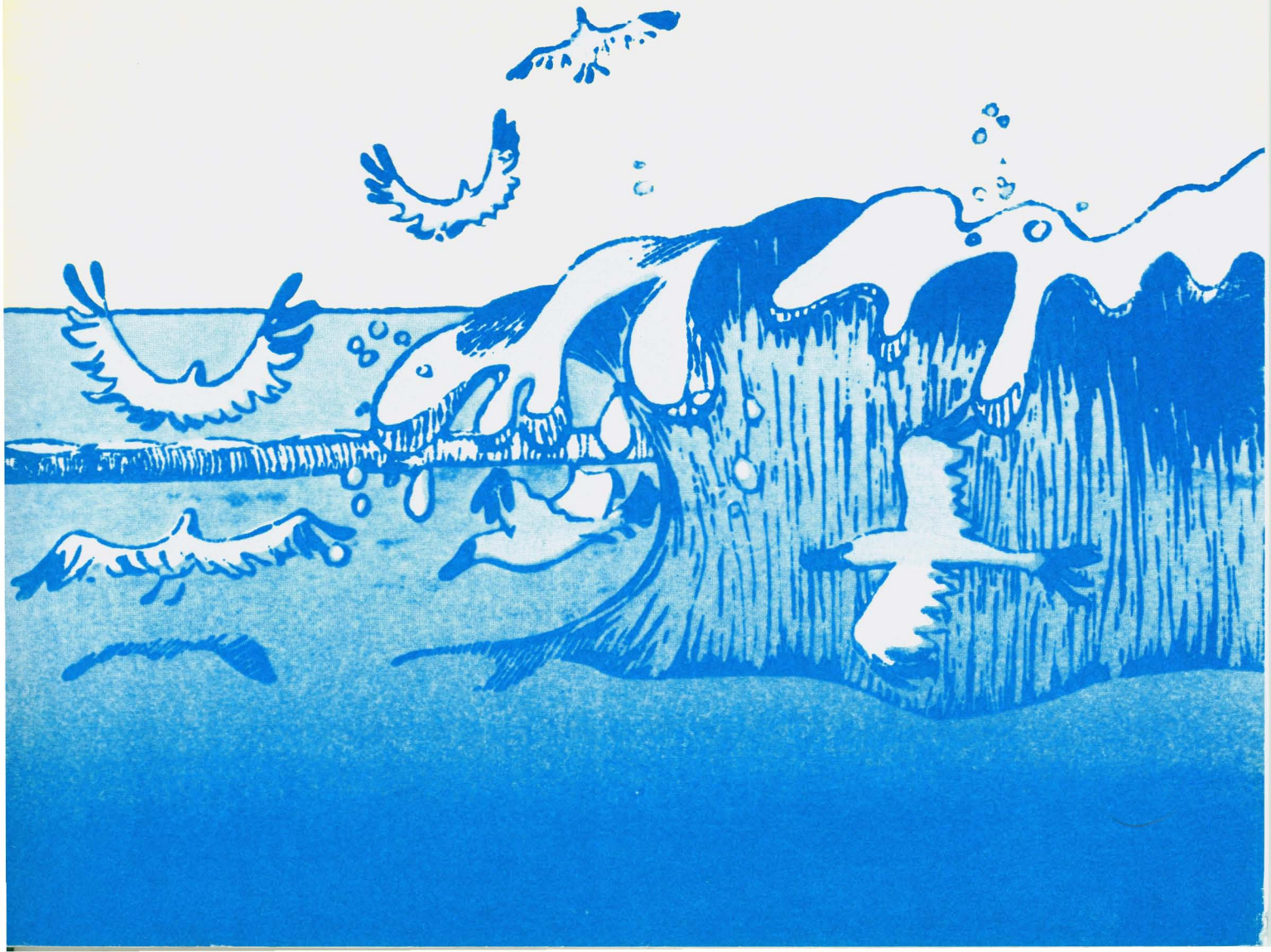
Volume 6, Number 2

Summer 1990

California

Coast & Ocean

formerly Waterfront Age



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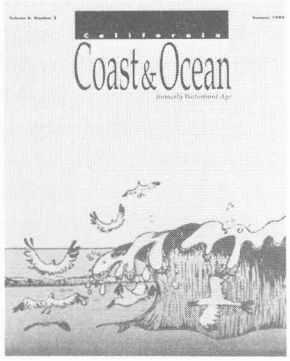


Cover: Woodcut by Ken Downing.

MARCIA GRIMM

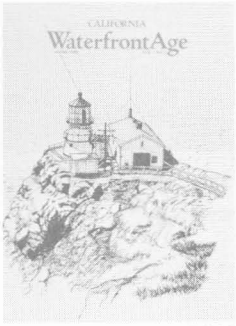
Wildlife Corridors see page 10

Printed on recycled paper

Dear Reader:

With this issue, the magazine you have known as *California Waterfront Age* becomes *California Coast & Ocean*. It is still the State Coastal Conservancy's quarterly, published in association with Romberg Tiburon Centers of San Francisco State University. We took the new name because we outgrew the one with which we started.

The magazine was launched in 1985 with the intent of focusing on urban waterfronts, which were being reclaimed statewide and nationwide as public assets. The Coastal Conservancy had valuable experience in waterfront restoration and development and wanted to share it with a wider public. During the past five years, however, our coverage has expanded to a range of other coastal issues. We have considered wetland restoration and controversies about mitigation of development impacts; watershed restoration, the growth of the land trust movement, environmental education, waste water reclamation, the expected effects of global warming on the California coast, as well as other emerging themes. At the same time, of course, we have continued to inform the public of significant Conservancy activities.



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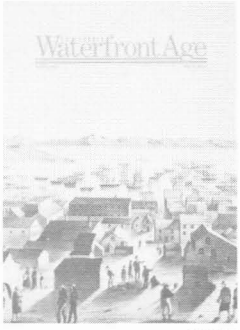

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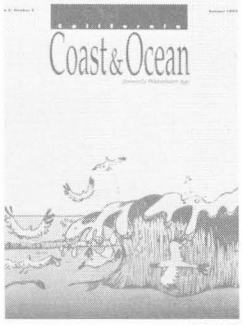


1990

The basic goal has remained the same: to contribute to the protection and enhancement of the quality and diversity of the California coast in keeping with the Coastal Act of 1976. We have drawn on the experience of the Conservancy and those it works with, but also on many other sources. More and more, we have found that local issues must be viewed in a wider context—within the watershed, the region, within national, and even global parameters. "From Other Shores," the department introduced in this issue, is a step in this direction. So is our new name.

The coast is not simply the territory that lies landward of the tidal zone. It extends out into the ocean. H.J. Walker, of Louisiana State University's Coastal Studies Institute, has observed, "If there has been a noticeable trend in the change of man's view of the coast through time, it has been one of expansion." In 1961, he pointed out, a coastal geography panel sponsored by the National Academy of Sciences-National Research Council proposed that the coastal zone "may extend far from land, across shallow waters to the limits of major interactions between the land and water interface."

Recent years have demonstrated with alarming evidence what our ignorance about the oceans is costing: oil and medical waste washing ashore, along with marine mammals dead of unknown causes; birds suffocating on waterborne plastic, vast ghost nets devastating calamitous numbers of living creatures. At the same time, the great ocean commons has become subject to greater territorial claims. As deep sea explorers discover marvels that we had never imagined, we are in danger of destroying not only them, but also life that sustains us.

Turning with greater attention now toward the Pacific Ocean, this magazine will continue to do what we have attempted to do since the beginning: to publish material that might open new ways of thinking and otherwise serve our readers, who are all in one way or another involved with the California coast and ocean.

Rasa Gustaitis
Editor

From the Executive Office

by Peter Grenell

Two hundred fifty years ago, European settlers had not yet established dominion over the North American landscape. Buffalo tracks half a mile wide were observed through the Kentucky bluegrass. Millions of passenger pigeons gathered in great flocks that darkened the skies. The Native American population was comparatively tiny and lived lightly on the land. What is now Kentucky was used as a common hunting ground by the Shawnees to the north and the Cherokees to the south; but they took only what they needed for survival and neither laid claim to the land. All this has changed, of course.

What is left of the wilderness is vanishing rapidly, replaced by human settlement and developed for agriculture and other human uses. We are now reduced to advancing such concepts as "wildlife corridors" in a last-ditch attempt to preserve and sustain adequate space for wildlife to survive for more than a generation. As Carol Arnold describes in this issue, [pp. 10-21], pockets of reserves and refuges for specific endangered species may not be enough. Although the Endangered Species Act is a vital defense against imminent extinction of many life forms, we must go beyond it, supporting other wildlife that is approaching endangered status or will be threatened if trends continue. Many conservation areas may simply be too small to afford adequate protection from neighboring development and sustain healthy populations. We need large, connecting areas, which include zones that have special environmental importance because of their species distributions, as well as buffer areas where varying degrees of human activity are permitted. This land use pattern is called for to preserve viable populations not only of species that are already endangered but of all wildlife.

Such a regional approach to habitat preservation has promise because it would provide sufficient buffering from human impacts while not requiring that all lands be acquired. Expense precludes acquisition of all land with important habitat value; and public and private sectors are becoming increasingly adept at using "creative financing" methods like less-than-fee acquisition, development rights transfers, and imaginative ways of sharing burdens of restoration and maintenance. If both public and private lands are managed in enlightened ways within a regional mosaic, the goals of conservation could be achieved.

> ***Local businesses and farmers with sound environmental practices should not be threatened by enlightened resource management.***

More work is needed to identify conservation parameters for different species and habitats. Clearly, some require total separation from developed or farmed areas; others may not be as sensitive. And it is not possible to preserve wildlife populations on every development site. But the regional, watershed-wide, or countywide approach could result in far greater protection for wildlife than we now have with isolated preserves. Among promising efforts is the work of New York's Adirondack Mountains Commission, which seeks to conserve resources while designing compatible roles for public use and private sector activities, all within the regional patchwork of public and privately owned lands. While some lands are to be acquired for conservation and public use, a strong effort will be made to sustain regional economies. Local businesses and farmers with sound environmental practices should not be threatened by enlightened resource management.

