranches that exemplify the park's cultural landscapes are the Peter Strauss Ranch, King Gillette Ranch, and Circle X Ranch. Before actor Peter Strauss purchased his ranch in 1976, it was a home and research and development facility for Harry Miller, inventor of the modern form of the carburetor and prominent designer of racing cars and engines. The site was historically home to the Chumash. The Park Service eventually purchased the ranch in 1987. The King Gillette Ranch was home to King Gillette, inventor of the Gillette razor, between 1926 and 1935. Today it is owned and cooperatively managed by the Mountains Recreation and Conservation Authority, the Park Service, and the California Department of Parks and Recreation. It will soon host a new integrated national and state park headquarters, which is scheduled to open in 2009. It is also the site of the inland Chumash village of Talepop. Circle X Ranch, located at the base of Boney Mountain in the dry, rocky slopes above the city of Malibu, is the site of a 1950s Boy Scout camp and the location of Sandstone Peak, the highest point in the Santa Monica Range. The Meek House, built during the 1920s and now occupied by a Park Service employee, is an excellent example of the settler era and is potentially eligible for the National Register of Historic Places.

Rancho Sierra Vista is the site of the park's Satwiwa Native American Culture Center and

Natural Area (see "Ethnography" for an overview of this center), a Chumash habitation site, and the crossroads of a historic Indian trail and trade route. Satwiwa ("the bluffs") was once part of the Spanish *Rancho El Conejo*, land granted to former soldiers Jose Polanco and Ignacio Rodriquez by the King of Spain. The property was developed as a horse ranch between 1936 and 1946, and the majority of the barns, equipment sheds, wells, and staff residences from this period remain, making Rancho Sierra Vista historically significant as one of the last intact 20th-century ranches in the Santa Monica Mountains. The last private owners farmed and ranched at the Satwiwa site for 32 years before the Park Service purchased the land in 1980.

Solstice Canyon protects several significant archaeological sites and a stone cabin representing the settler era, a magnetometer research facility instrumental in Earth exploration from space, and the burned ruins of the Roberts House (see "Historic Structures" for more information on the house). Solstice Canyon is now used as an outdoor classroom. Cheeseboro Canyon and Simi Hills are sites of significant cattle ranching in the late 18th century. Trails originally used by Chumash people in these areas may have been expanded during the ranching period.

HISTORIC STRUCTURES—RANCHES AND MOVIE SETS PLAY STARRING ROLES

As indicated above, Santa Monica Mountains National Recreation Area is full of historic structures that are components of various cultural landscapes, yet the park's historic structure program is in its early stages. To provide better management of historic structures, one staff member is participating in an internal training program, and the park has requested funds to support two technicians and a compliance

NATIONAL PARK SERVICE

This photo shows Paramount Ranch in 1960. The Park Service purchased the property in 1980 and subsequently restored the old movie ranch. Today visitors can watch productions being filmed there.

specialist to help care for historic structures. In addition, Santa Monica Mountains National Recreation Area, Channel Islands National Park, and Cabrillo National Monument have submitted a request for funds to repair and maintain historic structures and landscapes at the three parks, where a backlog of deferred maintenance projects continues to grow. Funds would also be used to hire two historic preservation specialists to complete projects in all three parks.

The park's list of classified structures indicates 22 structures are in good condition, seven are in fair condition, and six are in poor condition, while the conditions of four structures are unknown. None of the structures have been evaluated through historic structure reports, which guide treatment and use.

Three buildings within the park's boundary are listed on the National Register of Historic Places, but none of them are on Park Service land. Twenty-seven additional historically significant structures owned by the park are eligible for the National Register of Historic Places, but they have not yet been nominated. They include structures at Peter Strauss Ranch, Paramount Ranch, Rancho Sierra Vista, King Gillette Ranch, and Solstice Canyon. Completion of the historic resource study, which is currently under way, will help staff prioritize research and National Register nominations and determine the extent of the park's cultural resources.

Peter Strauss Ranch still retains the majority of the key buildings and structures associated with the Henry Miller period, including the main house, radio house, gate tower, aviary, and numerous stone retaining walls. An outdoor amphitheatre, 650,000-gallon swimming pool, and several other structures remain from the mid-20th century, when the ranch was operated as the Lake Enchanto Amusement Park.

Paramount Ranch includes movie sets, prop and equipment storage sheds, a barn, bunkhouse, office, harness room, paint shop building, caretaker's house and garage, mess

ERIN MCPHERSON

AMERICAN INDIAN CULTURES FEATURED AT SATWIWA

American Indian history and connections with park resources are well interpreted at Santa Monica Mountains National Recreation Area. The Satwiwa Native American Culture Center includes exhibits and offers a variety of interpretive programs that teach visitors about American Indian cultures. Satwiwa is jointly managed by the Chumash, Tongva, other Native Peoples of the Americas, and the National Park Service. The facility is available to all American Indian groups, not just traditional affiliates, making it unique within the Park Service, as it is not tribe-specific. Its emphasis on contemporary cultural groups and arts is also exceptional. Satwiwa is open on weekends, featuring public programs such as storytelling, cultural workshops, and crafts, and it is part of an elementary school field trip program. Interpretive themes there include biodiversity and an emphasis on how the Chumash were able to subsist in the mountains.

Santa Monica Mountains National Recreation Area has an exceptional ethnography program, due largely to the presence of a full-time cultural anthropologist.

hall, kitchen building, and the Paramount fire patrol station house and garage.

Structures at Rancho Sierra Vista (Satwiwa) include ranch buildings such as a main residence (Beal House), caretaker's residence, barn, equipment shed, and three reservoirs that supplied water for horses. The caretaker's residence, probably built between 1937 and 1944, now serves as park employee housing. The Beal House, constructed in 1940, is now used as the park education office, and its interior has been restored for this purpose. The 3,240-square foot western-style barn, built in 1938, may be used in the future for educational programs. The equipment shed (circa 1938) is now used as an office and residence.

King Gillette Ranch is home to nine buildings that date to the historic ranch period (1926 to 1955) and reflect the Mission Revival Style, including the use of adobe, adoblar, stylized stucco, and the hallmark red tile roof. Several structures at the ranch were designed in the 1920s by Wallace Neff, a famous southern California architect credited with shaping the region's architectural style.

At Solstice Canyon visitors can see the Matthew Keller House, a cottage built around 1865 and believed to be the oldest stone building in Malibu. The foundations of the Roberts House, designed by noted African-American architect Paul Williams, designer of the Beverly Hills Hotel, can also be viewed by visitors. The home was destroyed by fire prior to Park Service ownership and now only exists as a series of building ruins. The site is very popular, however, and still evokes a sense of the original home. Additional structures at the site were built in 1960 and 1964 and used for magnetic field testing of satellites until 1973 by Space Technology Laboratories, Inc., a division of Thompson-Ramo-Wooldridge (TRW). TRW designed and manufactured unmanned spacecraft for both scientific and defense purposes, and its *Pioneer 1*, the first industry-built satellite, was launched in 1958 as NASA's first foray into space. The park is now preparing a determination of eligibility to the National Register of Historic Places for the TRW buildings.

Ethnography (Peoples and Cultures)—Relationships Strong Between Park and Associated Groups

Santa Monica Mountains National Recreation Area has an exceptional ethnography program, due largely to the presence of a full-time cultural anthropologist. This is especially important when delicate issues arise, such as reburials within the park. For example, when a gravesite was found during a utilities trench project in Solstice Canyon, the cultural anthropologist brought various Chumash groups together, and they reached an agreement on reburial, which earned him the Regional Directors' Award for Cultural Resources.

The cultural anthropologist has been instrumental in nurturing partnerships with American Indian groups such as the Chumash, Gabrielino/Tongva, and several nonfederally recognized tribes. The completion of an ethnographic overview and assessment, currently under way, will further strengthen the ethnography program at Santa Monica Mountains National Recreation Area.

Also notable is an oral history project exploring the life experiences of Chumash, Gabrielino/Tongva, and other American Indian peoples living in communities surrounding the Santa Monica Mountains. This study is part of the park's long-term effort to develop an extensive repository of visual and textual data on indigenous cultures of the Santa Monica Mountains, including research among contemporary people to establish a baseline of ethnographic data. The park has also completed various other traditional use studies and ethnohistories that contribute to the successful management of ethnographic resources.

ERIN MCPHERSON

Exhibits at the Satwiwa Native American Culture Center teach visitors about American Indian cultures and connections with park resources.

MUSEUM COLLECTION AND ARCHIVES—DIVERSE ARTIFACTS WELL PROTECTED

The park's museum collection and archives consist of more than 300,000 items, including archaeological pieces such as ground stone, flaked stone, manos, metates, and shell beads. The park holds several hundred paleontology artifacts, including plant and shell fossils and petrified wood, many of which were recovered during construction work on parklands. Historical artifacts include objects such as doors, wallpaper, and hardware taken from historic structures within the park; biological artifacts include a small herbarium of about 400 local species. The park's archives are extensive and include texts, photographs, maps, and a collection of video and audio recordings on a variety of topics. In addition to a museum collection and archives, the park has a cultural resource library that contains books and files on the history of the region.

According to the park's curator, most objects are in good condition and none are in immediate danger. A housekeeping plan covers most preventive maintenance issues, and temperature and humidity are monitored continuously. The *Annual Physical Inventory* and *Checklist for the Preservation and Protection of Museum Collections* were last completed in 2007. All items were accounted for and 78 percent of the checklist conditions were met. To provide even better care for the growing collections and to assist with archiving materials, the park's curator has identified the need for a permanent, full-time museum technician.

The park's collections are housed at Rocky Oaks, a research facility that is considered too remote for most staff and researchers to easily access it. Staff would like to move the collections to King Gillette Ranch after the park's headquarters are relocated there in 2009, a move that would vastly improve the accessibility and use of these important items.

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Chumash leader Charlie Cooke (in red) takes visitors on a hike through Satwiwa.

STEWARDSHIP CAPACITY—

FUNDING AND STAFFING—IMPORTANT PROJECTS UNFUNDED

The 2007 annual operating budget at Santa Monica Mountains National Recreation Area was $6.4 million, an increase from $6.2 million in 2006. Despite the increase, the park's base budget has not kept pace with the growing costs and responsibilities associated with acquiring more land within the park's boundary. In fact, the park's 2003 business plan points out that the base budget has actually decreased in inflation-adjusted dollars by 10 percent each year since 1980, when the park's growing acreage is taken into account.

Science and resource management projects deemed necessary by park staff have not received sufficient funding or have gone unfunded altogether. For example, an annual increase of at least $200,000 each year is needed to fully implement the park's vital signs monitoring program, which tracks natural resources conditions that contribute to overall ecosystem health. To fully implement top invasive plant and restoration ecology priorities, the park requires an additional $150,000 annually. In addition, an increase of at least $150,000 per year is needed to support cultural resource protection, compliance,

education, and interpretation. And while the park receives outstanding support from interns and volunteers, its outreach and education efforts require additional money to fully meet the needs of the extensive community it serves. Finally, critical research and monitoring of wildlife, particularly carnivores, is a top priority at the park that requires a reliable source of funding to continue.

