

STATE
OF THE
PARKS

December 2008

REDWOOD NATIONAL AND STATE PARKS

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; email: 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
- * 25 regional and field offices
- * More than 120,000 activists

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

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INTRODUCTION



Redwood National and State Parks protect a primeval landscape where ancient giant trees cluster together, forming a cathedral of verdant canopy, held upright by massive gray columns and blanketed with a lush vegetative carpet. The parks preserve lands where visitors feel small as they stroll in the shadows of the enormous coast redwoods (*Sequoia sempervirens*), the world's tallest living organisms. These towering trees once grew in moist temperate

areas throughout the world, but now they can be found only within a narrow stretch of the Pacific coast of North America. Visitors to the parks today can thank visionary men and women who fought to save these special trees from the chainsaw and bulldozer. Their efforts will allow future generations the chance to stand in timeworn groves shrouded in fog and to stare skyward in awe at the sheer size and heights of the old-growth trees.

Coast redwoods once grew in certain areas throughout the world. Today they are found only within a narrow stretch along the Pacific coast of North America.

ASHLEY FICKE



Located in northern California, Redwood National and State Parks provide wonderful views and undeveloped beaches that serve both wildlife and visitors.

Located along the northern California coast, Redwood National and State Parks comprise a total of 131,983 acres, of which 71,715 acres are federally owned and fall within Redwood National Park. The remaining 60,268 acres are composed of three separate California state parks: Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwoods State Park. (See “Protecting the Redwoods” on page 3 for information on management cooperation among the national and state parks.)

Redwood National and State Parks were established to shelter the area’s remaining old-growth coast redwoods from extensive logging that threatened the existence of the oldest and largest trees. The Redwood parks preserve about 40,000 acres of old-growth redwood forests, which represent most of the last remaining old-growth coast redwood groves on Earth. In addition, the parks protect the world’s largest coast redwood forests and its tallest living trees. The

biggest is a giant that measures an astounding 379.1 feet and is located in a remote area of the park near several of the next tallest trees. Important not only for their massive size, coast redwood trees anchor one of the most productive ecosystems on Earth. This environment is highly differentiated and provides habitat for numerous plant and animal species, from the forest canopy down to the forest floor.

While the coastal redwood forest is extremely impressive as the centerpiece of the park, it is but one within the diverse group of ecosystems preserved. In addition to the big trees, visitors can experience rocky coastal outcrops that provide stunning views of the Pacific Ocean; foggy and breezy beaches; lush, fern-filled coastal stream and river valleys; and large expanses of prairie and oak woodland.

The diverse ecosystems of northern California have supported human life for thousands of years. Many different groups of American Indians, each with unique languages and distinct identities, have lived in the area. Descendants of these original residents still live nearby and help to guide the parks’ interpretation of their ancestors’ lives. Redwood National Park’s museum collection chronicles aspects of American Indian history and includes items such as redwood dugout canoes, traditional baskets, stone tools, arrowheads, and other carved items.

The discovery of gold in northwest California in 1850 brought many Euro-American settlers to the area. Although mining was not particularly successful, logging provided a more lucrative business venture. To a lesser extent, settlers also farmed and ranched the area. Park staff work to preserve this history by protecting historic structures throughout the parks. In addition to structures relating to ranching, Redwood National Park contains a World War II radar station, a portion of the Old Redwood Highway that brought scientists and early conservationists to the area, and a historic fish hatchery.

PROTECTING THE REDWOODS— ESTABLISHMENT OF REDWOOD NATIONAL AND STATE PARKS

Before logging began in the 1850s, coast redwood trees covered more than two million acres in California. Early logging activities had minimal impact on the ecosystem as a whole because trees were difficult to reach and were cut using hand tools. As technological advancements increased efficiency, however, the scale of logging activities accelerated. Completion of the Old Redwood Highway in 1923 allowed for easier access to the giant trees, and logging further escalated. In response to increasingly intense logging pressure, conservationists began to work to set aside tracts of coast redwoods for permanent protection.

The Save-the-Redwoods League was established in 1918 and dedicated itself solely to the protection of the coast redwood. The league worked to establish three state parks in northern California: Prairie Creek Redwoods State Park

(1923), Del Norte Coast Redwoods State Park (1925), and Jedediah Smith Redwoods State Park (1929). The Save-the-Redwoods League and the Sierra Club also worked toward the further conservation of the coast redwoods by leading the charge for the establishment of a national park. It was not until 1968, however, that Redwood National Park was established.

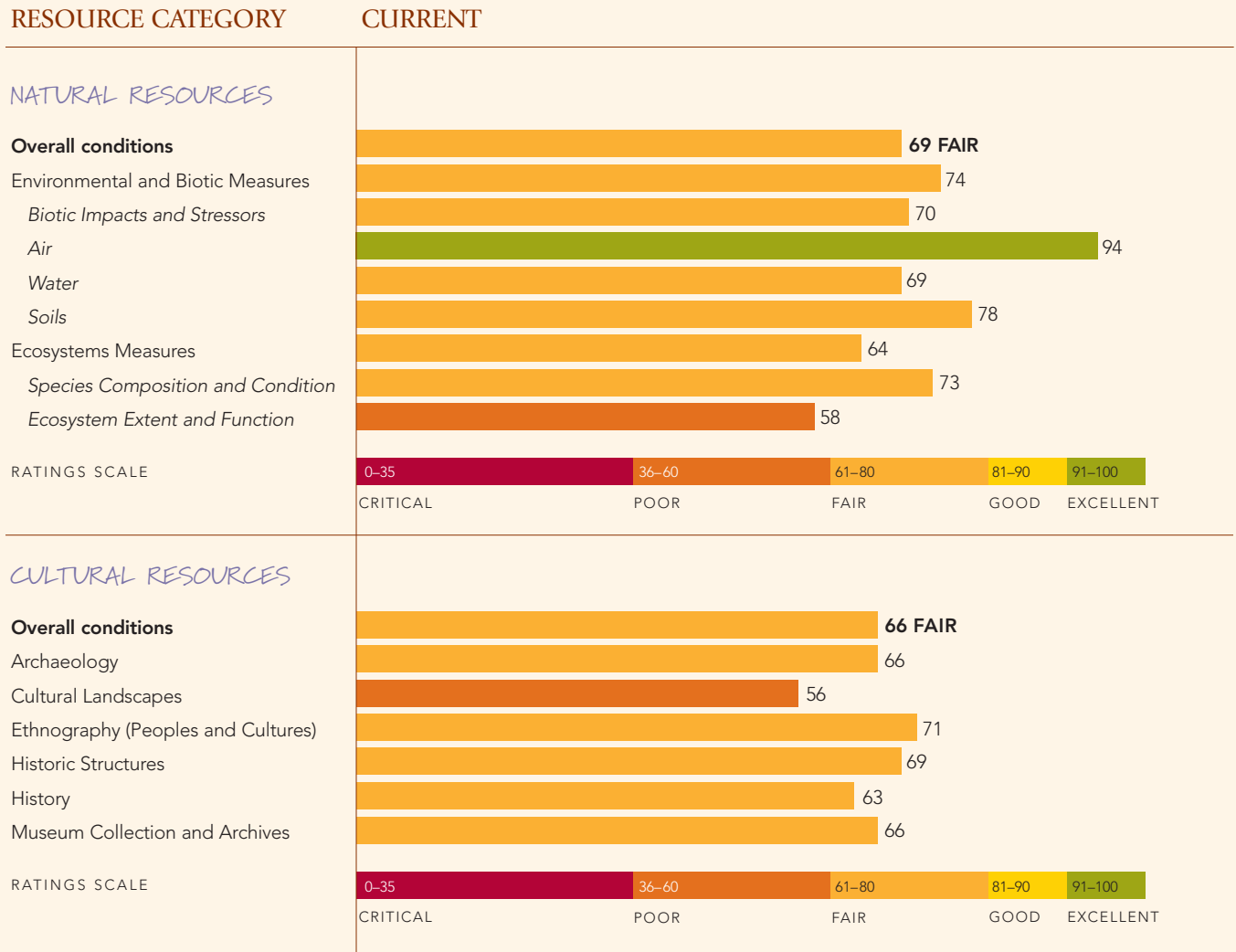
Since their creation, the primary function of the state and national redwood parks has been to preserve the natural features of the coast redwood ecosystem. Initially, the state and national parks protected about 58,000 acres. Continued logging on adjacent private lands prompted Congress to expand the national park's authorized boundary twice since the park's establishment. In 1978, the national park gained land in the Redwood Creek watershed, and in 2002, a number of private nonprofit groups, led by the Save-the-Redwoods League, and the State of California completed a major effort to acquire the entire



NATIONAL PARK SERVICE

Thanks to efforts by nonprofit organizations and the State of California, the Mill Creek watershed became part of Redwood National and State Parks in 2005.

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 Redwood National and State Parks, 78 percent of the natural resource information required by the methodology was available and 96 percent of the cultural resource 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 before a park was established. The intent of the Center for State of the Parks is not to evaluate Park Service staff performance, but to document the present status of park resources and determine which actions can be taken to protect them into the future.

Mill Creek watershed. The new Mill Creek acquisition was added to Del Norte Coast Redwoods State Park and ultimately became part of Redwood National and State Parks after a second major congressional boundary adjustment in 2005. Even with these acquisitions, resources at Redwood National and State Parks continue to be threatened by legacy roads (old, poorly maintained or abandoned roads) and activities on adjacent lands.

The three state parks—Prairie Creek Redwoods, Del Norte Coast Redwoods, and Jedediah Smith Redwoods—were initially envisioned to be incorporated into the new national park when it was established, but they remain separate entities. Today, the National Park Service and the California Department of Parks and Recreation jointly manage Redwood National and State Parks under a cooperative management agreement first signed in 1994. This agreement was designed to streamline management of the parks by allowing staff, funds, and resources to be shared and used by both agencies. As part of the agreement, both agencies follow a single general management plan, which was completed in 2000.

In recognition of the significant natural and cultural resources preserved and protected within Redwood National and State Parks, the National Parks Conservation Association’s Center for State of the Parks completed an assessment to determine the conditions of those resources. Because the National Park Service and the California Department of Parks and Recreation jointly manage resources, the Center for State of the Parks assessed natural resources throughout Redwood National and State Parks. Because of differences in cultural resource compliance requirements between the federal and state agencies, however, this assessment addressed cultural resources only within Redwood National Park (not within the state parks).