On the West Coast, the State Coastal Conservancy has evolved its programmatic emphasis in the same direction. The original focus was on specific wetland and other habitat sites. Now these are viewed within their context in coastal watersheds and river valleys, and in relation to compatible human activities. For wildlife corridors, buffers may be provided by compatible public access and recreation, environmentally sensitive agriculture, and other uses. Planning and implementation are underway, for example, in watersheds and other connected areas such as the Mattole, Tomales Bay, and coastal Sonoma on the north coast; Morro Bay, Elkhorn Slough, and Monterey Dunes on the central coast; and the Otay, San Dieguito, and Buena Vista areas on the San Diego coast.

Coalitions of government agencies, resource conservation districts, ranchers and other private landowners, and conservation groups are learning to resolve issues for mutual benefit. Contention is being replaced by cooperation.

The urgency is especially great on the coast, which contains most of the state's population and development and is subject to great pressures for land conversions. The artificial Coastal Zone boundary does not always correspond to the special needs of wildlife and habitat, so many opportunities in coastal counties are being ignored by default. The regional approach to resource conservation is in everyone's interest, not just the special interest of environmental groups. It is time for the state, environmental activists, naturalists, farmers, developers, educators, and local governments to join forces in creating our living pattern for the 21st century. ❐

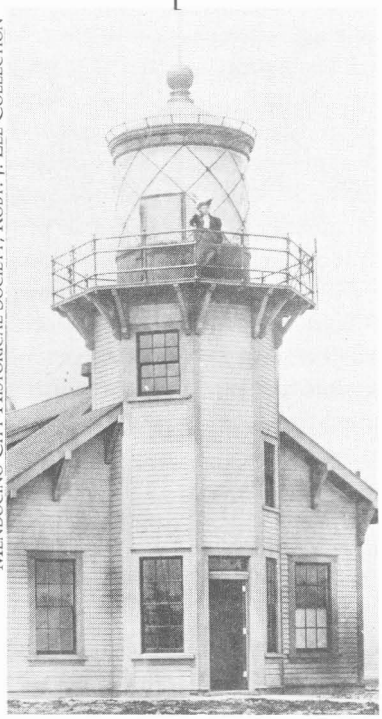
Ebb and Flow

During the first half of 1990, the Coastal Conservancy acquired scenic lands in Mendocino and Sonoma counties, then took steps to open these lands to public access while also protecting wildlife values; started to move on two projects that combine flood control, wetland enhancement, and watershed protection in northern Monterey County and Humboldt County, and was active on diverse projects in all coastal regions.

Point Cabrillo

In March the Conservancy authorized the purchase of 112 acres at Point Cabrillo, bringing to 198 the total acres acquired so far as part of a plan to protect the scenic and natural resources at this historic site in Mendocino County. The first 76 acres were acquired in 1988. The plan calls for the purchase of a final 85 acres when funds become available.

Funds for the first purchase ($1,887,500) came from the Conservancy; funds for the second ($2,255,000) came mostly from a legislative appropriation to the Conservancy from Tobacco Tax monies (Proposition 99). There is no definite funding as yet for the third phase, which is crucial to future park use of the headland because it will allow parking, restrooms and an interpretive center to be located on sites screened by topography and vegetation. (Estimated cost: $1,607,000). This 85-acre area is partially wooded and has abundant wildlife. It includes archeological evidence of extensive use by Native Americans, and remnants of houses built by the earliest European settlers.



Mendocino City Historical Society, Robt. I. Lee Collection

Point Cabrillo Light Station

The headland is best known for the Point Cabrillo Light Station, built in 1908 and regarded as the most complete example of a historic light station remaining in northern California. It is surrounded by grasslands, streams, freshwater wetlands, riparian corridors, and the only state marine reserve along the 100-mile Mendocino County shoreline. Offshore lies the wreck of the brig *Frolic*, which once plied the China trade. The Conservancy is now negotiating the acquisition of the light station from the U.S. Coast Guard.

Del Monte Dunes, Monterey

In April, the Conservancy authorized the acquisition of an option to the Del Monte Dunes (or "Ponderosa property") with $1.5 million provided by Proposition 70 in 1988 for purchase of natural lands in the Monterey Bay area. The principal goal is to restore and protect degraded habitat.

To acquire these 36 acres of beach and dunes has long been the number one priority for public agencies and conservation organizations that work along South Monterey Bay. The property's quarter mile of private beach front adjoins Monterey State Beach at the northern boundary of the city of Monterey. The Monterey Recreation Trail (partially funded by the Conservancy) runs along the site's inland boundary. The upland dunes provide habitat for the federally protected Smith's blue butterfly and five other rare species, including the Black legless lizard. Although this property could accommodate both recreation and protection, it is zoned for high density residential and commercial development and has twice been threatened with development proposals.

The landowner is willing to sell for $4.5 million, the value set by state appraisal. If further study of the property confirms its public value, the Conservancy will take the lead in coordinating a five-agency joint acquisition that should be completed within a year.

Marin Islands

By spending one dollar at the right moment, the Conservancy hopes to seize a great opportunity for the public and for wildlife. The agency has bought for one dollar a one-year option to buy the two Marin Islands and 325 acres of surrounding tidelands in San Francisco Bay just north of the San Rafael-Richmond Bridge. The action came in March, in response to an intense citizen campaign aimed at creating a Marin Islands National Wildlife Refuge in the middle of this major metropolitan area.

Three-acre West Marin Island is the most significant heron and egret rookery in the San Francisco Bay area. Although the rookery in the South Bay is larger, its population is decreasing as habitat deteriorates. Wildlife conservationists expect to increase the Marin Islands colony by closing East Marin Island to humans during nesting season.

To convert opportunity to reality, major private support as well as action by several government agencies are needed. The State Lands Commission has appropriated up to $500,000, and the Marin County Open Space District has

approved a $600,000 contribution for this acquisition. Representatives Barbara Boxer and Don Edwards have asked for $600,000 from Congress to the Fish and Wildlife Service, which would manage the islands. The Trust for Public Lands is coordinating private fund raising efforts. The asking price for this island property is $3.4 million.

San Rafael Canalways

On the East San Rafael shoreline in Marin County, an 83-acre diked seasonal wetland known as Canalways provides nontidal salt marsh habitat for the endangered Salt marsh harvest mouse as well as seasonal and brackish wetland habitat for shorebirds and waterfowl. It is also a main feeding area for egrets and herons from the nearby West Marin Island rookery. For the past 20 years, however, this wetland was threatened by development proposals. In April, the Conservancy approved the city of San Rafael's Canalways enhancement plan and authorized up to $540,000 to implement it. The goals are to protect the wetland from development, improve wildlife habitat by replacing weedy exotic plants along levees with natives, and provide public access to the San Francisco Bay shore. The city seeks to acquire the property.

Black Ranch, Sonoma County

Two miles of Sonoma County shoreline will be open to the public as a result of the Conservancy's acquisition of Black Ranch. By next year, walkers and wheelchair riders will have access to bluff meadows, while hikers will be able to follow rugged trails above beaches on the 273-acre property between Fort Ross and Russian Gulch, west of Highway 1. After authorizing the acquisition, with $655,000 of Proposition 70 funds, the Conservancy also authorized $233,000 to Coastwalk, a nonprofit organization, to build a mile-long wheelchair-accessible loop trail, related access facilities, and a footpath that will link this land to the state beach at Russian Gulch.

Mattole River Site Reservation

The Mattole River, which flows in Humboldt County, was once among the most productive salmon and steelhead streams on the north coast. Logging and other activities damaged the estuary and the watershed, diminishing the capacity of the watershed for supporting anadromous fish. In the past decade, local nonprofit organizations have undertaken work to restore the estuary and watershed, collaborating with the Coastal Conservancy, the Department of Fish and Game, the Department of Forestry, and the Bureau of Land Management. The Bureau owns the 60,000-acre King Range Conservation Area south of the river, including the rugged "Lost Coast" region, where hikers seek solitude and wild beauty.

To advance the restoration, the Conservancy in February authorized $434,500 to The Nature Conservancy to acquire about 400 acres north of the river mouth, including the portion of the Mattole estuary that is not already in public ownership. The property will be transferred to the Bureau after that agency has provided trade properties to The Nature Conservancy for sale on the private market. Proceeds from the sale of the trade properties will be used to repay the Coastal Conservancy.

Coastal Conservancy funds were needed to bring into public ownership important river and ocean front land north of the river mouth, thereby allowing greater opportunity for the protection and enhancement of the estuary, riparian corridor, Douglas fir forest, coastal bluff scrub and coastal prairie habitats. These conservation efforts will lead to improved salmon and steelhead spawning habitats.

An important component of this project was an agreement between all parties, including Humboldt County and the Cattlemen's Association, that resulted in a 300-acre grassland parcel remaining in private ownership, assuring its continued availability for cattle grazing or other agricultural uses.

Mission Bay Park

The city of San Diego will complete a pedestrian bridge in Mission Bay Park and make other improvements with $200,000 authorized by the Conservancy in February. The bridge will provide safe passage across Briarfield Crescent in the Sail Bay area of the park, allowing almost continuous pedestrian passage around the bay. It will provide the only public access around this cove, for the shoreline here is privately owned. The Conservancy's money will also go to pay for benches, planters, and observation areas, and will create over six acres of usable beach by removing docks and piers and widening the beach.

Año Nuevo Wheelchair Access

More than 150,000 people visit the Año Nuevo State Reserve in San Mateo County each year for a unique view of elephant seals on their breeding grounds. Among these visitors, some 600 are wheelchair riders or have limited mobility. To accommodate them, the Conservancy has authorized $10,000 for the nonprofit State Parks Foundation to refit a van purchased with $20,000 donated by the Chevron Corp.