Staffing shortfalls also plague the park. The park's 2003 business plan identified a shortfall of about 17 full-time equivalent employees for the resource protection category, which includes both natural and cultural resources protection. As personnel costs increase and budgets remain steady or decrease, it is not always possible to fill vacated positions, and new positions deemed crucial remain vacant as well. An outdoor recreation planner position at Santa Monica Mountains remains unfilled. The inventory and monitoring program needs permanent biological technicians. A cultural resource program manager, historian, archaeologist, compliance specialist, and two cultural resource technicians are all required for ideal management of cultural resources. Current staff handle many duties not in their official job descriptions, leaving these employees with less time for their primary job responsibilities.

PLANNING—FUNDING SHORTFALLS HINDER SOME PLANNING EFFORTS

Every national park is required to have a general management plan (GMP) that provides overarching guidance to park managers. The GMP for Santa Monica Mountains National Recreation Area was completed in 2002 and continues to provide broad management guidance, though it does not provide specific direction to guide day-to-day activities and projects. Instead, the park relies on a number of other documents, such as the fire management plan, vital signs monitoring plan, vital signs monitoring protocols, five-year strategic plan, and annual work plans. The fire management plan, completed in 2006, is recognized as a model within the Park Service. It incorporates updated research findings from southern California ecosystems studies and focuses on making surrounding communities safer while protecting natural resources.

When funds and staff are available, the park updates existing plans and works to complete other needed plans. A water resource management plan, completed in 1997, provides a critical and detailed examination of water resources and water-related issues in the Santa Monica Mountains. A freshwater monitoring protocol is also being developed as part of vital signs monitoring, in conjunction with the Mediterranean Coast Network of the Park Service's Inventory and Monitoring Program. Staff are working on a trail management plan that incorporates public input gained through scoping meetings. Work on a resource stewardship plan, a relatively new Park Service requirement, will begin once the park receives general guidance and sufficient funds and staff to complete the plan.

The park's invasive plant control program is guided by a set of priorities, but the park has not had the funds or staff needed to complete a weed management plan. Funding and staffing limitations have also slowed the completion of a historic resource study, an important plan that is needed to guide the park's cultural resource program.

RESOURCE EDUCATION—A MULTITUDE OF PROGRAMS ENGAGE AND TEACH

Santa Monica Mountains National Recreation Area provides opportunities not only for pure recreation, but also for learning about the park's cultural and natural resources. There are a variety of educational programs offered both at the park and off-site. In 2006, some 142,625 people participated in 482 interpretive programs. The park also offers exhibits that convey both natural and cultural themes, printed brochures and bulletins, and an online cultural heritage program.

Many of the educational opportunities are

Participants in the SAMO Youth program work in the park's native plant nursery.

ANTONIO SOLORIO/NATIONAL PARK SERVICE

geared toward introducing area students to the park's abundant resources and how to care for them. Hands-on work and park visits are part of the teacher-training programs available to educators in Los Angeles and Ventura Counties. EcoHelpers Restoration/Education Program, begun in 2003, provides high school students with credit for their participation in restoration projects. Parks as Laboratories: Studies of the Land, Water, and Air is a hands-on program that engages students in air, soil, and water experiments. National Park Labs: Studies of Wildland Fire Ecology enhances high school science, math, and technology courses by allowing students to participate in studies on the effects of wildfire in chaparral environments. SHRUBS (Students Helping Restore Unique Biomes) brings elementary students to the park to learn about resources, collect and analyze data, and participate in natural resource service activities. SAMO Youth, a successful program in its seventh year at the park, trains minority youths from the metropolitan area for careers in the Park Service. For six weeks during the summer, participants restore habitats, maintain trails, and learn natural resource principles.

The California Mediterranean Research Learning Center, affiliated with the Mediterranean Coast Network, contributes to community education in the area. Its purpose is to "establish a cooperative management, research and education effort that supports research about the park's ecosystems while involving and educating the public through citizen science opportunities."

SAMO Youth program participants help the park accomplish projects that would not otherwise be possible due to funding and staffing shortfalls. In return, the youths gain valuable training for careers in the Park Service.

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EXTERNAL SUPPORT—VOLUNTEERS MULTIPLY WORKFORCE, RESEARCHERS CONTRIBUTE VALUABLE DATA

Over the past ten years, staff at Santa Monica Mountains National Recreation Area have increasingly relied on volunteers to provide critical services. In 2006, the park's volunteer force was triple the size of its paid staff and donated 52,000 hours of service. Volunteers regularly assist with administration, offer technology support, staff the visitor center, patrol the park with rangers, and help implement science and resource management projects. Many projects in the park would not be possible without significant volunteer contributions.

Collaborative efforts between outside researchers and the Park Service have resulted in the collection of vital information, which has been instrumental in the development of recommendations for the park. For example, Park Service scientists work with researchers at Pepperdine University and the Resource Conservation District of the Santa Monica Mountains to collect amphibian data in streams across the mountains. Internationally recognized studies of bobcats, coyotes, and mountain lions have been the result of collaborative efforts between the park and scientists from the University of California–Los Angeles (UCLA), and the University of Massachusetts. Park staff are also working closely with UCLA to update the park's list of flora, and have teamed with researchers at the University of California–Riverside on non-vascular plant inventories. The park's water quality monitoring protocol is being developed with support from

California State University, Los Angeles. As an indication of the strength of the ties between the park and outside researchers, several park scientists hold adjunct university appointments with local universities and regularly advise graduate students about studies in the park.

Through the Park Service's Mediterranean Coast Network Inventory and Monitoring Program, staff are gaining information on both plants and wildlife. Participation in this network allows the park to accomplish more natural resource research than it could with just existing on-site staff. In addition, the program effectively uses student interns to complete critical monitoring tasks, providing key data for the park and educational opportunities for students.

Because the park is surrounded by so many communities and interacts with them on multiple levels, its relationship with its neighbors is extensive, complex, and generally positive. Communities are involved in park planning, resource management, fire management and prevention, and local land use issues. Staff work closely with various organizations, agencies, and jurisdictions in the Los Angeles area to promote resource conservation initiatives in and around the park, including on private lands.

The recreation area receives outreach support from other outside groups, including other agencies, foundations, and corporate donors. The Santa Monica Mountains Fund, an organization with a specific focus on the recreation area, assists in raising awareness of resource issues and obtaining public support for park objectives. The fund is also a nonprofit partner that can assist with obtaining grants, donations, and other philanthropic support for park activities. The park receives support from the Western National Parks Association, which operates the park bookstore. The association donates funds that help support science and resource management projects, trail maintenance, and printing of park publications.

While the programs offered by the park are numerous and diverse, and the number of programs offered has increased each year in the last decade, many requests from schools and community groups are denied due to lack of staff. Additional interpretive staff would help meet visitor demand for programs and lessen the burdens on current employees. Because only one position in this large park is devoted to interpretive media, park exhibits are not up-to-date. The park's visitor center is not adequately staffed, and employees from the park's operational division must fill in to meet visitor needs. When the center is moved to its new, high-traffic location at the King Gillette Ranch in 2009, even more staff will be required to assist with predicted larger attendance.

GARY BUSTEED/NATIONAL PARK SERVICE

Volunteers assist park staff with a variety of resource management projects. In this photo, a park intern poses with a patch-nose snake caught during a project to monitor reptiles and amphibians.

CABRILLO NATIONAL MONUMENT

NATIONAL PARK SERVICE

Cabrillo National Monument, named for explorer Juan Rodriguez Cabrillo and featuring a large statue of him, provides a natural oasis within the large metropolitan area of San Diego.

REPORT SUMMARY

In the year 1542, half a century after Columbus landed in the Americas, a Spanish expedition of three ships commanded by Juan Rodriguez Cabrillo landed on the coast of what would become California. Cabrillo became the first European to set foot on the West Coast, taking possession of it in the name of the King of Spain. In 1913, at the urging of a Spanish heritage group, President Woodrow Wilson designated a one-half acre national monument in honor of the explorer at the tip of the Point Loma peninsula, within San Diego. Subsequent additions have increased the monument's size to 160 acres of land and another 128 acres of rocky intertidal shore for which the park has administrative jurisdiction. The park also administers the waters surrounding the park to a distance of 900 feet from the mean lower low water tide line (the average of the lower low tide

lines). In addition, the Park Service co-manages the Point Loma Ecological Conservation Area, about 640 acres of undeveloped land, including and contiguous to the monument.

Cabrillo National Monument provides a natural oasis within the nation's seventh largest metropolitan area. It offers visitors opportunities to explore the secret world of shoreline tide pools. Because of the park's location on the Pacific Flyway, a major migration path, birdwatchers come for the chance to add new birds to their life lists. Many visitors admit that they come for some of the most spectacular views in California, where on clear days they can see various ships at sea, the lands of Mexico, the Coronado Islands, and in January and February, even migrating gray whales.

Cabrillo's wealth of cultural resources includes the 19th-century Old Point Loma Lighthouse (one of the first built on the West Coast), 20th-century military structures, archaeological sites, more than 77,000 museum objects and archives, and a visitor center that dates to the Park Service's Mission 66 era (1956–1966). Many of the cultural resources relate to the park's military history.

Point Loma's strategic location has made it an attractive site for military installations since the late 18th century. During World War II, the military closed the entire area to the public and erected lookouts, fire direction and base end stations (posts used to observe enemy targets so that artillery could be accurately directed toward them), and gun emplacements; the remnants of some of these and other military structures are found throughout the park. Today the park's neighbors include the U.S. Navy, U.S. Coast Guard, Fort Rosecrans National Cemetery, and the Point Loma Wastewater Treatment Plant. Because visitors must pass through land owned by the U.S. Navy to gain entry to the park, Cabrillo's hours of operation are cut shorter than most parks. Visitors must leave the park by 5:00 p.m.

Cabrillo is home to a wealth of natural and cultural resources for a park its size, and varied interpretation and education programs offer visitors an in-depth look at tide pools, the Old Point Loma Lighthouse, and the history behind Spanish exploration. In recent years, financial difficulties have hindered the park's efforts to preserve and protect many of these resources. The Cabrillo National Monument Foundation, volunteers, and partners from outside agencies have provided much-needed assistance, allowing for completion of projects that would otherwise go unaddressed because of budgetary shortfalls.