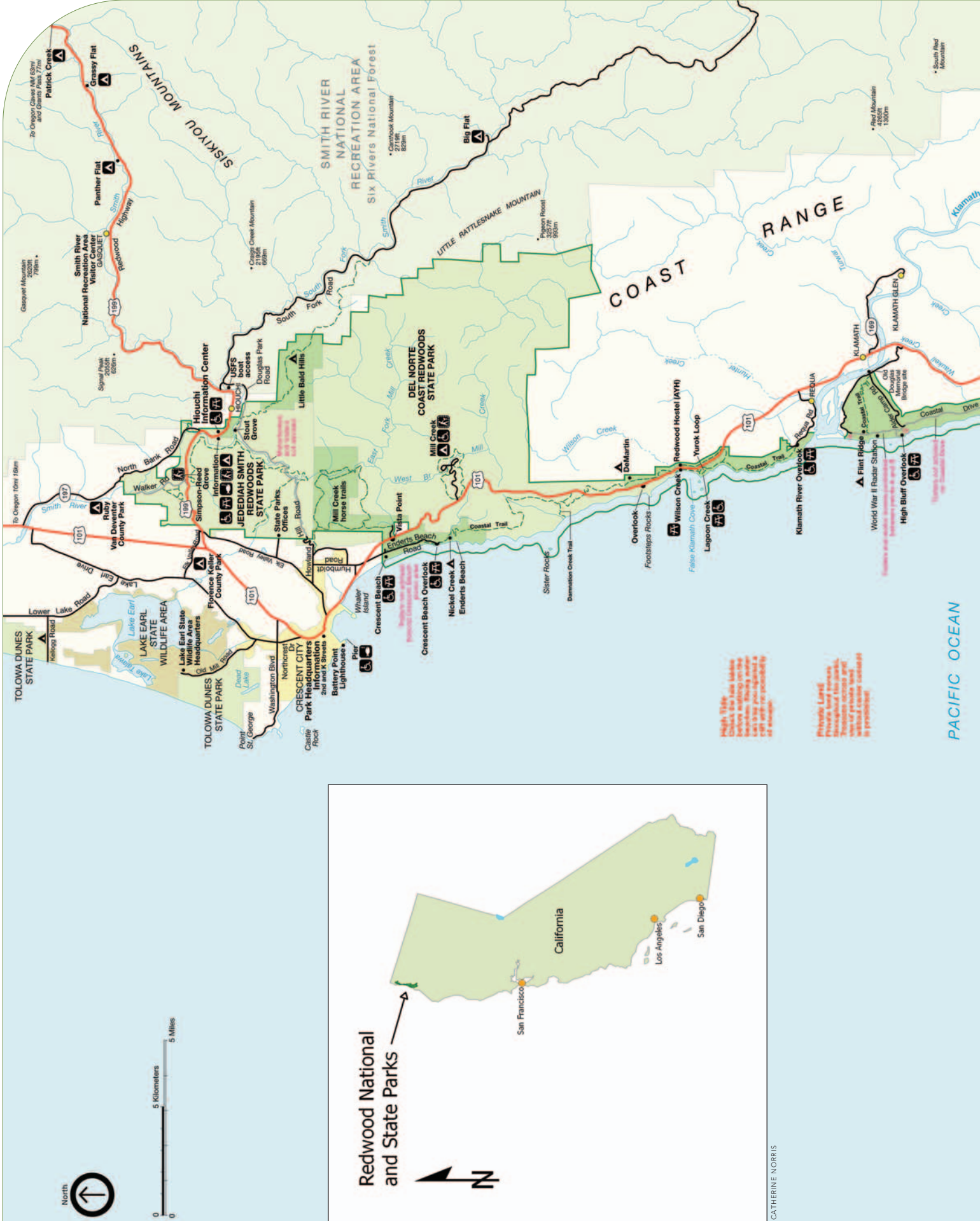
RATINGS

Current overall conditions of **natural resources** at Redwood National and State Parks rated a “fair” score of 69 out of 100. This rating includes assessment of natural resources within both the national and the state parks. 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”).

Redwood National and State Parks staff are working to help the parks recover from previous ecosystem damage that resulted from extensive logging and large floods; work includes watershed restoration (road removal and erosion control) and monitoring, as well as vegetation management. Both legacy and current effects of timber harvesting and logging road construction on adjacent lands still have the potential to adversely affect park ecosystems as erosion and sedimentation degrade water quality and habitat for salmon and steelhead trout. Park staff are systematically addressing these and other threats through monitoring, assessment, mitigation, and protection by park staff and a broad-based coalition of partners.

Overall conditions of Redwood National Park’s known **cultural resources** rated a score of 66 out of 100, indicating “fair” conditions. This rating includes assessment of cultural resources within the national park but not within the state parks. The National Park Service works collaboratively with state parks, but it does not have management authority over cultural resources within the state parks.

The majority of park resource management funding and staff is directed toward natural resources. Just 2.5 full-time equivalent staff positions are devoted exclusively to cultural resource management, which limits the park’s ability to study and care for cultural resources. Funds are needed to support a number of cultural resource plans and studies to ensure that resources are well protected and well interpreted for visitors.



High State
Check the tide tables before walking on the beach. Beaches may be very rocky and wet with the possibility of strong rip tides.

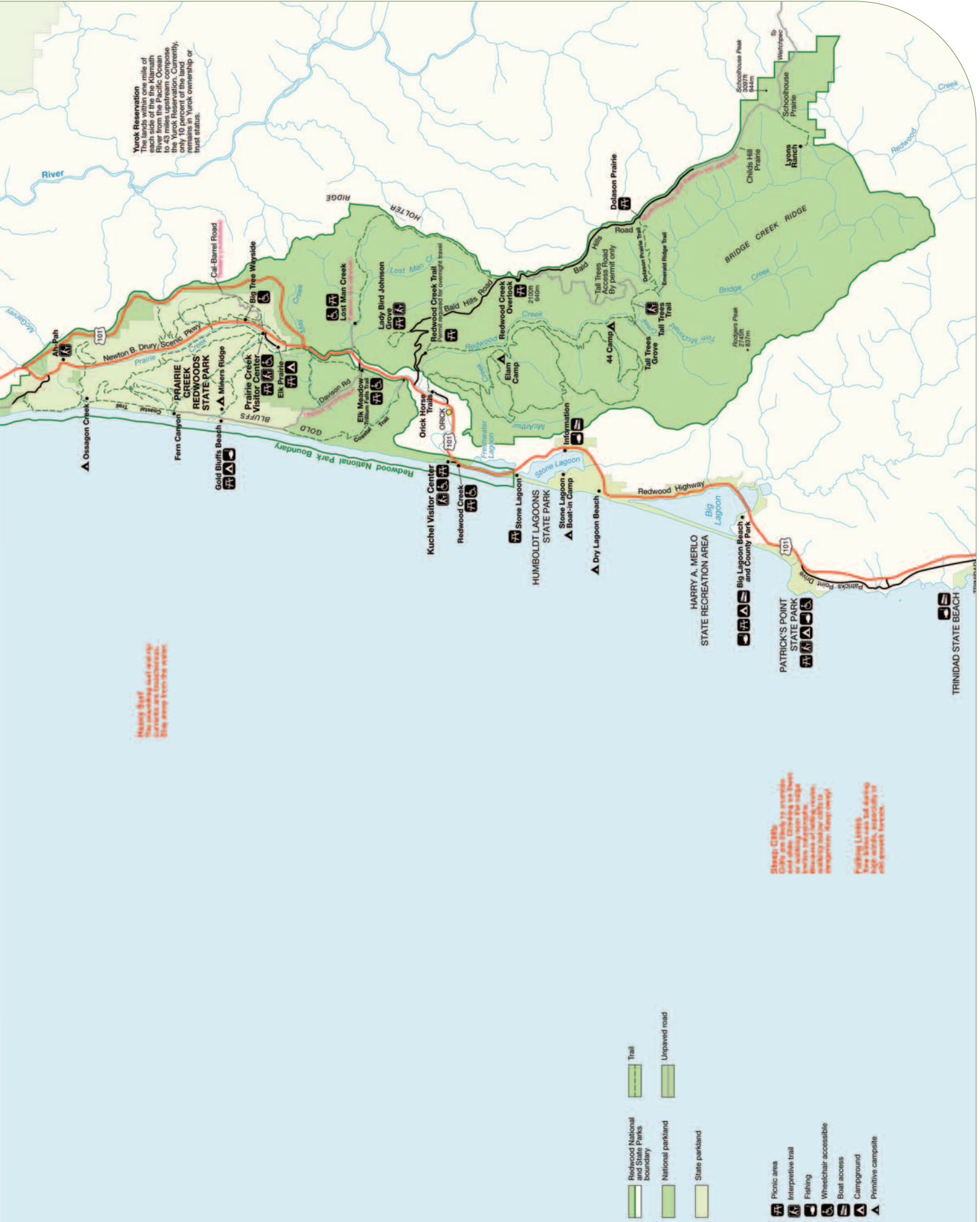
Private Land
Private land surrounds the park. Trespassing across private land is prohibited. Signs of private land are posted along the coast.

PACIFIC OCEAN

Redwood National and State Parks



CATHERINE NORRIS



Visitors to the park engage in a host of activities, including kayaking, hiking, scenic drives, and ranger-led interpretive programs.

RESOURCE MANAGEMENT HIGHLIGHTS

- Partnerships with public and private entities are vitally important to successfully manage, maintain, and improve the health of ecosystems within Redwood National and State Parks. Park staff are active in several partnerships to protect the aquatic and riparian habitats in Redwood Creek from upstream sources of sediment. Some of these cooperative relationships have been ongoing for more than 30 years and have been successful in improving the quality of the Redwood Creek aquatic ecosystem. The

park has also partnered with Humboldt State University, the U.S. Geological Survey Redwood Field Station, California Department of Fish and Game, and the U.S. Forest Service to better understand the health of natural resources in the park through research and monitoring, as well as to control invasive weeds, manage prescribed fires, and protect sensitive plant species. Volunteers from the California Conservation Corps and the Youth Conservation Corps have also been involved in projects within Redwood National and State Parks.

- The Park Service leases a privately owned state-of-the-art facility in Orick to house its expansive museum and archival collections. The collections, which total 665,137 objects, were previously scattered in various locations. This facility also stores items from nearby Whiskeytown National Recreation Area and Lassen Volcanic National Park. Collection highlights include American Indian basketry, crafts, and redwood dugout canoes; natural history specimens (e.g., butterflies, skulls, an herbarium, and soil samples); archaeological collections; and photographic collections.
- Since 1978, the National Park Service has removed about 220 miles of failing, abandoned logging roads. This work is necessary because sediment from these roads erodes and washes into sensitive stream channels that support salmon, trout, and other aquatic species. Park staff have developed, studied, and refined road removal technologies and shared these emerging restoration technologies with many other land managers.



- Park staff have implemented a program to remove non-native plants and encroaching conifers from about 2,000 acres of Oregon white oak woodland and coastal grasslands. Through this program, aggressive non-native species have been removed from several hundred acres of grassland in the Bald Hills, and conifers encroaching into oak woodlands and grasslands there have been cut. Without this work, many areas would lose the native vegetation typical of oak woodlands and coastal grasslands, which would have effects on birds and other wildlife. In addition, the park is restoring 31 acres of coastal dune habitat on northern Gold Bluffs Beach by removing European beachgrass, thereby improving habitat for the rare pink sand verbena and the federally listed threatened western snowy plover.
- Fire has been used as a tool in parts of the park since American Indians managed habitats and acorn production in the Bald Hills before Euro-American settlement. Today, the park's fire management plan guides prescribed burns and other activities to help improve ecosystem health and restore habitats ranging from oak woodlands to prairies and second-growth forests.
- Numerous cultural resources within Redwood National Park are listed in the National Register of Historic Places or have been determined eligible for listing, including the Lyons' Ranches Rural Historic District, Klamath River Radar Station B-71 (dating to World War II), Prairie Creek Fish Hatchery, Old Redwood Highway, and many archaeological sites.