Salinas River Wetlands Plan

To improve fish and wildlife habitat and also to protect farmers from flooding, the county of Monterey will prepare an enhancement and management plan for the Salinas River wetlands with up to $80,000 authorized by the Conservancy

in February. The 800-acre project area includes the lower three miles of the river, the Salinas River lagoon, the mouth of the old Salinas River channel, and the beach and adjacent dune lands.

The lagoon, riparian corridor, and adjacent uplands provide diverse and extensive habitat for over 280 species of fish and wildlife, including at least 38 threatened, endangered, or sensitive species. The Fish and Wildlife Service owns a 400-acre wildlife refuge south of the river, and the State Department of Parks and Recreation manages the beach and nearby dune lands to the north. Flooding has posed severe problems to farmers in the area. The plan for enhancing and managing the wetlands will recommend solutions to managing flood waters, to improve and expand fish and wildlife use, and will evaluate options for public access. The Monterey County Flood Control and Water Conservation District will contribute $97,000 toward the project. The Fish and Wildlife Service and the State Parks Department are also expected to contribute.

Salt River Enhancement Plan

In March the Conservancy authorized $100,000 to the Eel River Resource Conservation District in Humboldt County to prepare an enhancement plan for the Salt River. The agency is collaborating with the U.S. Soil Conservation Service in a joint effort to improve wildlife habitat and at the same time help dairy farmers in the Eel River Delta region with their severe drainage problems. The federal agency is contributing $104,000 toward this project.

The diking of wetlands, combined with logging and grazing in the watershed, have caused sediment to build up in the bed of the 13.4-mile-long Salt River, which flows from the Wildcat Range south of Ferndale into the Eel River and forms the southernmost portion of the extensive Eel River estuary. Consequently, the region's wildlife habitat is diminished and farms suffer drainage problems. The two agencies, as well as consultants under contract with the resource conservation district, will jointly investigate the degraded Salt River system, its upland watershed, the estuary, and connections to the Eel River. The study will conclude with recommendations to improve wildlife habitat and address the region's increasingly troublesome drainage problems. The Salt River drains nearly 13,000 acres of the Wildcat Range and nearly half of the 33,000-acre Eel River Delta.

High Tide at Mad River

Dedication ceremonies for the Mad River Slough and Dunes Cooperative Management Area were only hours away when the interpretive panels arrived. They had to be brought in by boat, at high tide. Oyster farmer Ted Kuiper lent his boat and, with other volunteers, helped the East Bay Conservation Corps to install them. The Coastal Conservancy funded The Nature Conservancy's acquisition of a key parcel in the Area, and worked to protect its sensitive resources and to provide public access together with this nonprofit organization and the Bureau of Land Management, Louisiana-Pacific Corp., and the Redwood Gun Club. Now visitors can wander through dense forest, bare sand dunes, and along salt marshes, mud flats and a freshwater swamp.

ANDREA PICKART

Bodega Bay Trail

Sonoma County will build three miles of bike lane and parking improvements along Westside Road in Bodega Bay with up to $110,000 authorized by the Conservancy in February. The Westside Road Bikeway is the first of three trail sections that will eventually link existing public and private marinas, county and state parks, and the community of Bodega Bay. It will also add to the Coastal Trail system being created by the Conservancy and others.

Dana Point Harbor

The Orange County Marine Institute will use up to $110,000 authorized by the Conservancy in February to build a permanent mooring at Dana Point Harbor for the *Pilgrim*, a replica of the brig in which Richard Henry Dana arrived in 1834 in the voyage he later chronicled in *Two Years Before the Mast*. The mooring will allow visitors to walk or ride wheelchairs to the *Pilgrim* and to board the brig.

Venice Canals Restoration

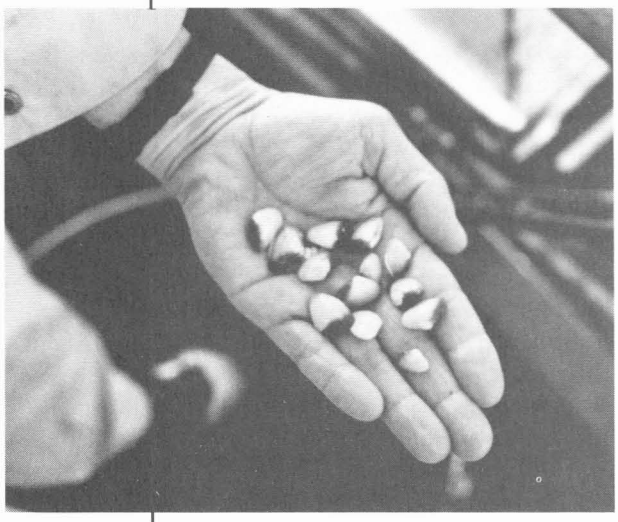
In addition to their value as cultural and historic assets, the canals of Venice, along with the adjacent Ballona Lagoon, support some of the last remaining pockets of coastal wetland habitat in Los Angeles County. Since they were built in 1904, however, the canals have seriously deteriorated. The city of Los Angeles intends to restore them for recreation, public access, and to protect and enhance existing wetland habitat. In March the Conservancy authorized up to $67,100 to the city toward the preparation of an enhancement plan that includes a hydrology study. The goal is to improve tidal circulation and water quality to benefit wetland and marine habitat. ❐

Conference Log

Chinese Clam Menance

On May 5, the Save San Francisco Bay Association held its 11th Biennial Conference entitled "Restoring the Bay." Regional historian Malcolm Margolin set the tone by describing the estuary as it was before European settlement. He painted a picture of wildlife in such abundance as to be almost beyond imagination. Grizzly bear, tule elk, waterfowl, and salmon dominated the land, air, and waters of the bay area.

Sam Luoma of the U.S. Geological Survey then described the changes to the estuary that have occurred as a result of European settlement. Many were familiar, such as bay filling and freshwater diversion. However, Luoma elaborated on a very recent development, which is only beginning to be understood: the introduction and proliferation of a tiny exotic species from Asia.



Courtesy U.S.G.S.

With the conference posing the challenge of restoring some of the natural diversity and abundance that has been lost over the past two centuries, many participants envisioned breaching dikes to enlarge the bay or increasing freshwater flow to revive ailing fisheries. Most, however, were at a loss to explain what could possibly be done about the Chinese clam.

In the early 1980s a research class from Diablo Valley College collected a small clam in the waters of Suisun Bay on the northern shores of Contra Costa County, Luoma said. The instructor did not recognize the clam and asked the U.S. Fish and Wildlife Service to identify it. It turned out to be *potamocorbula amurensis*, never before found in these waters, which had evidently arrived via the ballast water of a foreign ship.

The clam has proven to be a prolific organism that out-competes the estuary's native species. Researchers estimate that about 4,000 of the tiny invertebrates may exist in an 8.5 x 11 inch plot of bay bottom. By the late 1980s it had spread throughout the entire bay, and researchers were beginning to realize that its impact may ultimately be more far-reaching than originally imagined.

The Chinese clam tolerates a wider range of salinities than native species. As salinities in the Suisun Bay area have increased as a result of freshwater diversion and drought, this exotic clam has edged out native clams and come to dominate these waters. Because it is an extraordinarily efficient feeder, its population can filter the entire volume of water contained in Suisun Bay in about two days. This could have a devastating impact on the estuarine ecosystem.

Suisun Bay is the "nursery" of the estuary. Fresh and salt water meet there to create a welling up of nutrients. Under normal circumstances, there is an abundance of small plants (phytoplankton), which are food for small animals (zooplankton) that are in turn food for larger predators. Thus, the bay's fisheries and diving birds, such as terns, rely on this rich, Suisun Bay soup.

However, the Chinese clams may be filtering most of the phytoplankton out of the water, thereby removing the fundamental building block of the food web. With the phytoplankton gone, the water column of Suisun Bay is stripped of its high concentrations of small plant and animal life. The introduction of the Chinese clam may therefore pose an additional significant threat to the health of the estuary's fisheries, as well as to other species, which depend upon abundant phytoplankton in Suisun Bay.

Luoma explained that science does not have all the answers to questions about the impact of urbanization upon the estuary. He suggested that public policy makers should recognize that by altering the estuary's natural regime, whether by introduction of exotic species or by reduction of freshwater flows, we are performing an experiment upon the bay the outcome of which we cannot predict.

Marc Holmes

Focus on Open Spaces

The 1990 International Open Space Conference will be held September 22-26 in Palo Alto. Hosted by the Midpeninsula Regional Open Space District, the five-day conference will discuss challenges to open space preservation, such as changing population patterns, rising land prices, and land acquisition by large corporations and offshore investors. Participants will also be able to attend field workshops in the San Francisco Bay Area. Optional tours are available at extra cost. Registration is $295. For more information, call (415) 949-5500.

Coastal Zone 91

Coastal Zone 91, the seventh multidisciplinary conference on coastal and ocean

planning and management, "Global Concerns: Multi-Level Responsibilities," will be held July 8-12, 1991, at the Hyatt Hotel in Long Beach. Over 1,500 people are expected to attend. California's coastal and ocean resources will be spotlighted. Sponsors include the American Shore and Beach Preservation Association, Coastal Zone Foundation, National Oceanic and Atmospheric Administration, American Society of Civil Engineers, and the Port of Long Beach. For information, call Orville Magoon or Gail Oakley at (707) 987-0114 or fax (707) 987-9351. Or write Coastal Zone 91, P.O. Box 279, Middletown, CA 95461.

Landscape Ecology

A conference on landscape ecology will be held October 3-5 in Sacramento. The three-day gathering, offered by University Extension at the University of California, Davis, is designed for professionals in all areas of land use management.

Landscape ecology is a new environmental specialty, dealing with the patterning of the Earth's surface that comes about when adjoining patches of land are used in different ways. It considers how crop lands, pastures, towns, roads, woodlands, river corridors, and bits of wild land affect each other, how they affect processes that extend across expanses of land, and how these processes are maintained under varying degrees of human control.

Basic instruction in landscape ecology will be offered and applications to California land use problems will be discussed at the conference, to be held at the Red Lion Inn. For more information, call (916) 757-8893.