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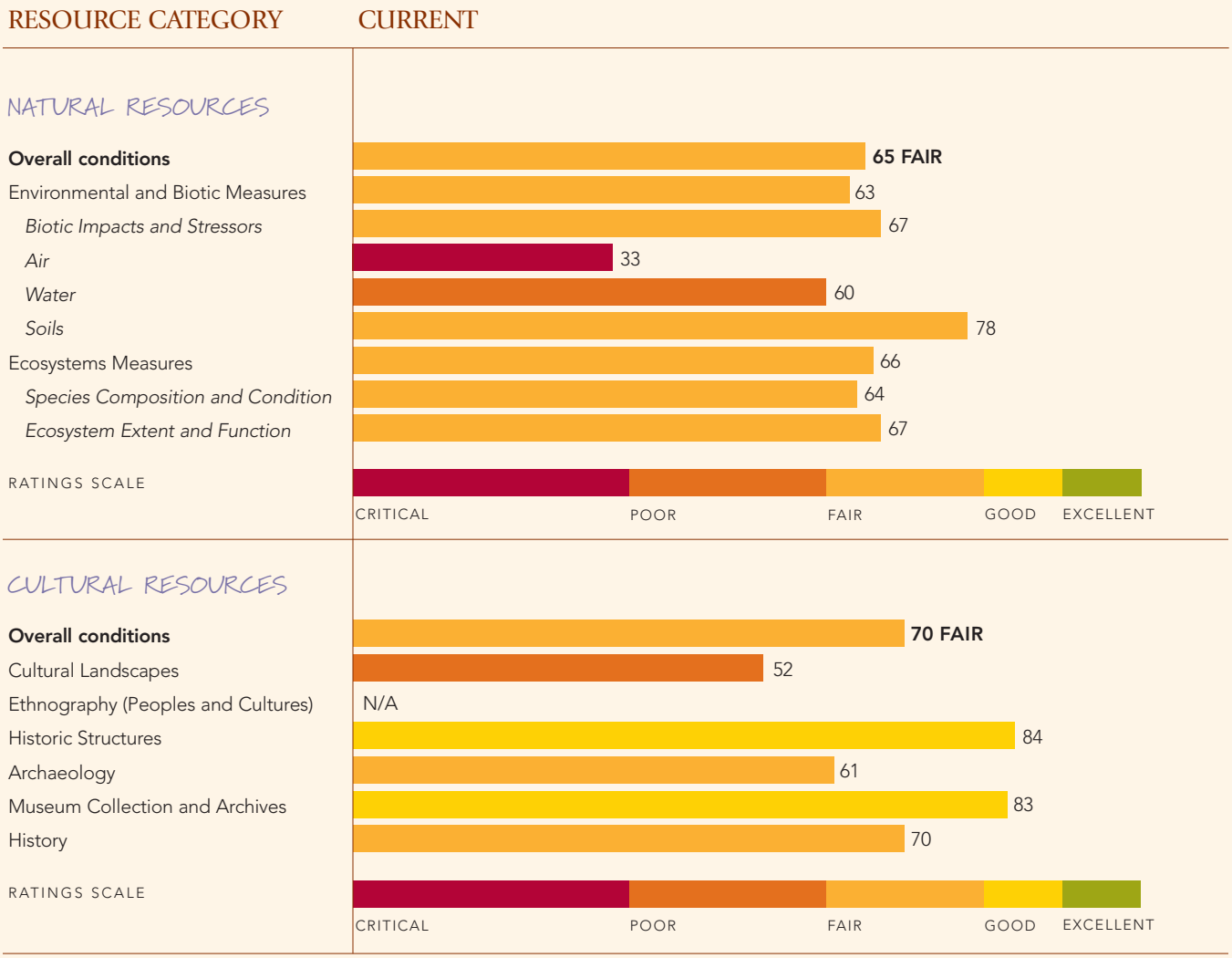
Note: When interpreting the scores for resource conditions, recognize that critical information upon which the ratings are based is not always available. This limits data interpretation to some extent. For Cabrillo National Monument, 64 percent of the natural resources information was available and 96 percent of the cultural resources information was available.



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

RATINGS

Current overall conditions of the known **natural resources** in Cabrillo National Monument rated a "fair" score of 65 out of 100. Ratings were assigned through an evaluation of park research and monitoring data using NPCA's Center for State of the Parks comprehensive assessment methodology (see "Appendix"). Human-caused ecosystem damage is evident within Cabrillo. Past land use by the military has resulted in drastically altered landscapes. Non-native vegetation, planted deliberately to control erosion, has overtaken the grounds. Pollution in the waters and air off San Diego has resulted in reduced environmental health. Visitor carelessness in intertidal areas has caused tide pool damage. Isolation from other natural areas limits species dispersal and recolonization and can affect the health of plant and animal populations.

Overall conditions of the park's known **cultural resources** rated 70 out of a possible 100, indicating "fair" conditions. A number of important cultural resource plans, assessments, and studies are needed to supplement existing information and guide resource management and interpretation.

Funds are needed to hire additional staff to ensure natural and cultural resources receive adequate care. Additional staff are needed to thoroughly survey the organisms found in the terrestrial and marine environments, to remove non-native species and restore native plant communities, and to manage data and geographic information systems. The marine biologist for the park was reduced from a full-time to a less than full-time position (subject-to-furlough) due to a loss of funding; this position should be restored to full time in order to effectively understand and manage the marine resources at the park, and to effectively interpret these important resources for the public.

Two permanent, full-time interpretation ranger positions (which have been unfunded for the last five years) and the existing permanent, full-time interpretation ranger position (which is now permanent, subject-to-furlough) need to be fully funded in order to provide programming for school groups; conduct outreach to the greater San Diego community; maintain and upgrade existing interpretive media; develop new exhibits, publications, and audiovisual programs such as films and podcasts; offer daily interpretive programming to park visitors; plan and produce special events; and evaluate the park's interpretive programming. Two park guides are also needed to adequately staff the visitor center.

KELLY COURKAMP

A statue of Juan Rodriguez Cabrillo commemorates his explorations.

KIM MCCRARY

Cabrillo National Monument is within San Diego—the nation's seventh largest metropolitan area. Pollution from runoff, shipping and boating activities, and other sources enters the waters around the park. Funding and staffing shortfalls have prevented park staff from studying how these pollutants could be affecting marine organisms.

KEY FINDINGS

- San Diego Bay is one of the most polluted bodies of water in the United States, a major concern for the park. At present, no studies have been conducted to determine how ocean currents interact with the park's kelp forests and intertidal areas. Heavy metals, endocrine disrupters, and carcinogens—all pollutants known to exist in the bay—may be carried by ocean currents to the shores around Cabrillo.
- While ocean breezes help protect the peninsula from some air pollution, smog limits views of the San Diego skyline, the Coronado Islands, the Cuyamaca Mountains, and migrating whales. The monument's stunning view of the bay is a major tourist attraction, but between 2001 and 2006, visitation dropped by 22 percent. Fewer visitors translate to lower revenues and less funding for conservation projects.
- Invasive plants, many of which were intentionally introduced, are harming Cabrillo's terrestrial ecosystems. Ice plant, an aggressive invader, was used extensively for erosion control. Non-native animals in the park include Argentine ants, Eurasian starlings, house sparrows, and occasional feral cats, which outcompete native species for food and other resources and prey on them, causing their decline. Raccoon populations are suspected to be artificially high due to human food sources (e.g., trash) and also likely compete with native species.
- Historically, 19 species of reptiles and amphibians resided on Point Loma. More than one-third are now gone. Scientists believe that temperature changes, increased ultraviolet radiation, interaction with non-native organisms, habitat loss, and decreased air and water quality all contribute to the loss of reptiles and amphibians worldwide. The health of these species is directly tied to ecosystem health; their decline signals overall degradation of the environment.
- Irrigation of ornamental landscapes within the park has encouraged the establishment of non-native plants and animals. Birds using these irrigation sites as water sources have drawn many enthusiasts to these areas for bird watching, which has led some groups to oppose Park Service plans to remove the irrigation system and restore natural systems and species.
- The park needs a number of cultural resources studies to better guide management activities, including a historic resource study, updates to the administrative history and cultural bibliography, a complete archaeological assessment, an archival assessment, and a new historic structures management plan. Also needed are historic furnishing plans for coast defense structures, which would inform and guide interpretive

The Whale Watch Weekend and Intertidal Life Festival draws people of all ages to the park to learn about and explore natural resources. Funding and staffing shortfalls could force the park to cancel this and other events.

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exhibits and facilitate proper interpretation of the resources. In turn, interpretation would help visitors make emotional and intellectual connections with the coast defense structures, the people who manned them, and the roles those people played in defending San Diego during World War II.

- Cabrillo lacks an ethnography program and needs a baseline ethnography study to help address this deficiency in its cultural resources program.
- The park is threatened with the possibility of having to cancel two of its popular annual events—the Cabrillo Festival and the Whale Watch Weekend and Intertidal Life Festival—partly because it does not have funds to hire needed interpreters or to cover other expenses to host these events. In 2006 and 2007, the U.S. Navy hosted the Cabrillo Festival on Naval Base Point Loma, and Cabrillo Festival, Inc.—a community nonprofit group—took on greater responsibility for producing the festival. It is unknown if this support will continue. Also in 2006 and 2007, the Cabrillo National Monument Foundation coordinated fundraising and received grants and donations to put on the Whale Watch Weekend and Intertidal Life Festival. Funding for these events is being evaluated on a year-by-year basis.
- A number of projects are stalled as a result of staffing and funding shortfalls. They include non-native vegetation removal; periodic assessments of the condition and relative abundance of park mammals, sensitive/rare plants, and other taxa; and development of a thorough species inventory for both marine and terrestrial invertebrates. In addition, there are not enough interpreters on staff to serve visitors on busy weekends and holidays.

CABRILLO NATIONAL MONUMENT AT A GLANCE

- Cabrillo National Monument is located at the tip of the Point Loma peninsula, just across the bay from San Diego's downtown business district and historic old town. On clear days from the monument's ridgetop lookout, park visitors are treated to spectacular views of the Coronado Islands, San Clemente Island, Tijuana, San Diego, the Cuyamaca Mountains, and the Pacific Ocean, as well as planes and ships using the nearby naval air station. In 2006, more than 804,000 people visited the park.
- Cabrillo provides abundant opportunities to view a variety of wildlife. In winter and spring, when tides are low, as many as 90,000 visitors explore the intertidal zones in the monument, where wildlife includes birds, crabs, mussels, anemones, and varied colorful algae. The migration of Pacific gray whales also draws many visitors. The two-day Whale Watch Weekend and Intertidal Life Festival is held each January at Cabrillo and is attended by about 10,000 visitors.
- Cabrillo National Monument boasts one of only a few peregrine falcon nesting sites in the San Diego area. Formerly listed as endangered, the peregrine falcon is an example of a successful restoration of a species.
- Community volunteers, dressed in period clothing, help bring the park's history alive. Stationed at the Old Point Loma Lighthouse, the Army Radio Station, or the visitor center complex, they teach visitors about the lives of some of the area's previous inhabitants.
- During World Wars I and II, military facilities on Point Loma provided vital coastal and harbor defense. Base-end stations, fire control stations, searchlight bunkers, and a radio station remain as evidence of military activities. "They Stood the Watch," an exhibit housed in the radio station at Cabrillo, shares the story of coastal defense with visitors.