REDWOOD NATIONAL AND STATE PARKS AT A GLANCE

- In recognition of their unique natural and cultural resources, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) has designated Redwood National and State Parks as both a World Heritage Site and an International Biosphere Reserve.
- The premiere habitats within the parks are the old-growth coast redwood forests, which are the largest stands of their kind in the world. Redwoods have a long history in the geologic record and were once found in coastal temperate climates throughout the world. The most recent ice age limited the coast redwood to its current distribution in a narrow 450-mile long strip along the Pacific coast of North America. Logging has reduced the old-growth redwood forest to less than 4 percent of this range, and the remaining old-growth forests are fragmented.
- The park's varied ecosystems provide habitats for nine species that are state and/or federally listed as threatened or endangered and two species that are candidates for listing under the federal Endangered Species Act. Old-growth forests are essential to the survival of the marbled murrelet, northern spotted owl, and fisher; the park's rivers provide critical spawning and rearing habitat for three protected salmonid species, chinook and coho salmon and steelhead trout; coastal areas within the park harbor the beach layia plant, western snowy plover, brown pelican, and Steller sea lion; and serpentine grasslands in the Little Bald Hills host the mardon skipper butterfly.
- Redwood National and State Parks have a rich history of human habitation and use. Parklands include traditional areas for American Indian groups such as the Chilula, Tolowa, and Yurok, while an array of well-preserved historic structures provide opportunities to educate visitors about the park's ranching and military history.
- Each year about 400,000 people visit Redwood National and State Parks to hike among the redwoods, take a scenic drive through groves, camp in one of the park's frontcountry or backcountry campgrounds, attend a ranger-led interpretive program, and view wildlife that includes Roosevelt elk, gray whales, and a host of bird species.

KEY FINDINGS

- Redwood National and State Parks are surrounded by private lands and other public lands. Resource extraction on these lands, particularly timber harvesting (and associated logging roads) to the east and south of the parks, continues to threaten park resources. Logging upstream of the park boundary can increase soil erosion and cause sediment deposition downstream in the park's aquatic and riparian areas. This sediment can fill in the deep pools used by growing juvenile and migrating adult salmon and steelhead trout and bury gravels critical to their spawning success. There is also a lack of large conifers in riparian areas both in the park and upstream to provide stream shading and to serve as a source for in-channel wood. The result is a lack of large woody debris to provide channel complexity and shelter to support native fishes. As a result of past land use and floods, Redwood Creek is currently listed under the Clean Water Act as impaired due to sediment levels and high temperatures, and three out of four salmon and steelhead trout species are federally listed as threatened under the Endangered Species Act. The Park Service has taken a leadership role to mitigate damage to the Redwood Creek watershed. In 1995 and 2000 the park entered into formal agreements with private landowners to "cooperate to identify, prioritize, and correct, where economically feasible, potential sediment sources in the Redwood Creek basin." In 2004, the park signed a formal agreement to join the Redwood Creek Watershed Group, a consortium of private landowners, local and federal agencies, local nonprofit organizations, and other interested parties seeking to improve conditions in Redwood Creek and the surrounding habitats.
- The Park Service and the U.S. Geological Survey have been conducting erosion and sedimentation studies on Redwood Creek since 1978, as mandated by the congressional act that same year that authorized a park boundary expansion to include land in the Redwood Creek watershed. The park's continued ability to collect data on parameters such as sediment transport is in jeopardy, however, due to inadequate funding. To continue the sediment monitoring mandated by Congress, the park needs to secure long-term funding.
- Ecosystem restoration is a priority for park staff, and it includes removing abandoned logging roads to limit delivery of sediment directly into streams and managing second-growth forests to achieve healthy, functioning ecosystems that can support specialist plants and wildlife. A consistent source of funding is needed to ensure this restoration work can continue.
- A legacy of extensive logging and past habitat loss continues to affect wildlife at the park. These changes have particularly hurt specialist species (e.g., marbled murrelets) that rely on the presence of large areas of old-growth forests.
- Two plant diseases caused by non-native pathogens are a concern within Redwood National and State Parks. Port-Orford-cedar root rot disease has claimed trees in the Little Bald Hills. The park rerouted a major trail in an attempt to stop the spread of the infection and works to protect uninfected trees. Sudden oak death (SOD) is a disease caused by a non-native water mold and is fatal to all

tanoaks it infects. It has been documented near the parks and is likely to spread into the parks within the next five years, altering forest ecosystems. Public education and implementation of best management practices, such as cleaning vehicles and establishing wash stations for bikes and hikers, are critical to controlling the spread of this disease. Removing dead, infected, and host trees (e.g., California bay laurel) reduces the amount of spores in infected areas.

- Douglas fir trees are encroaching onto the park's grassland ecosystems and cultural landscapes, partly due to fire suppression dating back to the 1930s. It is also a result of extensive land disturbance that has allowed a competitive advantage to the Douglas fir, an aggressive colonizing species. Additionally, the park's coastal scrub communities appear to be transitioning to Sitka spruce forest, partly in response to past and current fire management practices. It is unclear how the arrangement of coastal grassland,

scrub, and Sitka spruce forest habitats occurred on the landscape prior to European settlement, but it is known that coastal grassland and scrub habitats are currently in decline compared to emerging spruce forest habitats. Today, the park has a fire management plan in place to guide staff in the use of controlled burns to help restore native grasslands and oak woodland habitat in the Bald Hills.

- Although the parks' redwood forests have proven relatively immune to invasion by non-native plants, interior grasslands have not fared as well. A park survey found that 33 percent of the plants found on the prairie were non-native, which accounted for 50 to 75 percent of vegetative cover. On sections of the parks' beaches, non-native European beachgrass has become established. This plant has stabilized dunes that formerly contained native plants and animals that are adapted to wind- and wave-mediated disturbance and that now face a loss of their habitat.

The lupine population within the Bald Hills prairie has exploded two years after being treated with a prescribed burn.

ASHLEY FICKE



- Redwood National and State Parks house their substantial collection of museum and archival items in a modern facility, but of the 665,137 items in the collection, 199,971 have yet to be cataloged. Staff are committed to addressing the backlog by 2018 and have requested funds to hire an archivist. Staff are currently writing a museum management plan, which will take into consideration the addition of museum items and archival documents from nearby Whiskeytown National Recreation Area and Lassen Volcanic National Park that are now stored at the same facility containing Redwood's collections.
- Redwood National and State Parks have a rich history that includes American Indian, military, industrial, logging, ranching, fishing, and recreational themes. The park's historic resource study, which is 30 years old, needs to be updated to provide park staff with a valuable tool to guide resource management and interpretation.
- Prehistoric American Indian villages, middens, and camps, as well as evidence of more recent European settler activities such as logging and ranching, are among the 147 identified archaeological sites within Redwood National and State Parks. Of these 147 sites, 104 sites are on land managed by the National Park Service. Most archaeological sites in the parks were recorded by archaeologists decades ago, so park staff have been working to update information on current site condition. Archaeologists assessed the conditions of more than 70 archaeological sites in 2006 and 2007. As of 2007, 93 percent of the 104 sites managed by the National Park Service are known to be in "good" or "fair" condition. But more funds are needed to document sites according to current professional standards and to establish a regular site-monitoring program. This is necessary to adequately preserve these sites for their cultural and scientific values. This project would be the first step in developing a more comprehensive strategy for managing archaeological resources.
- Funding is needed to create historic structure preservation guides and to collect and compile archival files for each structure within Redwood National and State Parks. Years of work and many hundreds of thousands of dollars have gone into preserving these structures. The completion of these guides would document past activities and develop guidelines to ensure the future preservation of these important cultural resources.
- Funds are needed to evaluate and update the condition assessments of Redwood's cultural landscapes. This work may lead to the creation of detailed cultural landscape reports, which would enhance interpretation and help park managers protect landscapes by ensuring that other activities do not disturb their integrity.
- The park received a base increase in its operational budget in fiscal year 2008, resulting in a 32.3 percent increase over the preceding nine years. Prior to receiving this recent increase the operational budget had not kept pace with park needs. The fiscal year 2008 base increase should allow the park to better deal with what had been chronic understaffing and project delays.



THE REDWOOD NATIONAL AND STATE PARKS ASSESSMENT



ALEX FORIST

NATURAL RESOURCES— HOME TO THE WORLD'S TALLEST TREES AND A VARIETY OF THREATENED WILDLIFE

The assessment rated the overall condition of natural resources at Redwood National and State Parks a score of 69 out of 100, which ranks park resources in “fair” condition. Prominent factors negatively influencing the ratings

include a legacy of ecosystem damage from logging, invasive non-native plants, and threats from adjacent land uses such as continued timber harvest.

PARK ECOSYSTEMS—PARK PROTECTS REDWOODS AND MUCH MORE

Redwood National and State Parks protect and preserve a multitude of ecosystems, from rocky coast marine habitats and coastal scrub

The sun sets on grasslands and woodlands of the Bald Hills within Redwood National and State Parks.

The State of California has recognized the park's coastal areas as vitally important to the state's seabird populations and several federally and state-listed rare species.



communities to redwood forests and oak woodlands.

Coastal Areas

Redwood National and State Parks include 35 miles of Pacific coast shoreline. The boundaries of the park also extend a quarter of a mile offshore. The park leases the subtidal land from the State of California out to 1,000 feet. The Bureau of Land Management California Coastal Monument extends seaward outside the marine boundary of the park. The California Department of Fish and Game has jurisdiction over harvestable marine species.

Up to 40 percent of California's total number of seabirds as well as various marine mammals, including the federally listed endangered Steller sea lion (*Eumetopius jubatus*), breed on the park's relatively pristine coast. In recognition of this area's biological importance, the State Water Resources Control Board designated

a 30-mile stretch of the park's coastline as an Area of Special Biological Significance. The state is currently attempting to prevent polluted runoff from contaminating this area.

Further inland from the beach is the coastal scrub community, which supports plants such as coyote bush (*Baccharis pilularis*) and cow parsnip (*Heracleum lanatum*) that tolerate shifting sand, salt spray, and wind damage. Sandwiched between the coastal scrub community and the inland redwood forest are Sitka spruce (*Picea sitchensis*) forests, which also tolerate salt spray.