Waterfront Conference

The Waterfront Center's annual conference, this year entitled "Urban Waterfronts '90: Charting the Course," will be held October 11-13, 1990, at the Ramada Renaissance Hotel in Washington, DC. Lower Manhattan's waterfront will be featured. Panels will discuss waterfront planning in Japan, interpreting a waterfront's natural and cultural heritage, dealing with disasters, and conflict management in harbor use. Registration is $275 for members, $330 for nonmembers prior to September 10. For more information, call (202) 337-0356.

Celebrating Morro Bay

The ninth annual Morro Bay Harbor Festival will be held October 6-7, from 10 A.M. to 5 P.M. daily at the Embarcadero in Morro Bay. The festival brings together fishermen, civic and community groups, businesses, artisans, and environmental groups. Proceeds are shared by groups that donate time to the festival. Last year over $11,000 was awarded to 36 nonprofit and community service groups. Major cash award recipients were the California Conservation Corps, the Morro Bay Commercial Fishing Association, the Rotary Club of Morro Bay, Casa Solano, and the Central Coast Salmon Enhancement Program.

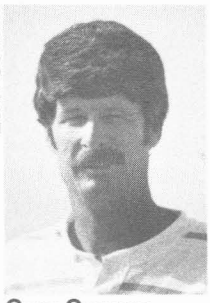
Earlier this year the California Park and Recreation Society honored the Morro Bay Festival with its Community Service Award for producing a community event that brings together a cross section of Morro Bay and is also one of the major fund raising events on the Central Coast. Festival coordinator Galen Ricard said the Morro Bay festival is the only one on the coast that gives most of its proceeds to the volunteer groups that help make it a success.

Admission is $2 for adults, $1 for seniors and students, and free for children under 12. The festival's main event is the Seafood Faire and Winetasting. For more information, call Galen Ricard at (805) 772-1155.

In Other News

Gorman Wins Award

Gary Gorman, founder and executive director of the Huntington Beach Wetlands Conservancy, received an award from the Environmental Law Institute's *National Wetlands Newsletter* at the annual conference of the Association of State Wetland Managers, held in Buffalo, NY, in May. The awards program is conducted in cooperation with the Environmental Protection Agency and the Association of Wetlands Managers. It is designed to recognize individuals who have demonstrated outstanding innovation and excellence in wetlands conservation at the state and local levels.


Lynn Gorman

Gary Gorman

Gorman worked through the small land trust he founded, with the help of the State Coastal Conservancy, to acquire a 25-acre parcel of degraded wetland at the mouth of the Santa Ana River in Huntington Beach and restore it while also mitigating the impacts of three public works projects. As project manager, he supervised the restoration of tidal flushing and set up a biological monitoring program. One nominator described Gorman as having a "contagious passion for wetlands." (See p. 42 for news from Huntington Wetlands.)

Nominations for the 1990 awards are now open. For information, contact Nicole Veilleux, editor, *National Wetlands Newsletter*, Environmental Law Institute, 1616 P Street NW, Washington, DC, 20036. (202) 328-5150. ❐

California Sketches by Alis Balbierius

How lonely
the spirit of Erich Fromm
Above America's
automobile ocean

for the American
gives up his car
only
upon arrival
in heaven or hell.
Then he walks
on his own
along the path of
another existence.

The Sierras

Eternity's footsteps
upon Earth's face

the highway
an arrow,
above it
the setting sun.

Here my soul,
released,
leaps
out the car window
a sudden breeze
runs
over the mountains.

Rough and cracked is
the bark of sequoia
like the American Indian
face

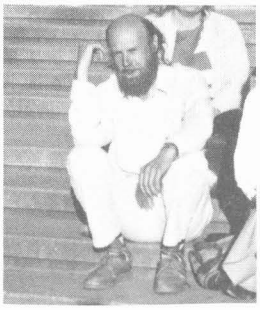
Enclosed
for centuries
already
in layers
of a vanished time

Lietuva (Lithuania)

Freedom seed
in parched ancestral land
waiting for rain
a thousand years

Pacific Ocean

On its shores
beside a dead bird
misery leaves my soul
and only
the ocean
remains



Alis Balbierius is a poet, ornithologist, and member of the environmental movement in Lithuania. These impressions, written in May 1990, during his first visit to America, were translated from the Lithuanian.

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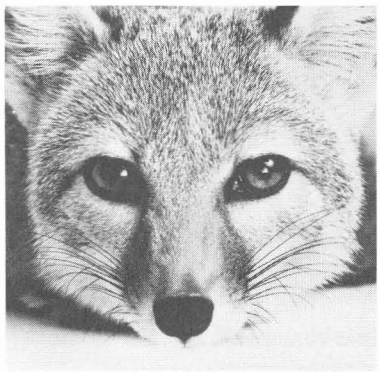
Wildlife Corridors

Landscape linkages may counter the "island effect" that can doom species isolated in preserves that are too small for them.

by Carol Arnold



Kit fox

ENDANGERED SPECIES PHOTOS BY SUSAN MIDDLETON ©1988. ALL RIGHTS RESERVED.

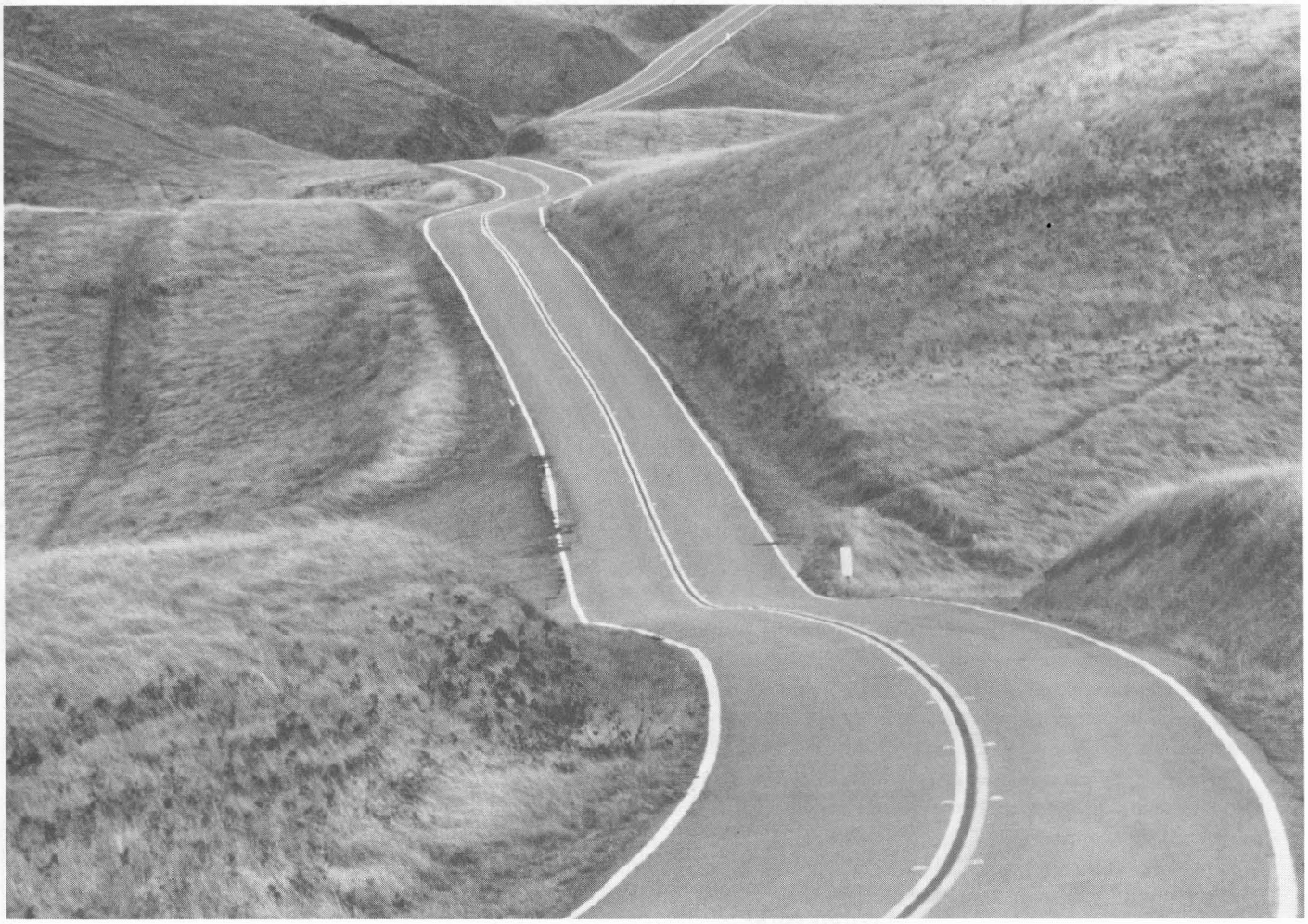
One recent weekday afternoon, in the midst of stop-and-go traffic on Interstate 80 along the shore of San Francisco Bay, motorists were startled to see a driver step out of his car into the roadway and wave his arms frantically at something close to the ground. At his feet was a duck followed by several ducklings, heading straight into the eight lanes of traffic. Leaving the bay behind, the duck family had already waddled past the first rows of stopped cars in its hike, presumably toward the aquatic park on the other side of the freeway. The man managed to shoo them back to safety—this time. They would probably try again though, if not that day, then another.

Four years ago, in southwestern Florida, a 195-pound radio-collared black bear accomplished an amazing 11-week journey through human habitat. He transected six counties, crossed eight major highways and a dozen other roads, swam a river and numerous canals, crossed fences and farm lands. Moving along abandoned railroad tracks, he passed suburban tracts, bee yards, turkey pens, and many roadside garbage containers. He was captured 200 miles from where he began.

Earlier this year in central California, a mountain lion was seen pacing in an agricultural field, looking confused and frightened. What had brought him to that exposed, dangerous place? Was he just "lost," as a news report suggested, or had genetic memory perhaps led him in search of some long-gone forest that his ancestors used to cross en route to feeding grounds on the coastal plain?