RESOURCE MANAGEMENT HIGHLIGHTS

- **Cultural resources care improved.** A new storage facility for the park's museum collection and archives was recently completed, and the Old Point Loma Lighthouse has been restored to reflect daily life in the late 19th century. The newly reconstructed Assistant Keepers' Quarters features an exhibit about the history of Point Loma's three lighthouses. The exhibit, which opened in 2005, describes lighthouse technology, the daily life and work of lighthouse keepers and their families, and the role of the lighthouses in the development of early maritime commerce in San Diego and the West Coast. Much-needed staff were also recently acquired—a historian, historic preservation specialist, and museum technician.

New exhibits teach visitors about Point Loma's lighthouses and the people who operated them.

KELLY COURKAMP

- **Non-native plants removed and native species reintroduced.** Staff and volunteers have wrestled with non-native, invasive vegetation at Cabrillo for the last 20 years. Recent restoration successes include reintroducing native vegetation around the Old Point Loma Lighthouse and removing most of the aggressive ice plant from the park. Some native plants are being propagated in a greenhouse for use in future reintroduction efforts.
- **Entrance station relocated.** To improve safety for visitors and provide protection to tide pool areas on the west side of the park, Cabrillo's entrance station was relocated in 2003. By moving the station to a site north of the main intersection, visitors to the tide pool areas now must pass through the entrance station first, where they are provided with park information and rules and regulations for exploring.
- **Collaborative management flourishes.** The monument, with 160 terrestrial acres, shares the peninsula with the U.S. Navy, U.S. Coast Guard, Fort Rosecrans Cemetery, and the Point Loma Wastewater Treatment Plant. With these and two additional entities—the U.S. Fish and Wildlife Service and the California Department of Fish and Game—it co-manages the 640-acre, largely undeveloped Point Loma Ecological Conservation Area. As part of the management process, "Good Neighbor" and "Working Group" meetings are held as a way to foster communication and collaboration among the various stakeholders. These meetings, which are held monthly and bimonthly, respectively, offer opportunities to discuss planned activities and resolve conflicts.

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Cabrillo National Monument protects intertidal areas that provide habitat and feeding areas for an abundance of wildlife.

NATURAL RESOURCES—PENINSULA PROVIDES REFUGE FOR VANISHING ECOSYSTEMS

The assessment rated the overall condition of natural resources at Cabrillo National Monument a 65 out of 100, which ranks park resources in "fair" condition. Prominent factors influencing the ratings are increased water and air pollution, visitor disturbance, habitat fragmentation, and invasive species. All have negatively affected the park's ecosystems.

PARK ECOSYSTEMS—FACING MULTIPLE PRESSURES

Historically, the northern limits of the Point Loma peninsula consisted of marshy lowlands, riparian areas, and grasslands. These lower areas were divided and developed into ranching estates centuries ago when San Diego was held by Spain (1769–1821) and then Mexico (1821–1848). The existence of military garrisons at La Playa and on Ballast Point suggests that herds of horses were allowed to graze on Point Loma.

As human populations increased, they changed the Point Loma peninsula and larger San Diego area. The San Diego River was re-

Cabrillo National Monument includes both terrestrial systems and intertidal areas.

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channeled, permanently diverting a major source of freshwater. Wetlands and mudflats on North Island and Coronado Island, across the entrance of the bay to the east and southeast, were "filled in," which altered water exchange between San Diego Bay and open ocean waters. The military, recreational users, commercial tours, fishing boats, cruise lines, and commercial shipping vessels heavily use the bay. It is regularly dredged to allow larger ships to pass through the channel.

There are 1.25 million people in the city of San Diego, making it the seventh largest city in the United States and the second largest in California. Associated urban pressures such as increased traffic, air and water pollution, and separation from other natural habitats will increase as the metropolitan area continues to grow.

With weather characterized by moderate dry summers and cool wet winters, Cabrillo is typical of a Mediterranean biome. A strong marine layer of fog forms during the early summer throughout the southern California coastal areas, and at times, the mist remains until late afternoon. This haze protects Point Loma from intense heat and is known locally as the "May gray" and "June gloom."

Because Cabrillo is located on a peninsula, natural features at the monument include both terrestrial and marine ecosystems. The terrestrial habitat at the monument consists mostly of remnants of southern maritime chaparral communities and southern coastal scrub, which includes southern coastal bluff scrub, southern foredune scrub, and two subtypes of coastal sage scrub—Diegan coastal and maritime succulent. Freshwater sources are few and consist of unmapped seeps and irrigation systems. On the western side of the peninsula, the sensitive rocky intertidal zone is popular with visitors at low tide. Further out to sea, just beyond park boundaries, one of the world's largest kelp forests blooms in the subtidal zone.

Terrestrial Ecosystems

Scrublands—Diegan coastal, maritime succulent, southern coastal bluff scrub, and southern foredune scrub communities—once covered California's now developed coastline, and scrub and chaparral dominated much of the state's foothills and western slopes. Today these communities are found only in certain geographic locations, and encroaching development has made them endangered. One of the subtypes at the monument, Diegan coastal scrub, includes black sage (*Salvia mellifera*), chamise (*Adenostoma fasciculatum*), and California encelia (*Encelia californica*), plants with aromatic vegetation. The second subtype, maritime succulent scrubland, is dominated by California sage (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*). Prickly pear cactus (*Opuntia littoralis*) and a state-listed threatened species of spurge (*Euphorbia misera*) also occur there.

Southern coastal bluff scrub is populated with boxthorn (*Lycium californicum*), goldenbush (*Isocoma menziesii*), and saltgrass (*Distichlis spicata*), all existing at the edges of bluffs and terraces in the monument, in thin soils susceptible to wind and salt spray. Succulents such as cliff spurge (*Euphorbia miserea*) are found there as well. The aggressive ice plant (*Carpobrotus edulis*), used for erosion control and as a fire retardant, and Australian saltbush (*Atriplex semibaccata*), which can withstand more salt spray than some of the native plants, encroach upon already threatened coastal bluff scrub habitat.

Southern foredune scrub exists in patches on about two acres within the park as a transient mosaic of shifting sand and plants. Most of the vegetation is sparse, consisting of herbaceous plants that are adapted to withstand high levels of salt. There is only about one hectare of this type of habitat in a few pockets scattered along the coast. There once was much more southern foredune scrub existing on large dunes in other areas of southern California, but human devel-

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Scrublands once covered California's coastline, but most were developed. Additional development continues to encroach on what is left of these ecosystems, which underscores the importance of protected areas such as Cabrillo National Monument.

opment of beach areas has left very little foredune habitat in the state.

Cabrillo is home to at least 26 plant species federally or state listed as endangered, threatened, or sensitive as a result of habitat destruction and urban development. The endangered Orcutt's spineflower (*Chorizanthe orcuttiana*) is considered the rarest. Although the few surviving populations are located outside Cabrillo, within the Point Loma Ecological Conservation Area, they are very near the monument on land that is contiguous to native habitat within the park. The San Diego coastal creeper (*Aphanisma blitoides*) was thought to be extirpated from San Diego County until hundreds of this semiannual plant were located during a rare plant survey in 2003. Cabrillo and the other partners in the Point Loma Ecological Conservation Area use a greenhouse to propagate sensitive plants for use in native plant restoration projects.

The Point Loma peninsula is home to the few surviving populations of the endangered Orcutt's spineflower. These plants are found very near to the park on land that is contiguous to native habitat within the park.

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Intertidal Zone and Marine Ecosystems

The shoreline, from the southern tip of the peninsula and along the western edge for about a mile, encompasses the rocky intertidal habitat at Cabrillo. Because it is one of the most easily reached habitats of its type in southern California, and one of its rarest, it is closely monitored by park staff and through a formal program developed with volunteers. The rocky intertidal area of the monument is divided into three management zones for purposes of crowd control and scientific monitoring, which should not be confused with the natural zone designations. The northernmost "use zone" (Zone I) is the most accessible and foot traffic is allowed. A majority of the visitors that come to the intertidal area each year explore this small stretch of beach, so this zone suffers the most damage. Zone II is located directly south of Zone I. High tides that slam against the cliffs naturally restrict access to this beach, though no regulations exist to prevent its use. The southernmost zone, Zone III, is a no-entry area, with access restrictions in place since 1996.

Natural zone designations differ from management zones. The splash zone (farthest inshore) and the upper intertidal zone are found on sandstone cliff faces in tide pools. Limpets, snails, barnacles, and chitons live in these aquatic habitats. Numerous species of algae, known as 'seaweed' to most visitors, also thrive there. The middle intertidal zone, fully submerged during high tide and fully exposed during low tide, is home to mussels, anemones, crabs, fish, lobster, and octopi. These animals have adapted over time to the drastic twice-daily changes in sea level associated with tides. The middle intertidal zone, especially at the water's edge, is an important feeding area for shorebirds and other wildlife.

During many years, more than 1 million people visit Cabrillo National Monument, a challenge for preservation of the intertidal zones. While permits are required for group visits to the tide pools, and group sizes are limited, the sheer

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The park's intertidal zones are home to a diversity of organisms, including anemones. Foot traffic can harm these habitats; visitors should take extra care to avoid damaging these fragile systems.

volume of foot traffic exacts a toll on the habitat. The intertidal zones are some of the most damaged areas at the monument.

Several intertidal species face multiple threats. Black and green abalone (*Haliotis cracherodii* and *H. fulgens*), once readily available at Cabrillo, are now gone, due to overharvesting and bacterial disease. In addition, riprap (large rock used to slow erosion on the beach) destroyed many of the green abalone nursery beds. The green abalone is seen occasionally in the area, but black abalone has not been seen at Point Loma since 1990.

Ochre sea stars (*Pisaster ochraceus*), gone from Cabrillo's waters since at least 1990, are still found nearby at La Jolla, Ocean Beach, and Baja California. The limited distribution of this species may be caused by some combination of high water temperatures, disease, and pollution.

California mussels (*Mytilus californianus*) in the park are in steep decline. The northern intertidal zone (Zone I) at Cabrillo, while the most damaged by visitors, shows the healthiest population of mussels. The southern zone (Zone III), although restricted to all entry, is located at the opening to San Diego Bay. Mussels have declined in that zone—perhaps because of water pollution—from 50 percent cover in 1990 to less than 1 percent now.

The ocean surrounding the peninsula comprises the major aquatic habitat at Cabrillo. Recent studies and reports by the California Recreational Fisheries Survey (1999–2005) indicate some stress on the kelp forest and on fish and invertebrate populations within the administrative area of the park, due to recreational and commercial fishing. Restrictions against harvesting any invertebrates (including lobster, red sea urchins, crabs, and limpets) and most vertebrates (fish) within and around Cabrillo exist according to federal regulations. The only fishing that is allowed is recreational fishing for finfish with hook-and-line from the shore. Jurisdictional discrepancies between the

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This fox sparrow was captured and banded as part of the Monitoring Avian Productivity and Survivorship project. This program, which is managed by volunteers, began in 2006.

federal government and the State of California concerning fishing in monument waters make control difficult. Specifically, the State of California only recognizes the Mia J. Tegner State Marine Conservation Area, which overlaps a small portion (150 feet from high tide levels) of the federal administrative area. This designation allows more commercial harvesting of finfish and aquatic plants than the federal government allows. Also, since the state does not map the federal area as closed for harvest in its fishing publications, commercial and recreational harvesting of fish and invertebrates does occur offshore in the park's administrative area, and enforcement of the federal regulations does not occur by the state. The Park Service does not have the means (i.e., watercraft) to enforce the regulations offshore nor the resources for monitoring the catch levels. Currently, no monitoring of catches from the shore occurs, nor are counts from commercial or recreational fishing vessels that use offshore waters and the kelp beds off Point Loma specific to those beds.