Redwood Forest

Old-growth coast redwood trees are the dominant features of Redwood National and State Parks. For redwood trees to be successful they need to be located in areas where sufficient oceanic moisture and fog can reach them. In northern California this range extends about 30

miles inland from the coast. Preserving these giant trees, which typically grow 200 to 300 feet or more in height, is the parks' main goal. Coast redwood trees are able to reach such heights because they grow in a temperate climate with a long growing season, they are extremely efficient with the water they absorb, and they can extract water from the fog that often rolls in from the ocean.

The old-growth coast redwood is the heart of one of the most productive ecosystems in the world. This environment supports a variety of plants, mammals, amphibians, and birds, in niches found from the tree canopy, several hundred feet into the air, down to the forest floor. Coast redwoods grow on a variety of terrain, including alluvial flats adjacent to rivers, hill slopes, and ridgetop terraces. These differing locations help determine which other plants are associated with the redwoods.

Prairie and Oak Woodlands

In addition to redwood forests, the park preserves about 1,500 acres of Oregon white oak (*Quercus garryana*) woodlands and about 2,500 acres of grassland found within the Bald Hills area in the southern portion of the park. The prairie and oak woodlands are vital habitats for Roosevelt elk (*Cervus elaphus roosevelti*), black bear (*Ursus americanus*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*), and these areas were historically important to American Indians and Euro-American settlers who relied on their resources.

Long before Euro-American settlers arrived in the region, American Indians actively managed the landscape. They used fire in the prairies and oak woodlands to increase acorn production, to increase browse for deer and elk and to concentrate them into smaller areas for hunting, and to provide a steady supply of materials to craft baskets and tools. Later, ranch-



NATIONAL PARK SERVICE

Many animals, including Roosevelt elk, rely on the park's prairie and oak woodlands.



The park uses controlled burns to maintain habitats for their ecological value and historic importance.

ers used fire to increase browse for wildlife and their domestic animals, as well as to discourage the spread of Douglas fir (*Pseudotsuga menziesii*) into the grasslands. Without the presence of fire, Douglas firs encroach into grasslands and reduce habitat for wildlife such as Roosevelt elk, black bear, and raptors. Today, the park's Bald Hills Vegetation Management Plan guides staff in the use of controlled burns, management of non-native plant species, and monitoring of management practices to maintain the Bald Hills habitats for their ecological value and for their historic importance as cultural landscapes.

PLANTS AND ANIMALS—PARKS HARBOR A HOST OF SPECIES

Redwood National and State Parks' diverse habitats are home to a considerable number of animal and plant species, including those that require several ecosystems to flourish. The park boasts 660 native vascular plant species, approximately 165 species of lichens, and 664 known species of fungus, although it is suspected that even more fungi have yet to be discovered. The parks also harbor 157 non-native plant species, of which 13 are considered to be highly invasive. (See "Non-Native Plants and Tree Diseases" on page 25 for more information.)

From raptors to seabirds, songbirds to waterfowl, Redwood National and State Parks provide habitats for 251 species of migrating and resident native bird species. Of the several non-native bird species recorded in the parks, European starlings (*Sternus vulgaris*) are the most common. Park staff do not know how this species might affect native birds; studies to explore this topic are needed.

Ninety-two species of mammals can be found at Redwood, ranging in size from diminutive shrews (*Sorex* spp.) to the enormous humpback whale (*Megaptera novaeangliae*). Just six of the mammal species are non-native, and only the Virginia opossum (*Didelphis virginiana*) is commonly seen. Redwood's habitats also support 17 amphibian (one—the bullfrog (*Rana catesbeiana*)—is non-native), 16 reptile, and 46 fish (six are non-native) species. A current study being conducted on the park's subtidal zone may reveal additional native species of fish. Intertidal monitoring currently being conducted tracks the distribution and abundance of a number of rocky intertidal invertebrates. Initial surveys have found one algal and 12 invertebrate non-native species in the park's marine environment.

THREATENED AND ENDANGERED SPECIES—PARKS MAKE SPECIAL EFFORTS TO PROTECT THEM

Redwood National and State Parks provide habitat for nine state and/or federally listed endangered or threatened species of plants, birds, fish, and mammals, as well as two species that are candidates for listing under the federal Endangered Species Act (fisher, *Martes pennanti*, and mardon skipper butterfly, *Polites mardon*). Several of these species rely on old-growth redwood forests to survive, and the extensive logging that has taken place has resulted in their decline and subsequent listing under the California and federal Endangered Species Acts. Despite state and federal protection and preservation of habitats within the parks, many listed species at Redwood, especially those that use several habitats during their lifetime, continue to decline. In particular, the salmon and steelhead trout species that spawn in the parks' rivers remain at low numbers, partly because of freshwater habitat loss and water quality impairments such as high water temperatures. Marbled murrelets (*Brachyramphus marmoratus*),

which live on the open ocean but nest exclusively in old-growth forests, are predicted to go extinct within the next century. Ocean conditions, such as decreased prey production and marine pollution, and nesting habitat loss have been cited as factors in their decline.

The beach layia (*Layia carnosa*) is the parks' only state and federally listed endangered plant species. This annual plant makes its home along northern and central California beaches on semi-stabilized sand dunes. The open beach opposite Freshwater Lagoon supports a small population of the endangered beach layia, as well as the rare wolf's evening primrose (*Oenothera wolfiti*). While the primrose is not currently state or federally listed, it has a state heritage rank that indicates it is critically imperiled in California. The numbers of both of these plants in the parks have been diminishing as non-native European beachgrass (*Ammophila arenaria*) colonizes coastal areas and stabilizes dunes, occupying habitat formerly available for these species.

Redwood National and State Parks host four state and/or federally listed bird species—

The beach layia population—the parks' only state and federally listed endangered plant species—is in decline due to non-native plants. This plant (shown here) is easily overlooked by the untrained eye.



NATIONAL PARK SERVICE

Habitat destruction on adjacent lands and encroaching barred owls threaten the park's federally listed northern spotted owls (shown here).



JOHN AND KAREN HOLLINGSWORTH/US FISH AND WILDLIFE SERVICE

California brown pelican (*Pelecanus occidentalis californicus*), northern spotted owl (*Strix occidentalis caurina*), marbled murrelet, and western snowy plover (*Charadrius alexandrinus nivosus*). The brown pelican was listed as endangered in the 1970s after exposure to dichlorodiphenyltrichloroethane (DDT), a common pesticide at that time, seriously diminished its ability to reproduce. Their numbers have since increased following a ban on DDT, and the species has recently been proposed for delisting by both the state and federal governments. Pelicans may still be at risk from changes in food availability and other climate-related changes in the ocean, as well as from oil spills and other marine pollution. Visitors often see brown pelicans at the park during the summer and fall—loafing on sea stacks, in estuaries, and on sandy beaches.

Northern spotted owls inhabit Pacific coast forests, strongly preferring mature and old-growth forests. Despite the slowdown in timber harvest on public lands in the region, extensive logging on private land still threatens to reduce spotted owl numbers. In addition to habitat loss, the northern spotted owl is threatened by the range expansion of the barred owl (*Strix varia*), which historically occurred east of the Great Plains. In the last few decades the barred owl has expanded its range and it now occupies the same habitat as the northern spotted owl. Barred owls are larger and more aggressive than northern spotted owls, compete with them for nest sites and prey, occasionally prey on their offspring, attack and kill adults, and can reproduce with them to create hybrids. Protection of known spotted owl nesting sites from human disturbance is necessary to ensure northern spotted owls continue to reside in Redwood National and State Parks. Barred owl home range and habitat use studies are currently under way in the parks and will go a long way toward understanding how barred owls are using the parks and how their use will affect spotted owls.

Marbled murrelets rely exclusively on old-growth coastal forests for nesting. This small

seabird has suffered a precipitous drop in population, which is primarily attributed to habitat loss, and is federally listed as threatened and California state listed as endangered. Old-growth forests within Redwood National and State Parks are vital to the survival of the marbled murrelet, as these parks support as much as 70 percent of California's population of murrelets. These seabirds are in serious jeopardy because they lay just one egg at a time, do not necessarily breed each season, and are subjected to high levels of nest predation from crows, ravens, and jays.

To protect the marbled murrelet, the park restricts excessive noise in marbled murrelet breeding habitat during the nesting season. Research has been inconclusive as to the precise effects of noise on nesting success, but staff are not willing to risk harm from preventable disturbances. Before performing work such as removing a road, park staff survey the area to determine if any marbled murrelets are present. If there is not enough funding to conduct these surveys of suitable murrelet habitat prior to performing work, the work must be postponed until after the nesting season. The park is also willing to alter projects in order to protect northern spotted owls.

In another effort to protect threatened birds, the park has instituted a program to reduce the presence of crows, ravens, and jays, which prey on the eggs and chicks of marbled murrelets and the federally listed threatened western snowy plover. The densities of these predators, which are collectively called corvids, are unnaturally high in certain areas due to the availability of human food left behind by visitors as well as food sources associated with dumps and agricultural areas outside the parks' boundaries. The parks use signs, free brochures, and videos at visitor centers to educate visitors about the effects of corvids on marbled murrelets. Plans are also in place to test the effects of removing picnic tables near marbled murrelet habitat and further restricting dispersed camping on



Redwood's undeveloped beaches provide habitat for a host of animal and plant species, including sea lions.

Redwood Creek to see if these measures reduce the availability of human food and, thus, reduce numbers of corvids. These measures will be implemented beginning in 2010.

Western snowy plovers are sometimes spotted along the parks' beaches, where they winter and nest. The major threats to these birds in the parks are invasive plant species that eliminate their habitat and nest predators. To provide adequate habitat for these birds, the park must remove harmful non-native plant species such as European beachgrass from coastal areas, especially at Gold Bluffs Beach. The park is working on this pilot project at the northern end of the beach, but European beachgrass is still widely present on other parts of the beach. Removing this non-native grass benefits the plovers as well as the pink sand verbena (*Abronia umbellata* ssp. *breviflora*), a rare plant.

Redwood National and State Parks provide habitat for several anadromous fish that hatch

from eggs in freshwater streams, migrate and mature in the ocean, and return to the parks' streams to spawn. Regional populations of three of these species—northern California steelhead trout (*Oncorhynchus mykiss*), California coastal chinook salmon (*Oncorhynchus tshawytscha*), and southern Oregon/northern California coho salmon (*Oncorhynchus kisutch*)—are federally listed as threatened. These fish have suffered dramatic population declines from overfishing, habitat destruction, and diminished water quality. While harvesting these salmon has been significantly reduced or prohibited entirely, their population numbers remain low. Even within Redwood National and State Parks, populations are low likely because of the effects that followed construction of the Redwood Creek Flood Control Project in 1968. This project consisted of 3.4 miles of stream channelization and flood levee construction, which eliminated valuable wetland and juvenile

salmonid rearing habitat. Levee construction, as well as highway construction that altered the Freshwater Spit, are also cited as causes for the extirpation of the tidewater goby (*Eucyclogobius newberryi*) from the park. This federally listed endangered fish species once occurred in Freshwater Lagoon and Redwood Creek.