What led these animals to venture into perilous human-dominated terrain cannot be known for certain. They were lucky. By a combination of chance and human goodwill, they were saved from becoming road kill statistics. An estimated 100 million wild animals are killed each year on the nation's roads. Animals move for many reasons, as do people—to feed, seek shel-

CAROL ARNOLD



Even in open space areas, highways interrupt patterns of wildlife movement. Underpasses prevent road kills and expand range.

ter, find mates, give birth. With humans claiming ever more of their habitat, their movements increasingly lead them into danger. Despite years of park and preserve acquisitions, protective regulations, and good intentions, we still know too little about the movement requirements of various species and have often failed to provide for them.

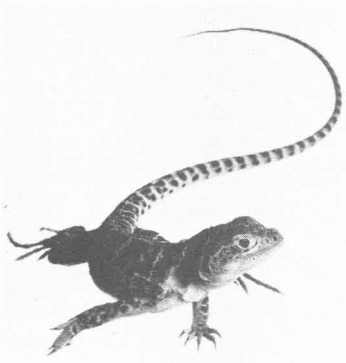
Studies of wildlife movements have traditionally focused on long-distance travelers, such as migratory birds and caribou, species that move thousands of miles between summer and winter habitat. Recently we have become aware that resident animals also have movement needs. An otter's home range is about 1,000 acres, a single bobcat needs 5,000 acres, a black bear must have at least 15,000 acres, and a Florida panther requires 150,000 acres. Many more acres are needed to maintain viable populations of these animals. These needs must be met if these and other species are to survive. The space left for them, however, has been steadily shrinking.

The Island Effect

Biologists are accumulating evidence that we may have trapped our remaining wildlife populations within what amounts to a collection of islands, cut off from migration routes and historic home range by roads, fences, dams, buildings, agricultural fields, clear-cuts, and other manifestations of human occupation. The boundaries of our public lands are generally arbitrary, laid out across a landscape that has been recognized as important to preserve, but is under competing claims. Parks and preserves are carved out of a human-dominated terrain, and their borders usually have more to do with political and economic concerns than with the needs of plant and animal communities within them.

"Prior to European settlement, Califor-

"Prior to European settlement, California was a natural mosaic of habitats. . . We have overlaid an incredibly detailed grid of artificial boundaries, lines on the landscape that the natural world didn't evolve to deal with."



Blunt-nosed leopard lizard

nia was a natural mosaic of habitats," says Richard Spotts, California representative of Defenders of Wildlife. "We had massive herds of tule elk and pronghorn antelope, as well as wolves, grizzly bear, and jaguar. We have overlaid an incredibly detailed grid of artificial boundaries, lines on the landscape that the natural world didn't evolve to deal with."

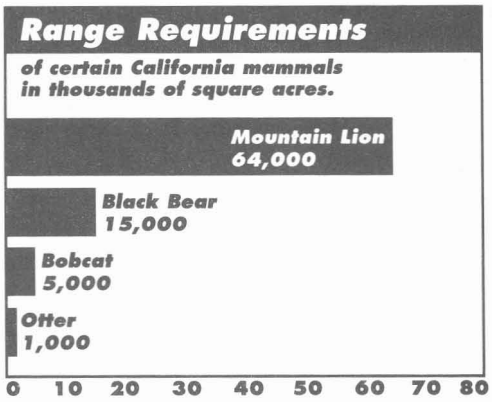
If our parks and preserves are indeed functioning as islands, many species may be doomed. Plant and animal extinction rates on islands are higher than in almost any other habitat area. Although true islands contain less than 10 percent of all bird species, for example, more than 90 percent of all bird extinctions have been reported on islands. The state with the highest percentage of threatened and endangered species is Hawaii, our only island state.

The theory that parks and preserves appear to replicate island conditions has been explored for some years but was defined more clearly in 1986 by ecologist William Newmark. In completing his doctoral dissertation on island biogeography at the University of Michigan, he produced compelling evidence that some mammalian extinctions in western North American parks are the consequence of the fact that the parks are too small to support many species that historically occupied a larger territory.

Gone from Bryce Canyon are the red fox, pronghorn antelope, northern flying squirrel, and the beaver. No river otter, ermine, mink, spotted skunk, and gray fox have been seen in Crater Lake National Park for many years; the black bear and badger have vanished from Zion National Park, and the wolverine and lynx from Mount Rainier National Park. The reasons for these extinctions were unclear until Newmark published his conclusion that "the loss of mammalian species [in the parks] is most probably attributable to the loss of habitat and the active elimination of fauna on adjacent lands." Cut off from their historic home range, isolated from other members of their kind and therefore unable to renew the gene pool, these animals were trapped within an area that was too small to maintain them and was surrounded by incompatible land uses, which prevented them from expanding their range.

"We cannot tuck species away in little reserves as if we were storing pieces in a museum, then come back a century later and expect to find them all still there," biologist Douglas H. Chadwick remarked recently in *Defenders* magazine.

Habitat fragmentation has four major effects. First, it restricts and isolates large free-ranging animals. Second, it leads to the loss of genetic integrity and viability within the species. (The Florida panther's decline is attributed to inbreeding resulting from range restrictions. Symptoms of inbreeding depression include loss of libido, high levels of infertility, high infant mortality, and eventual dwindling of the population. Research on adult Florida panther males found that 95 percent of those studied suffered from fertility problems.) Third, habitat fragmentation leads to a loss of species dependent upon a particular habitat. (Studies of breeding birds in hardwood forest fragments in north Florida showed that 47 percent of hardwood-dependent species have disappeared.) Fourth, habitat fragmentation opens the landscape to exotic, weedy plant species and to opportunistic wildlife species. (The cowbird is one of these species. It lays its eggs in other birds' nests, pushing out the eggs already there. The host bird hatches the cowbird's eggs and raises its young as its own. In the eastern United States, cowbirds are the likely cause of the extinction of one species of warbler and the decline of another.)



Examples of habitat fragmentation and the island effect abound in California. In the eastern Sierra, a major deer migration corridor is blocked by the Mammoth Lakes Ski Resort. Near the shore of Morro Bay, the remaining population of Morro Bay

kangaroo rat, the state's most endangered mammal, may be trapped in a privately owned habitat island of several hundred acres, separated from the remainder of its traditional habitat by residential development and other incompatible land use. The movements of black bear and mountain lions are increasingly restricted. The beaver, the otter, and other animals that move along watercourses are being increasingly restrained by dams, flood control "improvements," the removal of riparian vegetation, and water diversions. The same can be said for many species of songbirds and fish. Salmon and steelhead are declining rapidly. The Least Bell's vireo, one of many birds that depend on riparian habitat, is endangered. During the last century all but 5 percent of California's riparian habitat was depleted.

According to The Nature Conservancy's *Sliding Toward Extinction* report, "in California we have been rapidly eliminating . . . natural habitats without fully understanding. . . the consequences. . . . About 200 vertebrate animals, 600 species of plants and almost 200 different natural communities in California are considered . . . to be threatened with severe reduction or. . . extinction."

A New Strategy

How to stop this sorry litany of wildlife losses? Defenders of Wildlife and several other conservation organizations are promoting a strategy that, according to Chadwick, represents "a major shift in the way we go about practicing conservation. . . It involves a fundamental change in values arising from a broader vision of how nature works."

Central to that strategy are landscape linkages or wildlife corridors (in some cases referred to as greenbelts): planned connections between habitat "islands" to provide protected movement opportunities and increased range for various animals, thereby helping to maintain healthy populations and genetic diversity. These connections can be as inconspicuous as an underpass beneath a road or a hedgerow between two farmers' fields, or as impressive as a mile-wide riparian jungle bordering a major river, or 10,000 acres of forest lands connecting two national parks. Whether the links are broad or narrow, many scientists are convinced that without them many of our native animals and plants are doomed.

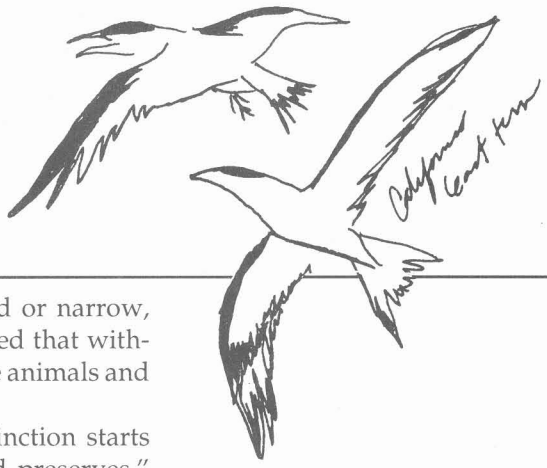
"The countdown for extinction starts when you establish isolated preserves," says Dennis Murphy, director of Stanford University's Center for Conservation Biology. "There is a propensity to design isolated garrisons for particular target species. Yet it's clear that organisms exist as regional metapopulations that are highly interactive. As soon as you cut dispersal corridors out of the system, you've assured extinction."

The Otay River Corridor

The Otay River Valley runs west from the San Ysidro mountain wilderness across the broad Otay-Nestor mesa and into San Diego Bay. Finger canyons extend north and south. As in most river valleys of southern San Diego County, the riparian habitat areas of the Otay River Valley have been severely degraded over the past 50 years by agriculture, industrial development and rapid urbanization. Only vestiges remain of the woodlands, freshwater ponds and marshes in the river's upper reaches and the brackish and saline marshes near the estuary. Today, wildlife survives here mostly around man-made salt ponds that form a patchwork pattern in south San Diego Bay, and large freshwater ponds created by gravel extraction in the upper river valley.

Wildlife use of the Otay River Valley is extremely high. Many mammals, fish, and insect fauna depend on the riparian corridor for water, shade and cover while traveling across otherwise open areas. Small mammals and birds use this route to scatter when population pressures or food and water shortages drive them from their usual habitat. Many migratory and resident bird species—some of them rare and endangered—feed and nest in the Otay River Valley and adjacent salt ponds. Among them are the Elegant tern, Black skimmer, Light-footed clapper rail, California least tern, Snowy plover, Least Bell's vireo, and Belding's savannah sparrow.