WILDLIFE AT CABRILLO—A PARADISE FOR BIRD AND WHALE WATCHERS

Cabrillo National Monument offers visitors a varied selection of watchable wildlife. From tiny limpets in the tide pools, to endangered songbirds and giant gray whales, Cabrillo offers the chance to escape the city and spend quiet time watching wildlife in a natural setting.

Cabrillo is considered the best place in the San Diego area for birding. Because of its location along one of the primary North American migration corridors, the Pacific Flyway, Cabrillo is a resting and feeding spot for hundreds of bird species. About 377 species have been recorded, but the Park Service only regularly monitors shore birds, via surveys conducted at low tide each winter and spring. The coastal California gnatcatcher (*Polioptila californica californica*), federally listed as threatened, and the brown pelican (*Pelecanus occidentalis*), federally listed as endangered, use the park extensively. In the San Diego area, Cabrillo is the only place where black oystercatchers (*Haematopus bachmani*) are seen; these birds mostly use areas of the park that are restricted from visitors but have recently been spotted in other more accessible areas as well. Cabrillo is also home to one of only a few nesting sites for the peregrine falcon (*Falco peregrinus*) in the San Diego area.

Each winter, Pacific gray whales (*Eschrichtius robustus*) pass by the western overlooks of Cabrillo on their way to breeding grounds in the bays of Baja, California, after a summer spent feeding in the Arctic. Their migration is the longest of any mammal on Earth—12,000 miles round-trip. Mid-January is the peak of migration at Cabrillo, but the whales are visible from December through March. Whale watching is a huge attraction at the park during these four months. Ranger talks and an educational movie are provided during whale season, and binoculars are loaned at the visitor center for viewing.

The park's community of land-dwelling mammals is significantly less varied than it once was as a result of surrounding development.

When the marshlands and grasslands at the northern boundary of the peninsula were developed, the remaining native habitat became isolated from other natural areas. The area that remained was too small to support many animals that had previously used the area, such as mountain lions (*Puma concolor*), bobcats (*Lynx rufus*), mule deer (*Odocoileus hemionus*), and jack rabbits (*Lepus californicus*). The two largest carnivores that remain at Cabrillo are the coyote (*Canis latrans*) and gray fox (*Urocyon cinereoargenteus*), while the largest herbivore is the desert cottontail (*Sylvilagus auduboni*). The small mammal community at the monument includes species such as the desert woodrat (*Neotoma lepida*), California mouse (*Peromyscus californicus*), cactus mouse (*Peromyscus eremicus*), pocket mouse (*Chaetodipus fallax*), and desert shrew (*Notiosorex crawfordi*). Ten species of bats also have been documented on Point Loma. Though adjacent properties owned by the U.S. Navy contain attractive wildlife habitat, a chain-link fence built by the Navy for security reasons may affect movement of mammals such as rabbits, skunks, and coyotes.

Historically, at least 19 species of herpetofauna (reptiles and amphibians) occurred on Point Loma; seven are now gone. Herptofauna are especially affected by changes in air temperature, increased ultraviolet radiation, interaction with non-native organisms, and changes in air and water quality. Scientists are monitoring herpetofauna populations worldwide as indicators of overall environmental health, and reptiles and amphibians are studied at Cabrillo as indicators of ecosystem health in southern California. An excellent monitoring program has been in place since 1995, which includes 17 survey locations in and around the park.

Less noticed wildlife at Cabrillo includes various tiny arthropods and invertebrates. There is at least one endemic species of arthropod at the park, a previously undescribed trap-door spider in the genus *Aptostichus* that was found

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The park has been monitoring amphibians and reptiles regularly since 1995. These animals, which are often small and go unnoticed by visitors, are important indicators of ecosystem health.

on a survey in the 1990s. A silk-spinning cricket (*Cnemotettix miniatus*) is also a park resident.

INVASIVE SPECIES—PLANTS AND ANTS THREATEN ECOSYSTEMS

Because of the extensive human use of Point Loma, the terrestrial habitat at Cabrillo has been severely altered, although restoration efforts have begun and show success. Disturbance from construction activities near visitor areas and visitor traffic on open footpaths have all caused erosion. Internal habitat fragmentation is a problem where roads and parking lots divide the landscape. Disturbance and fragmentation facilitate the spread of invasive species, both plant and animal. Park staff hope to restore 4.5 acres of disturbed land and control invasive plants on 7.5 acres by the end of 2008, largely in areas adjacent to roads and paths where non-native plants get established initially.

Today there are as many as 20 different non-native plants at Cabrillo. Many of them were intentionally introduced. For example, trees were planted to block views of buildings, while groundcover vegetation was planted to control erosion.

Non-native species can have far-reaching effects throughout ecosystems. For example, Argentine ants (*Linepithema humilis*) have displaced native harvester ants (*Pogonomyrmex occidentalis*), which is believed to have resulted in the disappearance of the horned lizard (*Phrynosoma coronatum blainvillii*), a reptile that feeds on the native ants. The lizard has disappeared from Cabrillo and from 45 percent of its native range. Park managers combat the Argentine ants by eradicating their mounds and removing non-native ice plants that provide them with shelter and water. Because Argentine ants need more water than native species, they thrive in habitat created by irrigation systems, which underscores the importance of limiting these unnatural sources of water.

Feral cats (*Felis catus*) and house cats prey upon birds, lizards, and small mammals, directly competing with native predators for food. Trapping and removing cats from the park can help, but some are pets that enter the park from residential areas, making trapping prob-

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Native ant species are at risk from non-native Argentine ants, pictured here, that are invading parts of Cabrillo National Monument. Park staff are working to eliminate the non-native ants using a variety of tactics.

lematic. Raccoons (*Procyon lotor*) are native to the area, but they have become a nuisance due to abundant food from trash bins. Coyotes too have adapted well to the urban lifestyle in nearby neighborhoods, causing their numbers to grow. This exerts pressure on the populations of small mammals eaten by coyotes.

San Diego Bay—Polluted by City Runoff and Shipping Vessels

San Diego Bay is located to the northeast and east of Cabrillo National Monument and the Point Loma peninsula. According to a 1996 National Oceanic and Atmospheric Administration (NOAA) study, San Diego Bay ranked as the nation's second most toxic of 18 bays studied. Much of the pollution in the San Diego Bay watershed and its receiving waters likely reaches the waterways through storm drains. More than half the land area in San Diego is impervious to water percolation because of parking lots, streets, sidewalks, driveways, buildings, and other human development, allowing contaminated runoff from storms to be carried out to sea. Until the 1960s, when sewage treatment plants were installed, untreated sewage and runoff (including pesticides, oil and gas, and chemicals) routinely drained into San Diego Bay, and in some areas raw sewage sediment was six feet deep. Today, accidental raw sewage spills continue to occur. Additionally, activities from shipbuilding and maintenance add tons of hazardous substances (heavy metals, PCBs, PAHs, and petrochemicals) into a water body already known to exhibit weak flushing from the natural flow of its tides and currents.

Scientists know little about how the pollutants in San Diego Bay affect the lives and reproductive cycles of the marine organisms that inhabit the waters surrounding Cabrillo National Monument. Degraded benthic communities, sediment toxicity, dissolved copper, and bacterial contamination have resulted in 303d listings, a category under the Clean Water Act for polluted bodies of water, at several points in San Diego Bay. All these locations are within a few miles of Cabrillo National Monument's eastern shoreline and the intertidal resources around Point Loma on the western side of the peninsula. There is some evidence that currents leaving the bay carry many pollutants within reach of the marine life at the monument. As a result of funding and staffing shortfalls, no research has been conducted on how ocean currents interact with the kelp forests and intertidal areas at Cabrillo.

Shipping activities also affect San Diego Bay. To accommodate large oceangoing vessels, the bay floor is repeatedly dredged. Today less than 20 percent of the ocean floor remains unmodified by dredging. More than 9,000 oceangoing vessels enter and exit San Diego Bay each year, and the high traffic brings bilge water full of chemicals, sewage, non-native species, diesel fuel, and oil. Natural currents in the bay are also affected, altered by the movement of the large ships.

Through a program overseen by the U.S. Army Corps of Engineers, dredge materials from the bay can be carried out to sea and dumped in an area about four miles from Cabrillo. Despite regulations, very few of the dredging loads actually land in the dump site area, which could be due to a combination of ships improperly positioned over the site when dumping materials and ocean currents carrying dumped materials away from the site. Prevailing currents in the bay could carry material dumped outside the regulated area to Point Loma.

Water quality testing within park waters is limited to bacterial counts and water temperatures, data collected near the outfall pipeline from the Point Loma Wastewater Treatment Plant adjacent to the park. According to monitoring conducted by the treatment plant, coliform bacterial counts are usually within safety guidelines. One notable exception occurred following a 2.26-million-gallon spill at the Point Loma Wastewater Treatment Plant in

Scientists know little about how the pollutants in San Diego Bay affect the lives and reproductive cycles of the marine organisms that inhabit the waters surrounding Cabrillo National Monument.

2004, which resulted in high bacterial counts for three days. Four other major raw sewage spills have occurred in the general area (though not at Point Loma) since 2000, totaling 43.1 million gallons. The Park Service plans to implement some water quality monitoring, but because of limited funding, resource managers are unsure if this will sufficiently record detailed information for the park's rocky intertidal area and immediate offshore waters.

AIR QUALITY—POLLUTION OBSCURES VIEWS, KILLS LICHENS

Though ocean breezes help protect the peninsula from some air pollution, contaminants such as sulfur dioxide, ozone, and carbon monoxide often result in a haze that obscures Cabrillo's famous harbor view. The nearest air quality monitoring station, located five miles away in downtown San Diego, measures carbon monoxide, ozone, and nitrogen oxides, but levels are not indicative of those at Point Loma, due to prevailing winds. A visibility camera has been present at the park since 1996, but funds are needed to analyze the data and upgrade the site with digital equipment.

Lichens are important soil stabilizers and indicators of air quality, and they can fix nitrogen, thus benefiting plants in the area. When lichens are lost due to pollution or disturbance, restoration possibilities are diminished for entire ecosystems. A recent inventory of lichens at Cabrillo and adjoining U.S. Navy property documented 67 different taxa, but some lichens that were present in the early 1900s are no longer there. Increasing levels of pollutants threaten remaining lichens, including an extremely rare species, *Texosporium sancti-jacobi*. Cabrillo National Monument is one of only a few sites in the continental United States where this lichen is found. Park staff do not have funds to implement a monitoring program for these taxa to document changes that are occurring over time.