Steller sea lions, pinnipeds federally listed as threatened, use several areas within Redwood National and State Parks. (Pinnipeds are a group of mammals that includes seals and sea lions.) The Steller sea lion population has plummeted in the last 30 years, and the California population now numbers just 500 animals. Researchers point to the commercial harvesting of the sea lions' food sources (e.g., pollock, herring, hake, and mackerel) as the main cause of their decline.

LAND USE HISTORY—LANDSCAPE BEARS EVIDENCE OF PAST ACTIVITIES

In the past, land that is now within the boundaries of Redwood National and State Parks was used in a variety of ways: as settlements and villages; for fishing, mining, and ranching; and for harvesting timber. Human activity within the current borders of Redwood National and State Parks began with American Indian groups who fished, hunted, and gathered there. Spanish exploration of the Pacific coast in the late 18th century brought the first Europeans to the area. In the 19th century, fur traders trafficked sea otter pelts to Russia and Great Britain. Jedediah Smith led the first inland exploration of the Redwoods area in 1828, and northern California saw a large influx of Euro-American settlers after gold was discovered in the Klamath River basin in the 1850s.

While gold prospecting brought settlers to the region, it was not as profitable as many had hoped and soon many prospectors turned toward ranching, commercial fishing, and logging. Farming and ranching both proved difficult on newly cleared land, however, as redwood stumps vigorously sent out shoots in

an effort to regenerate. Commercial fishing would also prove to be short-lived as aggressive fishermen took advantage of the lack of restrictions and quickly depleted the area's stock of chinook and coho salmon by the early 1930s. By 1934, commercial fishing was no longer permitted on the Smith and Klamath Rivers.

Coast redwood logging began in northern California in the 1850s and had little impact on the ecosystem at first. However, as advancements in harvest technology over the next century increased logging efficiency, a greater number of trees could be cut in less time. The extensive deforestation, road construction, and building of layouts (areas adjacent to trees that were cleared of vegetation and rocks to provide a space for cut trees to land) to harvest old-growth trees severely altered hillslopes and set the stage for tremendous erosion during subsequent large storms. The post-World War II housing boom led to expansive clear-cuts and road construction throughout the basin. By 1978 more than 80 percent of the original old-growth conifer forest had been harvested in the Redwood Creek basin.

Much of the land within Redwood National and State Parks was logged prior to becoming parkland, resulting in a mosaic of old-, second-, and third-growth forests. The park has expanded its borders on two separate occasions, and the vast majority of these acquired lands had previously been logged. Overall, old-growth coast redwood forests cover about 31 percent of the park, while second-growth forests constitute about 55 percent. Much of the old-growth remaining in the park is in isolated stands and may not be large enough to support species that rely on old-growth forests.

While old- and second-growth redwood forests may contain the same dominant species, they can differ remarkably in terms of production, health, and the variety of flora and fauna that they support. For example, second-growth forests do not contain the diverse multistory canopy structure needed to support old-growth



Land within the present-day boundaries of Redwood National and State Parks was historically used in a variety of ways. This photo, circa 1910, shows men tending to sheep at the Lyons Ranch.

specialist species such as the marbled murrelet and fisher, and are too dense for northern spotted owls to maneuver in while foraging.

Redwood trees in the most recently logged areas of the park are around 30 to 50 years old, while mature trees in the park are likely greater than 500 years old with a few reaching ages of over 2,000 years old. Though logging has ceased on the lands that were incorporated into the park, fully productive coast redwood ecosystems take centuries to develop after clear-cut harvesting. The development of an ecologically functional redwood old-growth forest may be hampered by the current condition of the park's second-growth forests. In many areas, the park's second-growth forests are too dense with trees (2,000 trees per acre versus 30 to 50 per acre in an old-growth forest) and are dominated by Douglas fir instead of redwood. The logging practices employed by timber companies created large areas of bare soil that were rapidly

colonized by Douglas fir, either from surrounding forests or from commercially purchased seed aerially spread over the clear-cuts. Since their inception, these stands have received no further management to thin or reduce the density of Douglas fir, which has directly led to dense, even-aged stands dominated by Douglas fir. These second-growth forests provide little of the wildlife habitat common to old-growth forests that stood prior to harvesting.

Redwood National and State Parks are arranged as a long and narrow strip, and because of this the parks' forests are quite susceptible to harm from fragmentation and edge effects. Roads, trails, and large blocks of second-growth forest all have the potential to fragment habitat, making it difficult or impossible for some species to move freely. Edge effects occur where the parks' ecosystems are located adjacent to areas that have been developed, logged, or otherwise altered. At these edges,

The Park Service removed a logging road from Prairie Creek Redwoods State Park in the 1990s to reduce erosion. In its place staff constructed the Ah Pah Trail, a short walking trail that provides views of the surrounding coast redwood forest.



ASHLEY FICKE

sunlight and wind may penetrate further into the parks' forests, and invasive or opportunistic species may proliferate. Examples of edge effects on redwood forests include increased crown dieback, stunted or slowed tree growth, altered species composition, and reduced habitat for and increased predation of old-growth specialist species. The park has taken an active role in mitigating these threats by acquiring key pieces of land or removing roads; however, the fragmented stands of old-growth redwood forests in the lower Redwood Creek basin will continue to suffer from edge effects until the surrounding second-growth forest is treated to accelerate growth and the development of a multilayered stand (see "Ecosystem Restoration" for more information). Managed in this way, the young forests can begin to buffer the edge of old-growth stands that currently tower up to 200 feet over the adjacent second growth.

ECOSYSTEM RESTORATION—PARK STAFF WORK TO REPAIR DAMAGE

The park is working to restore ecosystems that have been damaged by past human activities, particularly timber harvesting and the construction of associated logging roads. The majority of lands logged within Redwood National and State Parks were harvested prior to the passage of the California Forest Practices Act of 1973, which regulated logging and established rules for road construction. Today, previously logged land within the park suffers from altered tree species composition, denser canopies that restrict the movement of certain birds, and accelerated erosion rates. Management of these altered second-growth forests by mechanically thinning and prescribed burning will help accelerate the transition to an old-growth forest structure.

Old, abandoned logging roads have also had lasting impacts: Road failures and stream

diversions during large winter floods have delivered sediment directly to stream channels, causing a host of problems in the stream and riparian corridor. Sediment deposited in park streams has degraded habitat for salmon and other aquatic species. Park studies have documented that once sediment reaches streams, the impacts can persist for decades and affect multiple life cycles of salmon and steelhead. Highly erodible soils, steep terrain, periodic large floods, and past land use have combined to create a landscape within Redwood National and State Parks with the highest erosion rates in the United States.

To restore damaged watersheds, the park is largely focusing on removing or upgrading roads. When the park acquired the Redwood Creek area in 1978, it contained about 450 miles of logging roads. The park has treated (i.e., removed or stabilized) about 250 miles so far and anticipates treating about 125 more miles in the future. About 75 miles will remain for park administrative purposes. The park has also

removed a couple of relatively small dams to help salmon reach their spawning grounds. Further studies are needed to determine if other culverts and crossings are barriers to salmon and trout movement.

Restoration crews removing logging roads strive to get as much work done as possible during short working seasons that are in place to protect nesting marbled murrelets and anadromous salmonids. The noise generated by machines used to remove roads can disturb the birds, while an early onset of the rainy season can wash sediment from newly restored hill slopes into the streams downslope from restoration sites, harming salmonids. In addition, finding funds to support restoration work is a challenge. The park has sought funding through nonrenewable grants, and it must continue to work with outside agencies and organizations to achieve lasting success. A consistent source of funding is needed to ensure restoration work can continue.



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Park staff actively manage this section of second-growth forest by removing certain kinds of trees that are present in unnaturally high numbers, an artifact of past logging and replanting activities.

Park staff have been working with private landowners in the upper basin of Redwood Creek to come to formal agreements for improving watershed conditions. For example, roads have been removed from this parcel of private land north of the park in the Redwood Creek watershed.

ADJACENT LAND USE— COOPERATION IS CRUCIAL TO RESOURCE PROTECTION

Redwood National and State Parks are surrounded mainly by private and some public land, and activities within these adjacent areas have the potential to result in significant impacts on park resources. The majority of the privately owned land is under timber management, but some ranching and agriculture also occur. Residential development is limited.

Resource extraction on lands upslope and upstream of park boundaries threatens the parks' aquatic and riparian resources. The findings of watershed studies by the U.S. Geological Survey prompted Congress to expand the park boundaries in 1978 with the acquisition of land in the Redwood Creek watershed. In 2002, the California Department of Parks and Recreation acquired logged lands in the Mill Creek watershed. These purchases focused on improving watershed protection and health. Upslope and upstream logging combined with large floods had caused extensive infilling of Redwood Creek, and following a 1964 flood the channel in upper Redwood Creek was buried by more

than 20 feet of sediment. This sediment filled in pools and created a flat and featureless channel. Summer water temperatures increased dramatically in the river because the streamflow was spread out over gravel bars and exposed to the sun, and because logging had removed large streamside trees that had once provided shade.

Even with the 1978 and 2002 acquisitions, the boundaries of Redwood National and State Parks encompass only the lower 40 percent of Redwood Creek, and land use upstream still affects the protected systems within the parks. While most of the land the park acquired during the expansions had been severely disturbed by logging, it is now protected and managed by the National Park Service and the California Department of Parks and Recreation. The acquisitions also contained some healthy lands that had been spared the chainsaw, including a stand of old-growth forest that contains the world's tallest trees.

To help protect the park's natural resources from logging outside the park's boundaries, Congress established a Park Protection Zone (PPZ) upstream from the national park's boundary on Redwood Creek as part of the 1978 expansion. This PPZ is comprised of about 33,000 acres of private and Bureau of Land Management land immediately upstream of the park boundary and allows for park staff to provide input on timber harvest plans in this area.

The Park Service has formal agreements to work cooperatively on erosion control with landowners who manage 90 percent of the private land in upper Redwood Creek. The park has worked successfully with these landowners to inventory roads on private lands in the upper basin and prioritize road rehabilitation treatments. Successful road removal and upgrading projects have begun as a result of this cooperation. The park also played a significant role in the establishment of the Redwood Creek Watershed Group and continues to participate as one of its members. This group is



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Non-native European beachgrass dominates parts of Gold Bluffs Beach as shown here, but staff have removed it from 31 acres to improve habitat for native species.

comprised of private, local, state, and federal agencies as well as local nonprofit organizations and regulatory and scientific agencies. These groups have entered into a formal agreement to protect and improve watershed conditions in Redwood Creek.

The park also works with its American Indian neighbors to protect shared resources. Within the boundaries of Redwood National and State Parks are parts of the Yurok Indian Reservation as well as ancestral lands of the Tolowa and Chilula/Hupa peoples. The Yurok have signed a memorandum of understanding with the National Park Service and the California Department of Parks and Recreation, which stresses cooperation among the three separate parties on issues such as natural and cultural resource management, economic development, and how the park designs interpretive programs about the Yurok culture.