In 1989, an unprecedented cooperative effort began in the area to protect and restore wildlife corridors in the valley, while also providing new public recreational opportunities for the fast growing human population. The cities of San Diego and Chula Vista, the county of San Diego, the nonprofit Southwest Wetlands Interpretive Association, and others concerned about these issues formed a partnership designed to guide private development decisions while preserving, protecting, and, where possible, enhancing natural resources. The Coastal Conservancy has funded two enhancement plans that will recommend development strategies to minimize impacts to natural resources and identify the best areas for wetland and riparian habitat restoration and new access improvements. *By Lisa Ames*



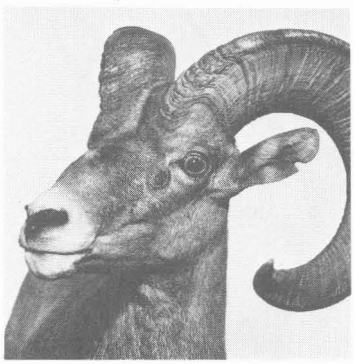
FROM THE VIDEO LANDSCAPE LINKAGES

Florida has only one or two reserves big enough for a single Florida panther, according to Defenders of Wildlife, making these linkages crucial to the panthers' survival.

A vivid case in point is the threatened Checkerspot butterfly, which population biologist Paul Ehrlich has studied at Stanford's 1,100-acre Jasper Ridge Preserve for 31 years. In 1973 there were three Checkerspot populations, totaling over 4,000 individuals, on Jasper Ridge. Ten years from now there may be none. One of the populations has already disappeared and others have diminished. "We haven't had 1,000 for the preceding decade," Murphy said.

The process that has led to the decline began 150 years ago with the introduction of European grasses. The Checkerspot lives only on native plants, laying its eggs on Common plantain and Owl's clover and taking nectar from daisy relatives. The plants it requires still grow in patches of serpentine soil, which have become de facto preserves because European grasses have not yet invaded them. With suburbanization and the building of freeways, however, the open space between the patches has been disrupted, isolating the butterfly populations.

"The lesson we take home from the Checkerspot butterflies is that 10 to 30 generations after isolation there is a good chance that a species will disappear," Murphy commented. "The single most important feature of conservation planning is the regional context into which preserves are designed."



Bighorn sheep

A Wider View

A new field of study, called landscape ecology, provides the required regional context and is the basis of the wildlife corridor strategy. The landscape ecologist seeks to understand the relation between adjoining "patches" of land such as agricultural fields, forests, grasslands, roads, river corridors, and towns. He tries to describe how these individual patches affect processes that extend across an entire landscape, that is, a large expanse of contiguous land. For park and preserve management purposes, the comprehensive approach of a landscape ecologist differs from the more traditional focus on individual park units or single species—a perspective that has inadvertently allowed habitat fragmentation to occur.

"Landscape ecology is a new dimension to wildlife conservation, which says that we have to take a bigger look," says Richard Spotts. "It might be naive, for example, to acquire a 50-acre area expecting it to remain static over time," he explains. "You have to consider whether the value for which the land is to be acquired can realistically be maintained once the area is removed from the landscape [by fencing or development of surrounding lands, for example]. Will the vegetative composition change? Will exotic weeds overwhelm the existing plants? The new scientific studies force us to raise such questions."

In a pioneering study under way in the Idaho Cooperative Fish and Wildlife Research Unit at the University of Idaho, J. Michael Scott and his colleagues have developed a process to provide some answers to such vital questions. Scott calls it a "gap analysis." It involves the analysis of species composition and distribution relative to the size and distribution of the preserved area and the opportunities for movement to other habitat areas. If this analysis shows that declines in species diversity can be expected, the next step is to attempt to "fill in the gaps" by expanding existing parks, establishing connections with other habitat areas, or creating new areas managed for biological diversity. In his study, Scott used satellite data to produce a vegetation map for Idaho. When it was overlaid with a map of preserve areas, it showed that 25 of 118 vegetation types were unprotected and 42 percent were inadequately protected. Initial funding for the study came from the National Fish and Wildlife Foundation and the Idaho Department of Fish and Game.

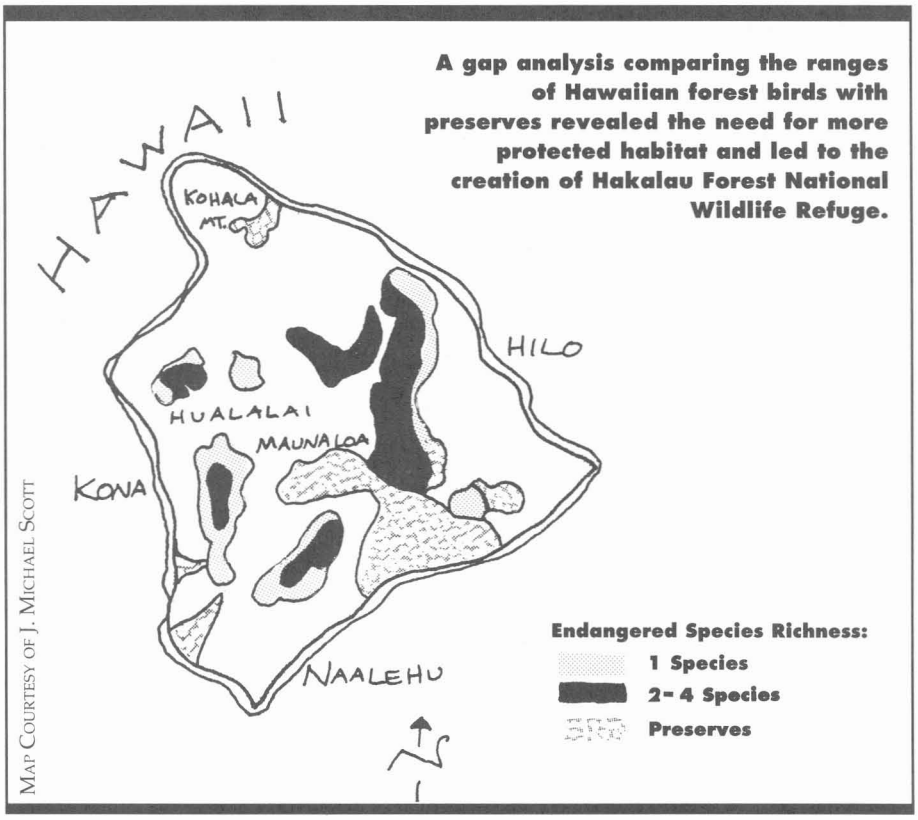
Gap Analysis:

Protecting Biodiversity By Using Geographic Information Systems

National and global biodiversity is disappearing, primarily because human beings have altered wildlands. Response to this loss has centered on rescuing species from the brink of extinction. The reactive strategy of recovering endangered species is difficult, expensive, and inefficient. It is unrealistic to expect limited conservation dollars to keep up with the growing number of listed and candidate endangered species. The best way to preserve biodiversity is to maintain common species in natural landscapes. Preliminary data indicate that the existing reserve system is inadequate for maintaining biodiversity and that additional reserve areas are needed. Presuming that only a small part of the land base will ever be devoted to preserving biodiversity, we need an objective way to identify and prioritize new conservation areas.

Gap analysis uses a software package called Geographic Information Systems (GIS) that performs digital map overlay to identify species-rich areas and ecosystems that are inadequately protected by existing reserves. GIS can analyze multiple layers of different maps, which could include satellite images of vegetation, U.S. Geological Survey maps of land ownership and topography, and maps of animal species distribution from state fish and wildlife departments, university studies, game management records, *etc.*

In an ongoing gap analysis of Idaho, U.S. Fish and Wildlife Service biologists at the Idaho Cooperative Fish and Wildlife Research Unit have developed a GIS database of the statewide distribution and status of several components of biodiversity. Maps have been compiled at a scale of 1 inch to 250,000 inches of biodiversity indicators, including vegetation, terrestrial vertebrate species, and localities of threatened and endangered species. These are being overlaid with maps of ecoregions, existing reserves, and land ownership. Exotic species and species adapted to human-altered habitats are excluded from the analysis. The goal is to identify unprotected areas in each ecoregion that contain high species richness or vegetation types and that may be threatened by future changes in land use. Managing these "hot spots" for their natural values should be the best way to minimize loss of our natural heritage.



A gap analysis comparing the ranges of Hawaiian forest birds with preserves revealed the need for more protected habitat and led to the creation of Hakalau Forest National Wildlife Refuge.

MAP COURTESY OF J. MICHAEL SCOTT

Presently, gap analysis programs are in place in Oregon, Utah, and Idaho. The entire nation could be done in six years for less than a penny an acre. Landscape linkages and corridors between wild lands, which may be critical in biotic responses to global change, could also be located. The database allows alternative patterns of future development to be analyzed with respect to fragmentation and isolation of wildlife habitats. Potential conflicts could be avoided by relating maps of natural exploitable resources to areas of critical environmental concern. Because future land use changes will result in a net loss of wild lands, identifying those areas that will most efficiently maintain biodiversity may be the only way to resolve conflicts between conservation and development.

By J. Michael Scott, U.S. Fish and Wildlife Service, and Blair Csuti, Idaho Cooperative Fish and Wildlife Research Unit, College of Forestry, University of Idaho.

A Workshop on Protecting Biodiversity Using Geographic Information Systems will be held October 29-31 in Moscow, Idaho. For information, contact Kathy Merk, Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow, ID 83843, (208) 885-6336.

The first statewide attempt to conduct a comprehensive gap analysis in California is about to start. Led by Frank Davis, professor of geography at the University of California, Santa Barbara, this two-year effort will produce a series of overlays displaying habitat areas, political jurisdictions, land ownership, and other information necessary for building a framework for comprehensive habitat conservation planning. It will include a network of wildlife corridors.