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Haze from urban pollution often obscures scenic views from Cabrillo National Monument. The park needs funds to analyze visibility data, upgrade equipment, and monitor species such as lichens that are sensitive to air pollution.

LAUREN GIEBLER

During World War II, the military built base end stations on Point Loma to observe enemy targets so that artillery fire could be accurately directed toward them.

CULTURAL RESOURCES—HISTORIC STRUCTURES PARAMOUNT, MORE FUNDING NEEDED

Cabrillo National Monument scored an overall 70 out of 100 for cultural resource conditions, including archaeology, cultural landscapes, history, historic structures, and museum collection and archives. Ethnography was not scored due to lack of information. This score indicates that the park's cultural resources are in "fair" condition. The scores for cultural resources are based on the results of indicator questions that reflect the National Park Service's own *Cultural Resource Management Guideline* and other policies related to cultural and historical resources.

The park's cultural resources are wide-ranging, reflecting local Spanish cultural heritage, 19th-century coastal development, U.S. military history, and the American Indian Kumeyaay people. Increased funding and more staff would enable Cabrillo staff to begin to develop important cultural programs and provide better care for the resources they currently manage. A much-needed historic resource study remains undone, no ethnography studies have ever been conducted, and historic structures are in need of repair and maintenance.

The historic Army Radio Station houses exhibits that interpret the park's 20th-century coastal defense history.

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HISTORY—THREE AREAS OF FOCUS INTERPRETED

For at least the past 12,000 years, the Kumeyaay people, known as The Fifth Nation, have inhabited the area in and around present day San Diego. The Kumeyaay established villages near freshwater sources, venturing outward to hunt and gather food. The contemporary descendants of those tribe members continue to live and work in San Diego County and beyond.

In 1542, Juan Rodriguez Cabrillo claimed the area now known as San Diego for the country of Spain, but the Spanish did not dominate this region until they built missions there in the late 1700s. At that time, San Diego Bay became a bustling center for commerce and trade, attracting people from around the world to its harbor. It was not uncommon to encounter Alaskans, Polynesians, Aleutians, Asians, New Englanders, Africans, and Mexican immigrants. These multiple ethnicities eventually intermarried with each other and with local Spanish and Kumeyaay descendents, leading to a new cultural identity—the *Californio*.

With the conclusion of the Mexican-American War and the Treaty of Guadalupe-Hidalgo in 1848, ownership of California was transferred to the U. S. government. The Gold Rush of 1849 lured tens of thousands of American immigrants to the West Coast, as did California's statehood in 1850. The large influx overwhelmed local *Californios*, and within a few short years, the identity of this Spanish-speaking group was folded into the larger identity of the English-speaking Californian.

With statehood came the fortification of the California coast. The peninsula of Point Loma forms a natural barrier at the entrance to San Diego, and its 422-foot ridgetop offers panoramic views of the harbor and the sea. U.S. government officials noted these strategic benefits and designated the peninsula as a military reservation in 1852. In 1854, the Old Point Loma Lighthouse was built to guide ships along

the coast. The lighthouse's elevation, coupled with low cloud ceilings in the vicinity, rendered the light difficult to see. It was replaced in 1891 with a lighthouse that is still in use today, located at the southern base of the bluff. The U.S. Coast Guard operates it.

The War Department dedicated Fort Rosecrans in 1899 and built a series of gun batteries over the years. During the two World Wars, Point Loma military facilities provided vital coastal and harbor defense systems. Until 1943, military construction on the point continued with searchlight bunkers, fire control and base-end stations, and gun batteries. Miscellaneous military construction outside of the park still occurs in support of military activities.

Three distinct areas of historic focus are interpreted at Cabrillo National Monument: the landing of Juan Rodriguez Cabrillo in 1542; the Old Point Loma Lighthouse in the late 19th century; and 20th-century military structures. Each theme is presented using a combination of visual, audio, and tactile interpretation within self-guided exhibits. Cabrillo's journey is outlined in an exhibit in the visitor center complex that includes life-sized models of the explorer in three life stages and examples of Spanish clothing, armor, and weapons. An interactive light board traces the exploration paths of Cabrillo and other conquistadors. The Old Point Loma Lighthouse and its cultural landscape are interpreted with period furnishings, re-enactments, and a lens exhibit in the Assistant Keepers' Quarters. Twentieth-century military structures at the monument are interpreted at the Army Radio Station using multimedia displays. While the lighthouse was adapted for military use during the two World Wars, the lighthouse and military structures represent two quite different themes and need to be interpreted as such. Living history programs support all three of the primary identified historic themes.

Amplifying the three historical threads and the addition of a fourth historical thread, that of the Kumeyaay nation, would benefit the monument. There is a modest exhibit about the Kumeyaay included in the Cabrillo display. All four histories are interconnected and should be presented as such to reveal the complete historical picture of the park. To accomplish this, Cabrillo needs adequate written histories from which to draw interpretive information. A full-time historian hired in 2002 spends about 20 percent of his time on specific research and is aided by a full-time volunteer and support from regional staff, but many historical documents remain incomplete or undone because of time and funding constraints. Currently the park does not have a historic resource study, an updated administrative history, an adequate cultural landscape inventory, or any ethnographic studies. Completing a park cultural bibliography would reveal gaps in the park's historical and interpretive documents and help park staff determine which documents need completion. Other future research at the park should include a historic furnishings report on military structures to guide creation of exhibits.

ARCHAEOLOGY—MORE RESEARCH NEEDED TO INFORM INTERPRETATION

Archaeological sites and middens on Point Loma suggest that aboriginal populations used the peninsula for hunting and fishing. Ten archaeological sites at Cabrillo are listed in the Archeological Sites Management Information System (ASMIS), a Park Service database used to organize and store archaeological information. Two of these sites are historic military structures; the remaining eight are disturbed shell and stone scatters, none of which are interpreted by the park. Because Cabrillo National Monument does not have a staff archaeologist, the park employs contractors or relies on staff from nearby Channel Islands National Park for archaeological support. As a result, fewer archaeological projects can be completed, and those projects take longer to finish. Because archaeological sites and artifacts have not yet

been thoroughly evaluated or documented, staff cannot adequately interpret them for visitors.

Staff are currently working to fully evaluate the condition and significance of each archaeological site, update ASMIS, and place park archaeological resources into a regional context. *Shadows of the Past*, a complete archaeological overview, was completed in 2001.

According to local archaeologists, there are many underwater archaeological sites within Cabrillo National Monument's waters; these sites have not been formally surveyed or evaluated. Navy divers and independent archaeologists have explored areas around Point Loma and have identified historically significant items such as bottles, whale bone, Spanish tiles, shipwrecks, airplane debris fields, and Spanish cannons. While strong tidal surges, sand deposits, and the high cost of retrieval make most of the items inaccessible, these underwater sites remain an important resource that could enhance interpretive programs about the whaling industry, Spanish occupation, and World War II.

HISTORIC STRUCTURES—PLANS GUIDING PRESERVATION

Cabrillo National Monument's 23 historic structures include the Old Point Loma Lighthouse, 20th-century military structures, and the Mission 66 visitor center. The lighthouse reflects the economic development of the area, while the military structures reflect harbor defense and strategic military activities from after the Spanish-American War until post-World War II. The Mission 66 visitor center was part of a decade-long movement (1956–1966) to improve national parks and represents the growing park administrative presence on the peninsula. The Old Point Loma Lighthouse has been listed in the National Register of Historic Places since 1974; nomination of the Mission 66 visitor center is under way. Most of the military structures have been nominated as part of

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This five-foot-wide searchlight was used during World War II. The park has begun restoration work at two of its historic searchlight stations.

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The Old Point Loma Lighthouse, Assistant Keepers' Quarters, and surrounding landscape have undergone a number of restoration projects over the years. Most recently, the lighthouse grounds were restored to their 1880s appearance and interpretive displays were constructed at the Assistant Keepers' Quarters.

the Fort Rosecrans District nomination, but none are currently listed on the register; all structures have a List of Classified Structures (LCS) identification number.

A four-year-term historic preservation specialist was recently hired at Cabrillo. Acquiring this staff member has allowed the monument to restore preservation maintenance programs on historic military structures and has resulted in the initiation of restoration work on the historic Generator Station, Searchlight Stations #15 and #18, and Battery Point Loma. Preservation and restoration work on historic structures is guided by the *Historic Structures Report for Harbor Defense Structures* (2000). Preservation work on the lighthouse is guided by the *Old Point Loma Lighthouse Historic Structure Preservation Guide* (1990). Cabrillo is able to acquire project money for specific preservation projects and now has the expertise to oversee these projects, but the preservation specialist position needs to be made permanent.

Old Point Loma Lighthouse

Built in 1854, the Old Point Loma Lighthouse was the last of eight lighthouses constructed along the Pacific coast from 1852 to 1854. Because heavy fog made the lighthouse difficult to see, a new lighthouse was built on the southwestern coast of the point in 1891, nearer to the water and below the fog line.

The first round of restoration work on the lighthouse began in 1935, when park staff used historic photographs to replicate its original appearance. From 1941 to 1947, the monument was closed to the public and managed by the U.S. Army, to ensure San Diego Harbor and the West Coast were protected during World War II. During this time the lighthouse exterior was camouflaged. As part of the Mission 66 national park improvement movement, the road around the lighthouse was reconstructed and a parking lot was installed. Major restoration of the upper portion of the lighthouse occurred in 1982, including strengthening of the brick tower and

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Some of the park's historic military structures are accessible only via a trapdoor and ladder.

replacement of some ironwork. In the 1990s, the Park Service used historical information to furnish the interiors of the rooms in the lighthouse to their 1880s appearance. Another restoration of the upper iron railings, iron deck, and copper roof occurred in 2006.

During 2004 and 2005, the grounds of the Old Point Loma Lighthouse were restored to their 1880s appearance and the Assistant Keepers' Quarters interpretive shelter was constructed. This interpretive shelter houses an exhibit about Point Loma's three lighthouses, only one of which is in the park and open to the public. Today park staff and volunteers in period clothing help make park interpretive programs at the lighthouse come alive.

Military Structures

Scattered throughout Cabrillo are 21 historic 20th-century military structures. Partially buried in the sandstone peninsula and covered in vegetation, most of these structures were built from reinforced concrete and date from the mid-1910s through the mid-1940s. They include fire control stations, searchlight shelters, gun mounts, sleeping and storage bunkers, a generator station, and a radio station. The Park Service has used some of the larger structures for storage, but until recently none of the structures were interpreted or open to the public. Cracked concrete, rotting wood, rust, and pest infestations all affect these buildings. Threats such as these are addressed with regular condition assessments, preservation treatments recom-

mended by *The Secretary of the Interior's Standards for Rehabilitation*, recommendations from the historic structures report mentioned above, and a regular cyclic preservation maintenance program. Since the implementation of the maintenance program, most of the military structures have been rated in "good" to "fair" condition.