NON-NATIVE PLANTS AND TREE DISEASES—PARK STAFF CONCERNED

Non-native species are of concern, particularly when they replace or compete with native species and alter ecosystem function. Within Redwood National and State Parks, researchers have identified 157 species of non-native plants. Grasslands are particularly besieged, with non-native plants constituting 50 to 75 percent of the vegetative cover. Old-growth redwood forests are the least affected ecosystems in the park. Only about 1 percent of vegetative cover in redwood forests is comprised of non-native plants.

Of the 157 species of non-native plants, park staff have identified 13 that are highly invasive and detrimental to the health of the parks' ecosystems. The most widespread of these invasives are European beachgrass, which is found along the parks' beaches, and non-native perennial grasses, which are dominant in the Bald Hills area.

European beachgrass threatens the parks' shoreline ecosystem by stabilizing shifting sands, which alters natural environments and makes them unsuitable for native species such as the threatened western snowy plover and several rare plants. European beachgrass was removed from the Freshwater Lagoon Spit area, and the native coastal strand plant community has recovered. Park staff also removed beachgrass from 31 acres on northern Gold Bluffs Beach and are considering large-scale management options for controlling or reducing this plant species on other parts of the beach.

Plant diseases—especially those that cause mortality in trees—are a concern in the parks. While coast redwood trees are extremely resistant to disease, the parks' Port Orford cedars (*Chamaecyparis lawsoniana*) and tanoaks (*Lithocarpus densiflorus*) are at risk from Port-Orford-cedar (POC) root rot disease and sudden oak death disease, respectively. POC root rot is caused by a water mold and is spread to trees in mud that is transported by vehicles, humans, and animals. This disease kills nearly every tree it infects and has already claimed an estimated 25 acres in the Little Bald Hills. Small incidences of the disease are also found in other areas throughout the park. The park has a POC root rot management plan that directs staff to identify current locations of the disease in the parks and prescribes management actions to control the spread of the disease. Continued monitoring is key to understanding if and how the disease is spreading, but funding is limited for implementing key actions outlined in the management plan. The park has re-routed a portion of the Little Bald Hills trail in an attempt to stop the spread of the infection. Additional actions include visitor and park staff education mostly in the form of evening ranger programs, discussion for the public during guided walks, brochures located at visitor centers, and oral presentations by staff.

Sudden oak death has not been documented within park boundaries, but it has infected trees

in nearby communities and is currently within 15 miles of the northern and southern ends of Redwood National and State Parks. Researchers and staff believe the disease—which is currently untreatable in the wild environment—is likely to reach the parks within the next five years and affect tanoaks, causing severe mortality rates as seen in the other coastal counties of California. Tanoaks play an important ecological role as food and habitat for wildlife, and they were a staple of the native people who still value their acorns for food and ceremonial purposes. Public education and implementation of best management practices, such as cleaning vehicles and establishing wash stations for bikes and hikers, are critical to controlling the spread of this disease. Removing dead, infected, and host trees (e.g., California bay laurel) reduces the amount of spores in infected areas.

VISITOR USE—RULES HELP PROTECT SENSITIVE PLANTS AND ANIMALS

Both state and national park services encourage visitors to fully explore the parks, and as access to resources is often made easy, damage is frequently an inevitable, if not an intentional consequence. For instance, visitors to the park's beaches can damage sensitive dune areas, trample delicate plant species, and disrupt nesting birds. In an attempt to protect dune communities, the park has prohibited driving on beaches, allowing only commercial fishermen with permits to operate vehicles there. There are 17 of these permits, which are to persist in perpetuity as authorized by the Northern California Coastal Wild Heritage Act of 2006. Fishermen holding permits are authorized to use vehicles to conduct commercial beach fishing. The permits are renewable on an annual basis and are available for re-issuance once vacated.

Visitor noise on trails and around campgrounds may disrupt several federally listed species. During the breeding season, the parks limit their use of power tools and ask visitors to



Unattended campsites and picnic areas attract Steller's jays, common ravens, and American crows. These species prey on federally protected species, such as the marbled murrelet and western snowy plover.

refrain from noisy activities (e.g., playing loud music) in areas where sensitive bird species are nesting. Visitors are also instructed not to feed any park wildlife, including Steller's jays, common ravens, and American crows. As previously noted, these three species of birds are known predators of threatened marbled murrelets and western snowy plovers. By limiting supplemental human food the parks hope to decrease the number of potential predators of murrelets and plovers. Users of the parks' trails must be educated not to spread diseases like Port-Orford-cedar root disease and sudden oak death disease, as well as non-native plants and weeds. In an effort to protect native and sensitive species from damage by visitors, the park closes certain areas during avian breeding season and establishes trail closures during the wet season.

Poaching of plants (redwood trees) and animals (Roosevelt elk and salmon) is also considered to be a problem at Redwood, as is the unintentional taking of brown pelicans and Steller sea lions. Pelicans can get caught in fishing gear, and Steller sea lions could potentially be shot illegally by fishermen who do not discriminate between them and the much more common California sea lions (not listed under the Endangered Species Act but protected by the Marine Mammal Protection Act). The park received a substantial base increase to its operational budget in fiscal year 2008, which will allow the park to hire additional resource protection staff and increase its capacity to deal with poaching and other resource protection concerns.

In this photo, the Klamath River meets the Pacific Ocean. The river is currently listed as impaired under the Clean Water Act. Upstream water diversion is a major factor.

AIR AND WATER QUALITY— PARK WORKING TO IMPROVE WATER QUALITY

Overall, air quality at Redwood National and State Parks rated excellent, though particulates are the only air quality benchmark that is currently measured. Ozone emissions and sulfates were monitored until 1995, but monitoring was discontinued because sufficient data were collected to show that ozone pollution was not a problem. Visibility at the parks was once compromised by airborne particulates but has since improved with the reduction in the number of sawmills and pulp mills operating within a 50-mile radius of the monitoring station. While particulate levels at the parks have improved over the years, they sometimes still exceed tolerable levels in the fall when local

timber companies and agency landowners, including the parks, conduct prescribed burns.

The quality of water resources within Redwood National and State Parks must be examined on a river-by-river basis. The Smith River, upper Hayes Creek, Prairie Creek, and Godwood Creek are considered to be in excellent condition. Both the Smith River and the portions of the Klamath River in California are designated Wild and Scenic Rivers under federal legislation passed in 1968 that identifies rivers with exceptional scenic, recreational, natural, or cultural values. However, there are significant water quality issues in the Redwood Creek and Klamath River watersheds. These watersheds have been damaged by a combination of past land use activities, including logging, agriculture, and mining. These land uses continue to affect water quality. Consequently, the Klamath River is currently listed as impaired under the Clean Water Act for sediment, nutrients, and dissolved oxygen, and Redwood Creek is listed as impaired for sediment and temperature. In the Klamath River, upstream water diversion is a major factor affecting water quality.

As noted previously, the park is actively working to improve water quality by decreasing erosion from roads and managing second-growth forests to speed their recovery towards a healthy old-growth ecosystem. The park is removing old abandoned logging roads, which will decrease the amount of sediment that enters streams and rivers during large floods. It is also working through partnerships to decrease impacts in upper Redwood Creek. Long-term studies have shown that the Redwood Creek channel is recovering from past flood events and sediment that once buried the stream is flushing out of the creek. However, other measures of recovery, such as stream temperature, occurrence of large wood in streams, and the presence of large streamside conifer trees, are not yet at ideal levels.





CULTURAL RESOURCES— PRESERVING A RICH HUMAN HISTORY

Redwood National Park scored an overall 66 out of 100 for cultural resource conditions, including history, historic structures, cultural landscapes, archaeology, ethnography, and museum collection and archives. This rating includes assessment of cultural resources within the national park but not within the state parks. A score of 66 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.

Although cultural resource preservation and management are not included in the park’s establishing legislation, a variety of federal laws require the Park Service to protect cultural resources. Staff began to care for these resources shortly after the park was established in 1968. The cultural resources division—with only 3 percent of the park’s budget and 2.5 full-time staff members—is responsible for researching, preserving, and interpreting these resources. While making considerable strides with available resources, many items from the museum

The Bald Hills area of the park is home to two cultural landscapes—the Bald Hills Archeological District and the Lyons’ Ranches Rural Historic District. The Lyons Ranch barn is in the lower left corner of this image.

Evidence of the area's ranching history remains in parts of the park. Staff have requested funds to update the park's historic resource study to explore this ranching history, among other topics.



NATIONAL PARK SERVICE

collection and archives still need to be cataloged, and support is needed to complete several important management documents (e.g., administrative history, historic structure reports, and cultural landscape management plans and reports).

HISTORY—STUDIES NEEDED TO BOOST RESOURCE MANAGEMENT AND INTERPRETATION

Having the proper reports and documents in place to guide management is an important part of cultural resources protection. To better serve this purpose, an administrative history is being prepared by a contracted historian and is expected to be completed in 2009. This report

will focus on the history of the park from its establishment to the present day, as well as on the unique management strategy in place at Redwood National and State Parks, which allows federal and state agencies to share resources to protect the parks.

The park's historic resource study, a document intended to provide a historical overview of the park and bring together information on all cultural resources, is more than 30 years old. As a result, it does not contain information on areas that have been added to the park in the last three decades. The park has proposed a three-year revision process to bring this document up to date but has not yet received funding to begin this process. The updated

historic resources study will bring together comprehensive research on American Indian, military, industrial, logging, ranching, fishing, recreation, and transportation history within the park.

Despite having a tremendous impact on the resources in the area and playing an enormous role in the establishment of the park itself, the park has not fully researched and documented the history of coast redwood logging. Staff have identified this need and requested funding for research to fully explore the history of logging in the area and its impact on the region's environment and economy. Once completed, this study will provide recommendations for improving interpretation of this part of the park's history.

CULTURAL LANDSCAPES—AMERICAN INDIAN AND EURO-AMERICAN HERITAGE PRESERVED

Cultural landscapes demonstrate human changes to the natural world and reflect how groups of people have used their surrounding resources. Redwood National Park has identified six cultural landscapes to date, while the state parks have additional landscapes. Redwood National Park does not have a historical landscape architect or other cultural landscape specialist on staff, so the park relies on regional Park Service staff to provide assistance for all cultural landscape related work. Regional staff serve many parks, so efforts to identify cultural landscapes, research their various components, and integrate them as landscapes into the park's management and interpretation plans have been slow. This work is important, though, as it can provide opportunities to enhance interpretation and visitor education.

In the Bald Hills area of the park are the Bald Hills Archeological District and the Lyons' Ranches Rural Historic District, the park's premiere cultural landscape. The Bald Hills Archeological District includes evidence of at least 4,500 years of human use and contains



many sites of prehistoric activities. It is listed in the National Register of Historic Places. The Lyons' Ranches Rural Historic District has been determined eligible for listing in the National Register of Historic Places. While National Register criteria relate the landscape's significance to the Lyons family and their sheep ranch, the park sees this area as a multifaceted land-

Jonathan and Amelia Lyons moved to northern California in the 1850s.