Florida Fills Some Gaps

Florida is considering doing a formal gap analysis and has already taken steps to enhance wildlife movement. Thirty-three underpasses are being built under a 150-mile extension of a major interstate route across the Everglades to allow Florida panthers and other wide-ranging species to pass. The Osceola National Forest has been linked with Okefenokee National Wildlife Refuge by a $7 million federal acquisition of connecting lands, thus providing nearly a million acres of protected area. According to Defenders of Wildlife, this combined area is now large enough "to provide the potential for reintroduction of captive-bred Florida panthers, whooping cranes, and red wolves as well as. . . to maintain viable populations of numerous other endangered species. . . "

Opportunities for more landscape linkages abound in or near Florida. The 171,000-acre Conecuh National Forest and the contiguous 183,000-acre Black Water River State Forest lie five miles to the north of Eglin Air Force Base, which includes open space with high habitat value. The connecting privately owned lands are rural and forested. If they were acquired and protected, an 817,000-acre preserve could be created—large enough for a viable population of the endangered Red cockaded woodpecker and other threatened wildlife.

San Joaquin antelope ground squirrel

The Loxahatchee National Wildlife Refuge and the Corbett Wildlife Management Area could also be connected by protecting five square miles of private lands to assure viable populations of Florida panther and black bear. If these lands are not connected, these animals are probably doomed because of intense development pressures in this area.

In some cases, small linkages can provide enormous benefits. A 2 percent addition to the total assemblage of lands already acquired by various government agencies to protect the Wekiva River in northern Florida and adjacent areas would assure the protection of the entire river system.

California Takes Steps

In California, no comprehensive plan to connect habitat areas exists. The state's population of 30 million—already 10 percent of the nation's and relentlessly growing—puts open space under ever greater development pressures. If we are to preserve what is left of our natural heritage, we must act right away or lose our opportunity to do so. A gap analysis is a good start.

"This is a more proactive approach," Davis said. "We have tended to focus our resources on the rare and endangered. Now we are seeing the need to protect species before they are rare and endangered."

Another hopeful initiative is a bill introduced by Sen. Don McCorquodale of District 12 (Stanislaus County and parts of Santa Clara County) to set up a task force of government and private sector representatives to "identify existing and long-range opportunities to conserve and enhance the state's wildlife habitat. . . and recommend policies and actions to achieve the long-range goal of conserving biological diversity." Implied in this legislation is the need for comprehensive planning to establish wildlife corridors.

The concept is beginning to find its way into the planning schemes of various resource agencies and nonprofit organizations. The Wildlife Conservation Board has purchased land for the purpose of providing increased opportunities for deer to move from their summer to their winter range. Both the Wildlife Conservation Board and the State Coastal Conservancy have been active in acquiring and restoring wetlands that provide food and shelter for migratory birds along the Pacific Flyway.

The National Park Service, U.S. Forest Service, and California Department of Fish

The San Dieguito Watershed

The San Dieguito River watershed is long and narrow, extending 350 square miles from the Volcan Mountains to the Pacific Coast at Del Mar in San Diego County. Its major river, 43 miles long, is channeled under numerous roads and is dry much of the year, its flow held back behind two major dams. Nevertheless, the river corridor provides valuable wildlife habitat. It links inland wildlife areas and serves as a resting point on the Pacific Flyway.

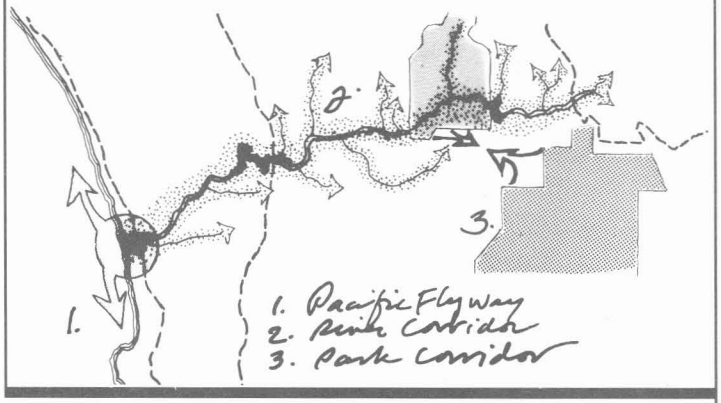
The stream that flows into the sea as the San Dieguito River begins at Ironside Spring in the arid mountains as Santa Ysabel Creek. It winds through Santa Ysabel Valley and past Witch-creek Mountain, is captured behind a dam in Lake Southerland, travels through Pamo and Pasqual valleys, passes San Diego Wild Animal Park and is captured again at Lake Hodges. Released below the last dam on this man-made lake, it emerges renamed as the San Dieguito River and continues through an increasingly developed watershed to the coast.

All along the way, canyons open into the river corridor, creating a network of travel routes for the small canyon and valley populations of Least Bell's vireo, the San Diego horned lizard, Orange throated whiptail, and other animals. This habitat network is essential to the survival of threatened and endangered species, and to keeping other species off the list. If its strands are broken by development, as they have been in other watersheds, wildlife populations will weaken, and some populations of endangered species might vanish.

Last year, hope for protecting the river rose when five cities and the county formed a joint powers authority to plan a river-long park, acquire property, and maintain it to serve the recreational needs of the area's growing human population. If the canyons of tributary streams are protected as part of that park, wildlife will also be served. Animals will also continue to move between the river and the upstream Cleveland National Forest, across land that is now protected under city, county, and state ownership.

The San Dieguito's estuary is an important link on the Pacific Flyway. A century ago the San Dieguito Lagoon was the largest coastal lagoon in the county, its channels and marshes encompassing perhaps 1,000 acres. More than half the lagoon and marsh complex has been destroyed since then by filling, transportation and development projects. Since 1978, however, the State Coastal Conservancy has been working with the cities of Del Mar and San Diego and with other agencies and nonprofit organizations to restore tidal flow in the undeveloped portion of the lagoon ecosystem, including the channels, wetlands, and surrounding uplands. In the early 1980s, the Wildlife Conservation Board acquired about 100 acres, which have been enhanced by the Coastal Conservancy and the Department of Fish and Game.

The San Dieguito River corrridor provides a web of travel routes for threatened and endangered species.



JULIE GOODNIGHT

With upstream, downstream, and canyon mouth linkages to the river corridor, species that otherwise might not survive may continue to play their part in maintaining the natural ecology. Coyotes, for instance, help to keep in check small animal predators, including domestic cats, that can decimate small mammal and bird populations, especially ground nesting birds such as the Least Bell's vireo and the California gnat catcher. Coyotes need to be able to travel, as do other large mammals, including mountain lions, mule deer, bobcats and ringtails. Golden eagles can travel without corridors but they require large areas to forage and a degree of isolation from disturbances. Protecting the San Dieguito River watershed would benefit all these species and many more.

If the joint powers authority succeeds in creating a park along the river and looks out for the needs of nonhuman species as it does so, bikers and joggers will be able to share a strip of territory with life forms they might otherwise only encounter during backpacking excursions to the remote wilderness.

By Melanie Denninger

Tijuana Estuary

The 2,531-acre Tijuana River National Estuarine Reserve protects the largest tidally flushed coastal wetland remaining in southern California. Although it is affected by many perplexing problems, the reserve provides diverse habitat for wildlife, including several endangered or threatened species. The future of the reserve, however, depends largely on what happens upstream.

Three-quarters of the Tijuana River's 1,735-square-mile watershed is in Mexico; the rest is in San Diego County. The headwaters lie in the northernmost mountains of Baja California and remote southeastern regions of San Diego County. The river traverses densely populated eastern Tijuana in a concrete-lined flood control channel, entering the United States just west of the border crossing.

Maps Courtesy of Lowry & Associates

Within the United States, the watershed and the river are mostly in a natural but highly degraded state. The 5,000-acre Lower Tijuana River Valley contains a ragtag mix of rural agriculture, horse corrals, and sand and gravel operations. Illegal fill and dumping have severely restricted the flood plain corridor; urban housing tracts encroach from north and east.

For nearly a decade the Coastal Conservancy has been working with other state and federal agencies and the city and county of San Diego to preserve and enhance the valley's natural values, focusing on the estuary and salt marshes. Shortly after the reserve was formed in 1982, Conservancy and federal funds were allocated for land acquisition to expand the habitat and maintain the integrity of the estuarine ecosystem.

Even as the Reserve boundaries were extended in the mid-1980s, however, troubling changes became evident. The river mouth closed with increasing regularity, eliminating tidal action and threatening fragile estuarine ecology. Channels filled with sediment. Just upstream, riparian habitats were diminished. Escalating sewage contamination and damaging trespass showed a clear need for communication with Mexico.

In 1986, the Conservancy undertook an intensively researched restoration plan and an accompanying environmental assessment. Once the environmental review is completed later this year, work on an extensive restoration project is expected to begin. Meanwhile, significant links with upstream areas are evolving. The San Diego County Parks Department has begun to acquire additional lands in the valley. While the county's long-range goals include developed recreational uses, plans also include generous restoration and extension of the valley's riparian habitat corridor. Habitat development work in the valley could benefit numerous species, most notably the endangered Least Bell's vireo.

The often spicy international dialogue concerning regional issues has begun to show progress. A recent U.S.-Mexican agreement will result in development of a sewage treatment plant to treat the chronic sewage flows now plaguing the valley. Cross border communication between environmental interests in California and Baja California on a range of issues gives rise to new promise.

The arduous work of restoring environmental quality to the Tijuana River Valley is underway, despite the formidable obstacles that impede the recovery of what has been lost. While full restoration is just a step beyond the nether land of dreams, the process has begun, the dream has been articulated in plans, and a large number of people in numerous organizations are working toward a common vision. Some say the notion of a viable and productive wildlife corridor linking the Mexican highlands with the sea is sheer lunacy; others say visions like this are just the thing that gets them through the next backup on the freeway, and beyond the monotony and disillusionment of our times.