In the last five years, all of the military structures in the monument have been emptied and cleaned, and Searchlight Shelter #18, Searchlight Shelter #15, and the historic Generator Station are being restored to their original condition by the park's historic preservation specialist and chief of maintenance. Recently, staff also converted the Army Radio Station into a self-guided World War II exhibit that outlines the story of Fort Rosecrans and the U.S. Army's coastal defense system.

Mission 66 Visitor Center

After World War II, prosperity and optimism encouraged thousands of Americans to visit their national parks. The need for a systematic method of communicating to park visitors led to the decade-long project (1956–1966) known as Mission 66. Before Mission 66, most park and monument structures were rustic-style buildings constructed by the Civilian Conservation Corps (CCC). Mission 66 designers took a different path, using contemporary and commercial designs for the new buildings. Visitor centers, prominently situated at entry roads, welcomed the masses with orientation information and other amenities, and they soon became emblems of a new era for the National Park Service. Cabrillo National Monument's visitor center is a product of the Mission 66 movement and reflects this time period.

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The park's visitor center, built during the Mission 66 era of the National Park Service, is one of its historic structures.

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A tactile sculpture shows visitors what the Old Point Loma Lighthouse and accompanying buildings looked like. It is accompanied by a wayside exhibit and audio recording that teaches visitors about the history of the lighthouse.

CULTURAL LANDSCAPES—CONNECTEDNESS LACKING IN INTERPRETATION

Cultural landscapes illustrate how people have changed and adapted to their surroundings. Three major cultural landscapes have been identified at Cabrillo National Monument: the Old Point Loma Lighthouse Historic Vernacular Landscape; the Fort Rosecrans/Coastal Defense Structures Historic Vernacular Landscape; and the 1930s Monument Landscape Architecture Historic Designed Landscape. Additionally, the Mission 66 Visitor Center Historic Designed Landscape is a potential candidate. An overall lack of documentation for the park's cultural landscapes hinders interpretation efforts. Currently, the lighthouse is the only landscape interpreted at Cabrillo.

Despite lack of documentation, the park's cultural landscapes are in "fair" to "good" condition. The Old Point Loma Lighthouse and its surrounding landscape were recently restored to reflect daily life in the late 19th century. Using historic photographs and documents, park staff installed a vegetable garden similar to the one planted by Maria Israel, who cared for the lighthouse with her husband for 19 years, and removed various 20th-century aesthetic improvements unrelated to the landscape. Structures within the Fort Rosecrans/Coastal Defense Structures Historic Vernacular Landscape and the Mission 66 Visitor Center are on cyclic maintenance programs and in varying stages of restoration. No documentation exists for the 1930s Monument Landscape Architecture Historic Designed Landscape.

Interpretation of cultural landscapes is vital to understanding the overall historic and cultural significance of the monument. All of the landscapes reflect the military and administrative history of Point Loma, as well as the broader themes of exploration, settlement, and defense. Some of the landscapes could be paired up and interpreted together using similar themes. For example, the Old Point Loma Lighthouse Landscape and the Fort Rosecrans/Coastal Defense Landscape both illustrate the strategic location of Point Loma, military activity on the peninsula, and the defense of the West Coast of the United States. The 1930s Monument Architecture Landscape and the Mission 66 Visitor Center reflect administrative activity within the park and historic landscape design movements within national parks.

ETHNOGRAPHY (PEOPLES AND CULTURES)—HISTORY MISSING DUE TO LACK OF STUDIES

No ethnographic studies have been conducted at Cabrillo, despite the fact that the entire Point Loma peninsula could be considered a cultural landscape for native Kumeyaay people. Because of this lack of information, the National Parks Conservation Association did not determine a score for the condition of ethnographic resources.

Current research outlines the history of the Kumeyaay as separate from the history of Spanish discovery and settlement in the San Diego area. In reality, these histories are tightly interwoven. Although a large community of Kumeyaay resides in San Diego County today, park staff have had difficulty establishing relationships with these modern-day Kumeyaay. The park sends planning and resource management notices to the established tribes as required by law, but the park has never received a reply. There is some interaction between the park and the local tribes through special events. For the past five years, the Barona Cultural Center and Museum (BCCM), linked to one of the local tribes, has participated in the annual Cabrillo Festival, and BCCM staff have provided in-service training to park staff. In addition, the keynote speaker at the 44th annual Cabrillo Festival Commemorative Ceremony in 2007 was from the Campo Kumeyaay Nation.

There is an obvious effort on behalf of park staff to include and recognize Kumeyaay within park interpretation; however, without a historic resource study, ethnographic studies, or some compilation of the park's intertwined histories, it is difficult to recognize the significance and impact of the Kumeyaay. The history of the Kumeyaay reflects long-ago use of park natural resources (tide pools); first contact with Europeans; ethnic blending and intermarriages; Spanish/Catholic conversion; inclusion of native peoples; and the status of modern-day American Indians in the United States. Ethnographic studies and interpretation would enhance Cabrillo National Monument and give a more complete picture of the history of the San Diego area.

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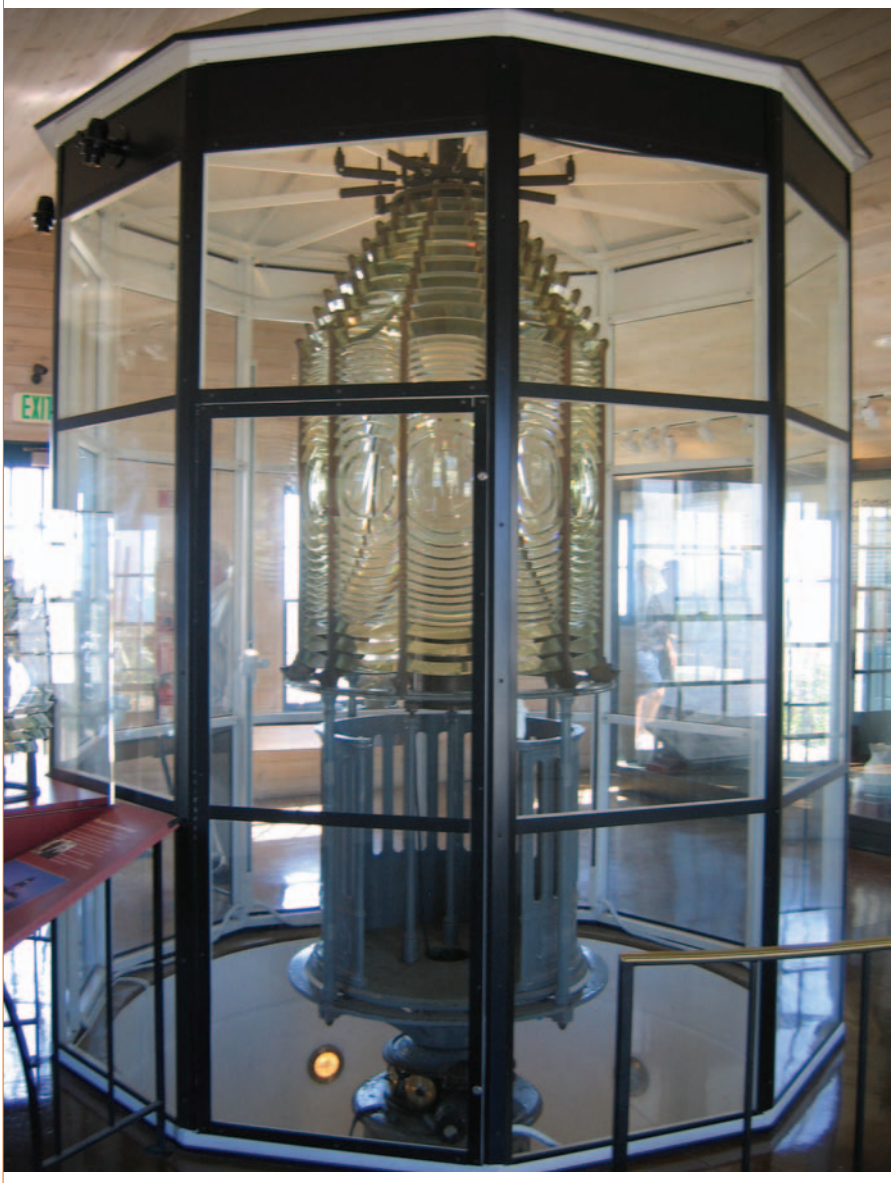
Acting Superintendent Wendy Janssen speaks at the 44th Annual Cabrillo Festival Commemorative Ceremony and Wreath Laying in 2007. The festival includes educational activities and cultural demonstrations that incorporate American Indian, Mexican, Portuguese, and Spanish cultures.

MUSEUM COLLECTION AND ARCHIVES—NEW STAFF AND STORAGE FACILITY BENEFIT THE MONUMENT

Cabrillo's museum collection and archives include replicas, museum artifacts and specimens, and administrative material spanning more than 60 years of history. Some of these are displayed in the Old Point Loma Lighthouse, the lighthouse exhibit, the coast defense exhibit, and the Cabrillo exhibit. The archives include photographs, drawings, maps, historical research, reports, oral history transcriptions, construction documents, drawings and blueprints, videotapes, microfilm, audiocassettes, resource management records, central files, and electronic records. Archaeological artifacts (with varying degrees of documentation), the original commemorative statue of Juan Rodriguez Cabrillo, and a rotating Fresnel lighthouse lens are also part of the museum.

Visitors can get a close look at a Fresnel lens on display at the park.



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In 2005, the park completed work on a new 2,016-square-foot storage facility for its museum collection and archives. With help from the Western Archaeological and Conservation Center (WACC), park staff have been cleaning, organizing, inventorying, and cataloguing most of the more than 220,000 pieces in the collection. About 77,000 of these items are now stored in the new facility. The WACC is still working to transfer some items to microfiche and other digital formats, and park staff are moving and cataloging remaining items. Upon completion of the transfer, individuals will be able to access the collection's online catalog.

Historic photos are currently improperly stored in cardboard boxes and file cabinets, waiting to be incorporated into the new facility. Exposed to humidity and temperature fluctuations, the photos are subject to mold and deterioration. According to the museum technician, photos have also suffered pest infestations of mice and silverfish. There is no finding aid for the photos, nor are they stored in a particular order. As a result, it is difficult to navigate the photos or to determine if any are missing.

Once the entire park collection is moved, catalogued, and made accessible to internal and external researchers, Cabrillo will require a full-time, permanent museum technician to manage the new storage facility and online park catalog, oversee additions to park collections, and administer archival use policies. At this time, Cabrillo employs a full-time museum technician who spends all of her time working with museum materials, but this position is a four-year (term) one. Volunteers also assist the technician in the new storage facility.