This barn is one of the structures that remains on land once owned by the Lyons family. They moved to northern California in the 1850s, built homes, barns, fences, bunkhouses, and other structures, and began raising award-winning sheep, staying on the land for 100 years.

scape that also has a significant American Indian history. This story has yet to be formally defined, but the Yurok and Chilula peoples place particular importance on the area, as it was traditionally used for hunting, gathering, and ceremonies. In the 19th century, Euro-American settlers arrived and built homes, barns, fences, and a cemetery, many of which can still be seen today. The park has taken measures to stabilize eight of the structures within this historic district. These structures and elements of the built environment allow visitors to easily envision the area's ranching past, and they provide staff with ample opportunities for interpretation.

To ensure that the resources in the Bald Hills are protected and interpreted properly, park staff would like to prepare a visitor use management plan and a cultural resources management plan. These plans would identify viewsheds that need to be protected, interpretive themes that could be explored, and locations for roadside parking and new trails. American Indians associated with the Bald Hills area will

be included in the planning process. Funds are needed before these plans can be initiated.

Redwood National Park preserves several additional important cultural landscapes, including the structures that comprised a World War II radar station, portions of the Old Redwood Highway (this highway runs through Del Norte Coast Redwoods State Park as well), the Klamath River Ethnographic District, and the Prairie Creek Fish Hatchery. The radar station, highway, and hatchery are all currently listed in the National Register of Historic Places, and the Klamath River Ethnographic District has been nominated for inclusion.

The Prairie Creek Fish Hatchery, built in 1936, was used to improve commercial and sport fishing in the area by producing and releasing silver and king salmon, and cutthroat, rainbow, and steelhead trout. Park staff would like to rehabilitate the hatchery and adaptively use it, possibly for educational or interpretive programs. Leasing the structure to an appropriate entity would provide for its upkeep and maintenance, costs the park cannot afford. The park has completed work through the Historic American Buildings Survey (HABS) to document the hatchery in detail, research that is required before any restoration work can commence. HABS—initiated in 1933 by the American Institute of Architects, the Library of Congress, and the National Park Service—is the nation's first federal preservation program. It was established to document America's architectural heritage.





The Klamath River Radar Station, disguised to resemble a farmhouse, was built during World War II to protect the Pacific coast of the United States.

HISTORIC STRUCTURES—UNIQUE STRUCTURES OFFER INTERPRETIVE OPPORTUNITIES

From fences surrounding pastures to a meandering old highway and even a disguised military radar station, Redwood National Park preserves 31 historic structures. Eleven of these structures are listed in the National Register of Historic Places, and the rest have been determined eligible for listing in the National Register. These structures help visitors to realize the historical value of the park.

In a recent inventory, the majority of the 31 historic structures were rated as being in either “good” or “fair” condition. This is quite an accomplishment considering that the park’s maintenance budget is small and the structures are spread out and often in remote areas. In order for the park to continue to be able to maintain its historic structures, however, continued funding is needed. Only four struc-

tures, all within the Lyons’ Ranches Rural Historic District, are listed as being in “poor” condition. The biggest threats to historic structures at the park—aside from natural aging—are fire, extreme weather, and vandalism. The park has management plans in place to address these risks.

The Klamath River Radar Station B-71 is one of the most important historic resources within the park’s borders. The radar station was built for the military during World War II to protect the Pacific coast of the United States against Japanese attack. The power building and an operations building were constructed of two-foot-thick concrete walls but had an exterior façade that resembled a farmhouse and barn. Because these two buildings were constructed on high coastal bluffs, they are in danger of suffering damage from landslides. The park completed research on these structures through HABS.

The bunkhouses at the Lyons Ranch are in need of historic structure reports to guide their management and preservation.



ALEX FORIST

The Old Redwood Highway, completed in 1923, allowed visitors to drive right up to the giant coast redwoods and become personally aware of the grandeur of the environment. Current Highway 101 follows some portions of the Old Redwood Highway. Other portions of the Old Redwood Highway are lost, but some exist as old roadbeds. A section of the highway within the park is listed in the National Register. Though it is no longer drivable, it is accessible to visitors via the Damnation Creek Trail. Other sections of the Old Redwood Highway are used as other park roads (e.g., Alder Camp Road). The highway is currently rated in “fair” condition.

Historic structure reports are needed for all of the park’s historic structures, but especially for the Prairie Creek Fish Hatchery and the barns, sheep shed, and cabins associated with the Lyons’ Ranches, to enhance management and preservation of the park’s historic structures.

These exhaustive reports contain a host of detailed information, including photographs and measurements of every aspect of the structures. These reports would be extremely useful in the event the structures are damaged or destroyed by storms, wildfire, or any other unplanned occurrence, as they would contain a record of construction techniques and all previous maintenance conducted by the National Park Service. These reports detail both successful and ineffective actions and would be beneficial to future park preservationists. The park has requested funding to support this work, which would be needed to inform any plans to restore the hatchery and use it for educational purposes.

Redwood National Park primarily uses seasonal staff to care for historic structures, and they mainly focus on cyclical maintenance of the facilities (i.e., repairs are scheduled and performed on a rotating basis). Though seasonal

staff are generally very skilled at carpentry, there is a need for a qualified supervisor to ensure that repairs consistently meet Secretary of Interior standards for historic preservation. To maximize the benefits from the cyclical work, staff have proposed drafting historic structure preservation guides for the park's historic structures. In addition to these guides, the park would like to collect and organize archival documents for each of the structures within the Lyons' Ranches Rural Historic District.

ARCHAEOLOGY—RICH HUMAN HISTORY WARRANTS ADDITIONAL EXPLORATION

Redwood National Park contains a wealth of archaeological resources; research into these resources began shortly after the park's establishment. Archaeological sites that have been researched at the park include prehistoric American Indian villages, middens, and camps, as well as evidence of more recent

Euro-American settler activities such as logging and ranching.

All told, Redwood National and State Parks protect 147 identified archaeological sites. The National Park Service manages 104 of them. Less than half of all parklands have been officially surveyed, so it is likely that additional sites remain undiscovered. Previous explorations have focused on the southern and coastal areas of the park since most inventories were conducted to support proposed National Park Service projects in those areas that required compliance with Section 106 of the National Historic Preservation Act.

Information about the park's archaeological sites is recorded in the Park Service's Archeological Sites Management Information Systems (ASMIS) database. Of the 104 archeological sites managed by the National Park Service, 93 percent are documented in "good" or "fair" condition. However, many of the docu-

ALEX FORIST



The park displays this redwood dugout canoe within the Kuchel Visitor Center, located near Orick, California.

ments recording these sites do not meet current professional standards and should be updated. The overall condition of archaeological resources at the park is difficult to determine, and managing for their preservation is a challenge. The fact that many of these sites are in remote, undisclosed locations provides a measure of protection.

Current archaeological research at the park is focused on inventorying resources and revisiting sites that were explored in previous decades to reevaluate their conditions. Funds are needed to support this work. The information collected will be included in ASMIS, and once the work is complete, it will form the basis for a formal site-monitoring program that will also assess potential damage to sites from natural and human sources.

Additional archaeological work may include an archaeological survey of 4,000 acres of the park outside the already heavily surveyed Redwood Creek Basin. This work is necessary to identify other significant archaeological resources within Redwood National Park in accordance with the National Historic Preservation Act and National Park Service policies.

Other resources that have yet to be explored include submerged Paleo-Indian archaeological sites and any shipwrecks that exist within 1,000 feet of shore (the area within the park's boundary). Redwood National Park is in line for funding for a submerged cultural resources inventory in fiscal year 2010. After data are gathered, the park will prepare and publish a report with detailed findings and recommendations for management of these resources. This project would take advantage of a recent agreement between the Park Service and the State of California that facilitates federal management of offshore resources.

The cultural resources branch chief oversees the park's archaeological resources with the assistance of a permanent part-time archaeologist. The archaeologist offers informal archaeo-

logical training opportunities for other park staff and proposes suggestions for incorporating archaeology into interpretive programs.

MUSEUM COLLECTION AND ARCHIVES—EXPANDED COLLECTIONS REQUIRE NEW MANAGEMENT PLANNING AND DOCUMENTATION

Redwood National Park oversees an expansive museum collection and archives that contain 665,137 items; of these, 199,971 have yet to be cataloged. Park staff are committed to addressing the backlog by 2018, but without an archivist currently on staff, progress is slow. To address this need, staff have requested funds to hire an archivist. Recent work done to reduce the backlog includes cataloging a fish scale collection that can be used to establish growth patterns and age of fish.

The park displays and interprets artifacts from the museum collection and archives at the Kuchel Visitor Center near Orick, California, a town surrounded by the park. Most of the items are related to the American Indian inhabitants in the area and include historic items such as redwood dugout canoes, stone tools, arrowheads, and other carved items, and pieces from local, modern American Indian culture. The park recently installed an American Indian basketry exhibit at the visitor center.

Redwood National Park leases space in a new, large privately owned museum and archive facility located at the South Operations Center in Orick. This new facility is extremely important to cultural resource protection at the park and will ensure that these resources are well preserved for future generations. For example, the archive houses important documents related to the watershed restoration work at the park, which can be used to inform this type of ecological restoration work throughout the United States.

Staff are currently writing a museum management plan. This document will take into consideration the addition of museum items



Intricately woven American Indian baskets are part of the park's museum collection.

and archival documents from nearby Whiskeytown National Recreation Area and Lassen Volcanic National Park that are now stored at the same facility containing Redwood's collections. Because Whiskeytown and Lassen had substandard facilities and no staff to manage museum collections, the museum collections associated with those parks were moved to Orick in 2005 and are managed by the Redwood curator. These items were considered to be in "critical" condition and the park needs to address these new items and formulate plans for future acquisitions.

The park is also working on a scope of collections statement that will cover the state parks' collections and will be used to help staff determine how to grow the museum and archival collections.

ETHNOGRAPHY—POSITIVE RELATIONSHIP BETWEEN THE PARK SERVICE AND AMERICAN INDIAN GROUPS IS NECESSARY TO PROTECT RESOURCES

Lands now within Redwood National and State Parks are within the ancestral territory of the Yurok, Tolowa, and Chilula peoples. Yurok ancestral territory covers much of the central part of what is now Redwood National and State Parks. The continuity of their homeland and their lifestyle were greatly altered by the arrival of large numbers of white settlers in the 1850s. The modern-day Yurok are represented by a tribal government that takes an active role in discussions with the park regarding a variety of issues. The Tolowa traditionally lived in the northern part of the park and up to the present-day Oregon border. Today the Smith River and Elk Valley Rancherias and the Tolowa Nation largely represent them. The Chilula people inhabited the southern portions of the park, but they no longer exist as an independent tribe. Many Chilula were forced out of their ancestral home-

lands by the federal government and had to relocate to the neighboring Hupa Tribe. The history and traditions of these peoples are inextricably tied to the land, a heritage they continue to live and pass on to future generations.

Now that the Park Service manages portions of their ancestral homes, it is the park's responsibility to foster relationships with these traditionally associated peoples and protect the resources that are important to them. Since Redwood National Park was expanded in 1978, American Indian groups have worked with the park to preserve the natural and cultural resources that are so crucial to their traditional lifeways and to the mission of the National Park Service. Park staff regularly consult with affiliated tribes about park planning activities and management actions. The park has a signed memorandum of understanding with the Yurok Tribe that establishes quarterly review meetings for consultation with the tribe prior to taking actions that could affect them, provides for the exchange of cultural information, and works to improve employment opportunities for tribal members.

Park staff would like to complete an ethnographic overview of the Smith River corridor.

Consultations with tribal elders foster good relationships between the Park Service and American Indian groups, and they help ensure the Park Service complies with various laws such as the Native American Graves Protection and Repatriation Act (NAGPRA). For example, consultations with tribal elders could reveal that objects in the park's museum collection or objects that have been unearthed during archaeological work are considered sacred or are objects of cultural patrimony, which could necessitate action under NAGPRA. Continued funding to support these consultations is important.

In 2005, the park completed an ethnographic overview and assessment titled *Defining Common Ground: An Evaluation of Relationships and Cultural and Natural Resource Issues Between Redwood National and State Parks and the Park-Associated American Indian Communities*. Other work includes an ethnographic overview of the Bald Hills area and oral histories of current and former park staff, people knowledgeable about the history of lands now within Redwood National and State Parks, and local American Indians. The park would like to complete an ethnographic overview of the Smith River corridor and Little Bald Hills. Little Bald Hills is an important area for American Indians. If funded, this project will entail collaboration with the Smith River Rancheria, Elk Valley Rancheria, and Tolowa Nation. Additional work might include restoration of a traditional cultural landscape at Gann's Prairie, which was the site of a Yurok world renewal ceremony. Once restoration is completed, the landscape could be eligible for the National Register of Historic Places.

To date, the park has not evaluated any traditional cultural properties—aside from archaeological sites—for the National Register of Historic Places. This has gone undone largely because of staff shortages and a lack of funds.





STEWARDSHIP CAPACITY

FUNDING AND STAFFING—BUDGET INCREASE SHOULD ALLOW PARK TO ADDRESS SOME NEEDS

Stewardship capacity details how well equipped the Park Service is to protect the parks. The most significant factor affecting a park's ability to protect its resource is the funding a park receives from Congress and the administration. The park received a base increase in its operational budget in fiscal year 2008, resulting in a 32.3 percent increase over the preceding nine years. Prior to receiving this recent increase the operational budget had not kept pace with park

needs. The fiscal year 2008 base increase should allow the park to better deal with what had been chronic understaffing and project delays.

PARK PLANS—MANAGEMENT PLANS CURRENT OR BEING UPDATED

To guide the management of diverse resources, national parks rely on a variety of management plans. The primary overarching planning document at most parks is the general management plan (GMP). The GMP for Redwood National and State Parks was approved in 2000. The purpose of the joint federal-state plan is to provide a clearly defined, coordinated outline for resource protection and visitor use, and a

A park crew monitors intertidal resources.



A 2006 integrated watershed strategy for Redwood Creek guides park staff with the management of the watershed.

basic foundation for decisionmaking and managing Redwood National and State Parks for the next 15 to 20 years.

Additional park planning documents include a current strategic plan that runs through 2008, which sets short-term and long-term management goals, and a business plan that outlines funding issues and opportunities. The fire management plan was completed in 2004. The Bald Hills Vegetation Management Plan addresses oak woodlands and grasslands in the Bald Hills, while an exotic species management plan addresses the treatment of non-native plants. A plan to manage the park's second-growth forests is nearing completion

and will guide research and management activities essential to recovery of these systems.

Redwood National and State Parks has individual plans for watersheds requiring intensive management. Redwood Creek has an integrated watershed strategy that was written in 2006, and Lost Man Creek also has a management plan written in the same year. Specialized plans also exist for wildlife, including a bear management plan (1995) and a mountain lion sighting standard operating procedure (1997) that provides guidance on managing emboldened animals that constitute a threat to visitors. The Western Snowy Plover Management Strategy (2005) outlines necessary actions for reducing human impact to nesting plovers. The Port Orford Cedar Management Plan (2004) is in place to help the survival of the park's Port Orford cedars. The plan dictates seasonal closures and the rerouting of hiking trails that could provide a corridor for spreading Port-Orford-cedar root rot. A conservation strategy for threatened and endangered species (2003) also provides suggestions on implementing management plans, such as watershed restoration projects, while minimizing impacts to species protected by the California and federal Endangered Species Acts.

The park is in the process of updating and revising a number of management plans. Compilation of an administrative history for the park is under way; a museum management plan is currently being written; and a revision to the 30-year-old historic resource study has been proposed. Auxiliary management plans such as the backcountry management plan and an update of the fire management plan are in the early stages of development. The environmental assessment for the trail and backcountry management plan is in progress, and studies of the effects of visitors on park resources are being considered. Park staff would also like to develop a visitor use management plan, a cultural resources management plan, and a historic structure preservation guide.

RESOURCE EDUCATION—TERRIFIC SCHOOL INVOLVEMENT

Resource education programs and interpretive exhibits have the ability to foster appreciation of park resources and engender a sense of stewardship in park visitors. Most state and national parks provide learning experiences through ranger-guided or self-guided tours, interpretive exhibits in visitor centers, or informational brochures and wayside exhibits. Redwood National and State Parks offer a variety of educational opportunities for visitors and the local community throughout the year. These include traditional visitor experiences such as evening campfire talks offered at three different campgrounds, Junior Ranger activities, and daily forest walks. Redwood parks also offer field seminars, guided bike rides and walking tours, a park newspaper and resource fact sheets, and outdoor education opportunities for local schools. Tidepool walks, whale-watching talks, salmon spawning tours, and all-night stargazing/meteor shower programs are available when conditions and schedules permit. There are five visitor and information centers within

Redwood National and State Parks; the three operated by the National Park Service hosted 206,681 visitors in 2006.

Two curriculum-based programs are available in the park. Howland Hill Outdoor School operates in the north and Wolf Creek Education Center operates in the south. Both day and overnight programs are offered. The primary focus is field studies about wetland, stream, prairie, and old-growth forest communities. Exploration of tide pools is sometimes available near Crescent City if staffing and low tide schedules permit.

Redwood National Park employs six permanent National Park Service field staff who provide programs to the general public, three permanent staff who operate the outdoor schools, up to 15 seasonal staff who work during the summer and winter, and a chief of interpretation who oversees all interpretive programs and activities. A significant operations increase in fiscal year 2008 will allow the park to add two permanent and seven seasonal positions to its interpretive staff. These additions will allow the park to improve services, offer



ALEX FORIST

Interpretive rangers guide walking tours throughout Redwood National and State Parks. A funding increase in 2008 will allow the park to provide additional programs, and will enable staff to better communicate resource protection messages to the public.

Volunteers assist park staff with a multitude of tasks, including scientific research and monitoring.



NATIONAL PARK SERVICE

more programs, and better convey resource protection messages to the public. Even so, the staffing increase falls short of recommendations in the park's long-range interpretive plan and business plan, which recommend an additional five permanent positions beyond the two that will be possible under the budget increase.

EXTERNAL SUPPORT—VOLUNTEERS ARE VITAL

Many national and state parks rely on support from volunteers, community groups, and nonprofit organizations to help bridge the gap between the park's needs and what the park can afford. At Redwood National and State Parks, a total of 83 volunteers worked 13,685 hours in fiscal year 2007. Almost 3,000 of these hours contributed to resource management and science projects. A Student Conservation Association intern supervised the National Park Service's California Exotic Plant Management

Team removing invasive plants from various park locations, and a foundation called the Consortium for Oceanographic Research and Education funded an intern team (beginning in 2006 and returning in 2007 and 2008) that spent about 1,000 hours each year measuring intertidal water quality parameters and conducting marine inventories.

Volunteers contributed about 4,000 hours to the roads and trails maintenance crew, assisting with surveys for road removal projects, repairing trails, and removing brush from trails. A total of 29 volunteers contributed about 6,000 hours assisting the interpretation division with operating visitor center desks, roving park trails and providing information to visitors, presenting programs at the Howland Hill Outdoor School and the Wolf Creek Education Center, and scanning the parks' slide collection. Resources benefit from the work of these and other volunteers, but a lack of available housing limits the

number of volunteers that the park can accept.

Nonprofit organizations, educational institutions, and other government agencies also provide critical support. Over the last ten years, the Redwood Park Association—a nonprofit organization established in 1985 to support education programs at Redwood National Park—has provided \$500,000 in aid. The association operates bookstores in the parks' visitor centers, with proceeds supporting visitor programs, exhibits, museum collection preservation, research, and park publications.

The North Coast Redwood Interpretive Association is a nonprofit cooperating association that serves seven California state parks, including Del Norte Coast Redwoods State Park, Jedediah Smith Redwoods State Park, and Prairie Creek Redwoods State Park. It provides funding for interpretive staff and park publications, provides volunteer services to the state parks, and works to get more funds for the state parks through the California legislature.

The Save-the-Redwoods League has long been involved in conservation of redwood trees and was instrumental in the establishment of Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, Jedediah Smith Redwoods State Park, and, ultimately, Redwood National and State Parks. The league is still quite active in further protecting redwoods and is working to acquire key pieces of private land to mitigate threats from activities such as logging that occur outside Redwood National and State Parks.

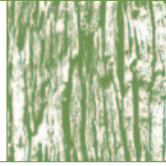
Humboldt State University supports the park by providing students who work on resource projects in the park. The National Park Service also enjoys an excellent relationship with the California Department of Parks and Recreation; these two entities work closely to address overall management of Redwood National and State Parks.

WHAT YOU CAN DO TO HELP:

- **Support or become a member of a group helping to protect the parks**, such as the Redwood Park Association (www.redwoodparkassociation.org), Save-the-Redwoods League (www.savetheredwoods.org), North Coast Redwood Interpretive Association (www.ncria.org), Smith River Alliance (www.smithriveralliance.org), or NPCA (www.npca.org/support_npca).
- **Volunteer.** Redwood National and State Parks are looking for dedicated people who can lend a helping hand. To learn about opportunities, call 707.465.7390.
- **Become an NPCA activist and learn about legislative initiatives 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.



Watching wildlife is a favorite visitor activity at Redwood National and State Parks.



APPENDIX: METHODOLOGY

To determine the condition of known natural and cultural resources at Redwood National and State Parks 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 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.

For this report, researchers collected data and prepared a paper that summarized the results. The draft underwent peer review and



ALEX FORIST

The understory plant species of the coast redwood ecosystem rely on the rays of sunlight that are able to penetrate the dense forest canopy.

was also reviewed by staff at Redwood National and State Parks.

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.

ACKNOWLEDGMENTS

For more information about the
Center for State of the Parks®
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