KELLY COURKAMP

STEWARDSHIP CAPACITY

FUNDING AND STAFFING—SUPPORT NEEDED FOR STAFF INCREASES, RESTORATION, AND MONITORING

Cabrillo's annual operating budget for 2007 was $1.483 million, a slight increase from 2006's $1.452 million. This supports a staff of 25 employees. It is estimated an additional $75,000 per year is actually required just for historic structure repair and preservation alone. A "wish list" for projects in the park greatly exceeds the annual budget each year. For example, 2005 wish list costs totaled $5 million, compared with the allocation that year of $1.446 million.

Unfilled positions and forced reduced schedules at the monument limit what current staff can accomplish. Several full-time positions have been reduced to part-time due to budget limits; these should be restored to more adequately cover workloads. Within the last five years, Cabrillo has lost two permanent interpreter positions due to funding shortfalls. The park needs two additional interpreters to assist with guided programs on busy weekends and holidays. These employees would also alleviate the workload of current interpretive staff, allowing more time for outreach, development of new displays and printed materials, creation of new

Park staff and volunteers dress in period clothing to help bring the park's history alive for visitors.

curriculum-based education programs and teacher trainings, and evaluation of interpretation and education programs and interpretive media. Additional interpretive staff would also allow the historian to focus on conducting and presenting historic research and completing needed documents and plans.

Additional assistance with natural resource management is needed to understand and protect the resources on this unique peninsula. Unfilled maintenance worker positions have led to delays in landscaping work, facility repair, cleaning, and general upkeep. The park requires a skilled staff member to assist the current staff with specialized tasks such as electrical, plumbing, and masonry repairs. More office space, computers, supplies, equipment, uniforms, and vehicles will be needed to support additional staff.

ADDITIONAL ASSISTANCE WITH NATURAL RESOURCE MANAGEMENT IS NEEDED TO UNDERSTAND AND PROTECT THE RESOURCES ON THIS UNIQUE PENINSULA.

The following projects at Cabrillo have been stalled due to shortfalls in staff and/or funding: non-native vegetation removal and documentation of related activities; management of the park's greenhouse; collection, storage and propagation of native plant seeds for use in restoration; systematic monitoring of bats; periodic monitoring of native vegetation; periodic assessment of condition and relative abundance of park mammals; periodic assessment of condition and relative abundance of sensitive/rare plants; development of a thorough species inventory for both marine and terrestrial invertebrate species; and regular maintenance and restoration of historic structures. The park has requested two full-time employees to inventory and monitor natural resources; one full-time employee to remove non-native vegetation, restore disturbed habitat, monitor for recovery/re-infestation, and operate the greenhouse; and one full-time geographic information systems (GIS) specialist to manage existing and develop new databases, archive data, and post information on the park website.

PLANNING—UPDATED PLANS NEEDED

Cabrillo National Monument's general management plan (GMP) was completed in 1996 and is in need of an update because all of the projects in the plan have been completed, thanks to funds collected through park recreation fees. The park is currently awaiting funding for an updated GMP. The park also needs an updated plan to guide natural and cultural resource management. The Park Service recently instituted resource stewardship strategies to replace existing resource management plans. Cabrillo staff are awaiting guidance and will seek funding before developing a resource stewardship strategy.

In cooperation with the U.S. Navy, the park has prepared a fire management plan that provides for fire suppression strategies around certain structures, mitigation of invasive plant species as sources of ignition and fuel, and prescribed fire treatments designed to help meet ecological goals and native species management. The park also uses a 2002 vegetation management plan to guide restoration of native coastal sage scrub habitat.

The park has requested funds to prepare a historic resource study, a cultural landscape inventory, and a historic structures preservation guide for the care of U.S. Army coastal defense structures from World Wars I and II.

RESOURCE EDUCATION—VISITORS BENEFIT FROM TOP-NOTCH EFFORTS

Guest interaction with staff educators and interpreters is a major part of the visitor experience at Cabrillo. In 2006, the park reached 38,274 visitors with formal interpretive programs, while another 584,000 interacted with staff at the visitor center, out in the park, or through the Junior Ranger Program. Rangers and trained volunteers provide information about park plants and animals, while volunteers in period attire present living history programs. Films and exhibits at the visitor center cover both cultural resource and natural resource themes. The *Juan*

Rodríguez Cabrillo and the Age of Exploration exhibit tells the story of Iberian explorer/conquistador Juan Rodríguez Cabrillo and 16th-century exploration of North America. A film about the explorer, *In Search of Cabrillo*, is shown daily in the visitor center auditorium. *On the Edge of Land and Sea: The Tide Pools of Cabrillo National Monument*, a film that premiered in January 2006 and is also shown daily in the auditorium, describes the rocky intertidal system and Park Service efforts to monitor and preserve it.

Park rangers provide curriculum-based educational programs to elementary students from October to June. Instructional packets for teachers, films (such as *On the Edge of Land and Sea*), and educational Web pages (such as a Web tour of coastal sage scrub) have all been developed. An estimated 8,000 children and educators take advantage of the programs on Juan Rodríguez Cabrillo, the Old Point Loma Lighthouse, Kumeyaay uses of native plants, tide pools, and coastal sage scrub each year. There are plans for additional programs in the future.

Due largely to consistent outreach efforts, the monument has become a source of local pride for the San Diego area and is recognized as a significant tourist draw. Whale Watch Weekend and Intertidal Life Festival, an event held each January, is especially popular. The monument also observes National Park Week and Junior Ranger Day in April, the National Park Service Founder's Day celebration on August 25, National Public Lands Day in September, and the anniversary of the first lighting of the Old Point Loma Lighthouse on November 15. When time permits, Cabrillo staff serve as speakers at local Kiwanis, Rotary, and other civic group meetings.

Within the last five years, Cabrillo has lost two permanent interpreter positions due to lack of funding, causing the park to cut back on special events and outreach. The park's popular Cabrillo Festival, for instance, no longer takes place at the monument, and the burden for producing the fall festival each year has shifted largely from park staff to Cabrillo Fesitval, Inc., a nonprofit community group. The loss of

NATIONAL PARK SERVICE

During 2006 and 2007, the park relied on the Cabrillo National Monument Foundation for funds and other support for the Whale Watch Weekend and Intertidal Life Festival. This favorite visitor event could be discontinued if funds and staff support are not secured on a permanent basis.

special events has reduced the amount of media attention the park receives.

EXTERNAL SUPPORT—PARTNERS AND VOLUNTEERS PROVIDE VALUABLE SERVICES

Cabrillo National Monument benefits from a large volunteer workforce and various partnerships with outside agencies. Because of funding shortfalls, many tasks would go undone at the monument without this assistance.

Since 1956, the Cabrillo National Monument Foundation (CNMF) has provided support and more than $1.6 million for research and interpretive programs, including historical, educational, and scientific activities. As the park's cooperating association, CNMF is an independent, nonprofit organization working to enhance the visitor experience at Cabrillo. Revenue comes from donations, memberships, and the sale of publications and other educational items. CNMF also operates the bookstore at the visitor center and has published several award-winning books on historic and scientific topics relating to the monument.

Through its Volunteers-In-Parks program, Cabrillo is able to provide enriching experiences for volunteers and tackle projects that staff cannot address, due to lack of time or funding.

NATIONAL PARK SERVICE

Volunteers assist park staff with a variety of resource management projects, including amphibian and reptile monitoring.

In 2006, 341 volunteers donated 11,542 hours of service. They regularly participate in tide pool surveys, reptile and amphibian monitoring, bat counts, shorebird counts, greenhouse work, and habitat restoration. Others re-enact living histories, serve as tide pool educators, participate in community clean-up events, staff the visitor center, assist with maintaining the museum collection and library, edit the park newsletter, assist with historic research and special events, and staff the entrance station. Youth Conservation Corps teams have assisted with restoration work, but funding shortfalls have reduced this team from eight members to just four members.

Partnerships and cooperative relationships also benefit the monument. All entities on Point Loma, as well as the U.S. Fish and Wildlife Service and the California Department of Fish and Game, are part of the Point Loma Ecological Conservation Area Working Group, which oversees the care and preservation of the Point Loma Ecological Conservation Area. Because the monument shares the peninsula with the U.S. Navy, U.S. Coast Guard, Fort Rosecrans National Cemetery, and the City of San Diego's Point Loma Wastewater Treatment Plant, "Good Neighbor" meetings are held as a way to foster communication and collaboration among the various players. These monthly meetings offer opportunities to discuss planned activities and resolve conflicts.

In the past, the Exotic Plant Management Team at Point Reyes National Seashore has assisted Cabrillo staff with combating invasive plant infestations, but due to funding shortages, has not completed work in the park for two years. As a part of the Park Service's Mediterranean Coast Network Inventory and Monitoring Program, the park gains opportunities to acquire additional information on both plants and wildlife. Participation in this network allows the park to accomplish a bit more natural resource study than it could with just existing on-site staff.

WHAT YOU CAN DO TO HELP SOUTHERN CALIFORNIA'S MEDITERRANEAN BIOME PARKS:

- **Participate in park planning efforts:** The public is invited to provide input on all park plans and studies. Channel Islands National Park is currently updating its general management plans. Copies of the parks' planning documents and information on opportunities for public involvement can be found online (www.nps.gov/chis, www.nps.gov/cabr, and www.nps.gov/samo).
- **Support or become a member of a group helping to protect the parks:** NPCA (www.npca.org/support_npca), Santa Cruz Island Foundation (www.west.net/~scifmail), Cabrillo National Monument Foundation (www.cnmf.org/home.html), Western National Parks Association (www.wnpa.org), the Santa Monica Mountains Fund (www.samofund.org), The Friends of Satwiwa (http://satwiwa.org), Trust for Public Land (www.tpl.org), and other regional organizations.
- **Volunteer in the parks.** Many parks are looking for dedicated people who can lend a helping hand. To learn about volunteer opportunities, contact the parks: Channel Islands National Park, 805.658.5730; Santa Monica Mountains National Recreation Area, 805.370.2301; Cabrillo National Monument, 619.557.5450; or visit www.volunteer.gov.
- **Become an NPCA activist and learn about legislative initiatives and protection projects affecting parks.** When you join our activist network, you will receive *Park Lines*, a monthly electronic newsletter with the latest park news and ways you can help. Join by visiting www.npca.org/takeaction.

Coastal sage scrub blankets parts of the Santa Monica Mountains.

TARJA SAGAR/NATIONAL PARK SERVICE

APPENDIX: METHODOLOGY

To determine the condition of known natural and cultural resources at Channel Islands National Park, Cabrillo National Monument, Santa Monica Mountains National Recreation Area, and other national parks, the National Parks Conservation Association developed a resource assessment and ratings process. The assessment methodology can be found online at NPCA's Center for State of the Parks® website (www.npca.org/stateoftheparks).

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

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

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

ERIN MCPHERSON

For this report, researchers collected data and prepared a paper that summarized the results. The draft underwent peer review and was also reviewed by staff at Channel Islands National Park, Cabrillo National Monument, and Santa Monica Mountains National Recreation Area.

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

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