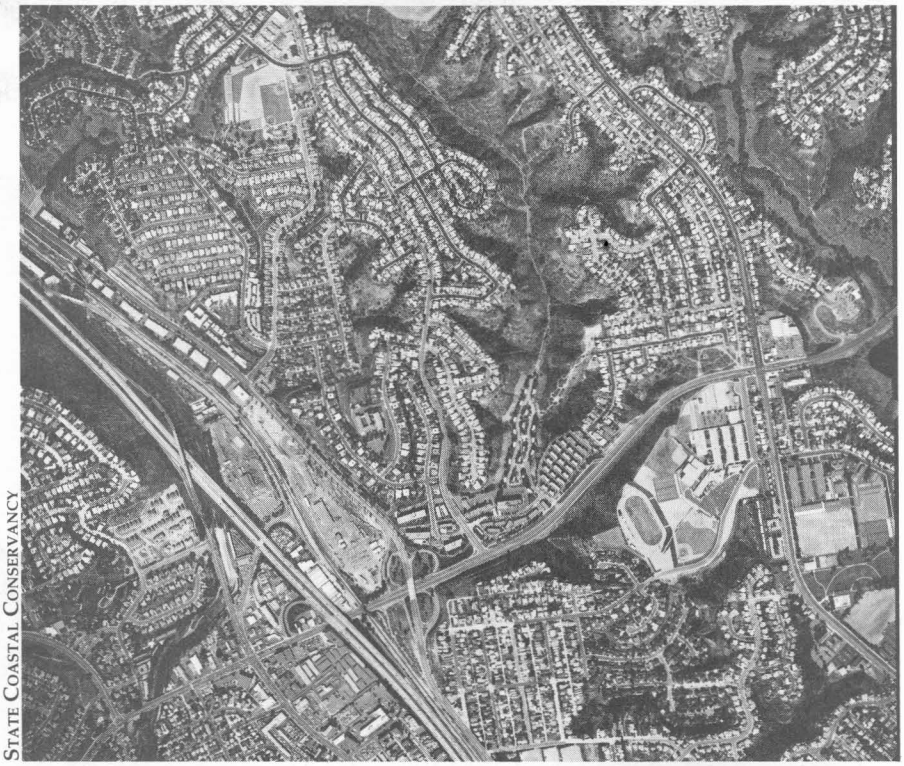
By Jim King

and Game are working together to reestablish a population of Sierra-Nevada Bighorn sheep in national forest lands adjacent to Yosemite National Park. As part of that project, the animals' movement patterns are being studied and used as guides to management to help avoid the consequences of an earlier effort in northeastern California: the Bighorns contracted a disease from nearby domestic sheep and died within the first week.

In projects to restore coastal wetlands, the Coastal Conservancy seeks to enhance movement opportunities for fish and wildlife through stream and riparian corridors. This agency increasingly considers entire watersheds and their relationship to downstream resources, such as coastal estuaries and other wetlands. [See boxes pp. 13-18.] In other projects, the Coastal Conservancy is working with others to connect coastal dune areas to preserve the diverse array of plant and animal species found in this type of habitat. (Wildlife corridors serve for plants as well as animals. Fruiting plants depend on animal consumption and movement to disburse their seeds. Many plant species depend on insects and birds to disperse pollen and prevent inbreeding.)

The Coastal Conservancy is also participating actively in efforts to link up agricultural, open space and habitat lands along the San Mateo County coast through its acquisition of interests in a total of more than 2,100 acres of ranch lands. These efforts have been promoted by several private nonprofit organizations and public agencies to link up the coastal trails and beaches with coastal terrace and mountain parks and preserves.

The Santa Monica Mountains Conservancy and the Tahoe Conservancy have acquired lands to enhance wildlife movement. The Nature Conservancy is attempting to link scattered habitats in the San Joaquin Valley with the 300-square-mile area it and the Bureau of Land Management are buying in the Carrizo Plain to protect various species, including the endangered San Joaquin kit fox, the Antelope ground squirrel, the Blunt-nosed leopard lizard, and Giant kangaroo rat. The scattered habitats in and of themselves are not especially valuable in the long term for these species, according to

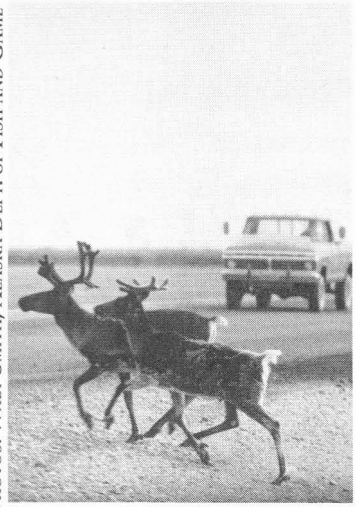


State Coastal Conservancy

State Coastal Conservancy

Top: San Diego County, near Clairemont. Canyon-mesa habitat that provided habitat for songbirds, coyotes, and other wildlife now isolated by development. Bottom: Diminished riparian corridor of Oso Flaco Creek, Santa Maria Valley, east of Nipomo Dunes.

Whose right of way?



PHOTOS: WALT SMITH, ALASKA DEPT. OF FISH AND GAME

The Alaska Department of Fish and Game is studying the long-term effects on the caribou population of roads, the Alaska pipeline, and other man-made barriers that caribou encounter in their annual migration. Pregnant caribou and calves are much more sensitive to these disturbances than bulls. This year Congress will consider two bills that would permit oil extraction from the 19-million-acre Arctic National Wildlife Refuge. About 80,000 caribou give birth there annually.

The Nature Conservancy's Ken Wiley. Linked, however, they can function as corridors to the core habitat, the Carrizo Plain. Several government agencies and private groups have formed a consortium to advance this goal.

The Nature Conservancy is also expanding its Consumnes River Preserve to link important habitat areas. It hopes to encourage the creation of a "conservation corridor" that connects the Sacramento/San Joaquin River Delta, of which the Consumnes River is a part, to the Sierra Nevada region, "insuring the preservation of a complete representation of the original Delta, Central Valley and mountain landscapes," the organization's Summer 1990 newsletter reports.

Wildlife corridors can also be incorporated into timber practices. Larry Harris, author of *Fragmented Forests* and an expert in this field, recommends an "island archipelago" approach for the harvest of Douglas fir: leaving a series of interconnected forest preserves, sufficient in size, distribution, and number to assure viable populations of wildlife.

In the future, it will likely be increasingly difficult to justify construction of a road or other obstacle through prime habitat within parks and preserves without at least providing some animal crossings.

A Funding Priority

Wildlife corridors are also emerging as a funding priority. Proposition 70, the California Wildlife, Coastal and Parkland Conservation Act of 1988, designated $6 million to the Wildlife Conservation Board for acquisition, enhancement, restoration, and/or protection of critical habitat areas, specifically including "significant routes of migration for wildlife." Proposition 117, the so-called Mountain Lion Initiative approved by voters last June, places a funding priority on projects that will serve as "corridors linking otherwise separated habitat so that the genetic integrity of wildlife populations will be maintained." The Planning and Conservation League, which is responsible for promoting these funding initiatives, is preparing a report on what California's conservation priorities in the 21st century should be. The report will call attention to the need for wildlife corridors.

Some would argue that it is too late for all this in light of human population growth and the increased demands it places on natural resources. The demands are real enough, but choices can still be made that will respond to them and, at the same time, preserve our flora and fauna.

Human development can be designed to allow for wildlife movement. If considered in the planning stage, these allowances can often be simple and inexpensive. A streamside forest could be left intact. A coastal canyon could remain undisturbed. An under crossing could be built beneath a road. New or existing parks and preserves could be linked, sometimes by adding only a small amount of land. It is important to note that the design of preserves and connecting corridors must consider the needs of the particular species that would use them to avoid potential problems. They should be sufficient in size and include a diversity of habitat types (such as a mix of upland and wetland areas) to preserve viable populations.

If we can view the needs of wildlife as not too dissimilar from our own, the decisions that lead to wildlife protection become easier to make. The human ability to move from place to place is guaranteed by a network of roads, walks, trails, bridges, tracks, waterways, and other conveyances. Without these movement corridors we would find it difficult to get to work, go to the store, visit friends. Wildlife corridors serve the same function. Both allow living beings to move about, gather food, find shelter, intermix—to live. ❐

FOR FURTHER READING

Adams, L.W., and LE. Dove. 1989. *Wildlife reserves and corridors in the urban environment, a guide to ecological landscape planning and resource conservation.* Columbia: National Institute for Urban Wildlife.

Chadwick, D. 1990. The biodiversity challenge. *Defenders* (May/June): 19-30.

Harris, L. 1984. *The fragmented forest: Island biogeography theory and the preservation of biotic diversity.* Chicago: University of Chicago Press.

Mackintosh, G., ed. 1989. *Preserving communities and corridors.* Washington: Defenders of Wildlife.

Newmark, W.D. 1987. A land-bridge perspective on mammalian extinctions in western North American parks. *Nature* 325: 430-432.

Quammen, D. 1988. The Newmark warning. *Outside* (May): 31.

Soule, M., D. Boulger, A. Alberts, R. Sauvajot, J. Wright, M. Sorice, and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. *Conservation Biology* 2: 75-92.

Suchy, W. and L. Harris. 1988. "Landscape Linkages." A video produced by Florida Films, Gainesville, Florida.

Carol Arnold is a project manager in the Coastal Conservancy's resource enhancement program. She oversees the Nipomo Dunes Enhancement project, a continuing Conservancy effort to link significant dune habitat. She also manages the Morro Bay Watershed Enhancement project to improve habitat in Morro Bay's watershed and wetlands.

Canine Access

and the One Percent Syndrome

by Rasa Gustaitis

DAVID MILLER

A dog runs along the shore, chasing a stick tossed into the surf, racing after shorebirds it can never catch. The sight of it makes many people smile, for it goes with the sense of freedom they feel on the edge of the ocean. Other people, however, look at the same dog and see a mess in the sand, disturbed wildlife, even a reason to be afraid.

Where to permit dogs and under what conditions is a divisive and difficult question for those charged with managing parks, protecting natural areas, and providing public access to the coast. "It is not an issue that lends itself to being reasonable," said Ranger Jay Eickenhorst at Stinson Beach in the Golden Gate National Recreation Area. "You can polarize a community on how to deal with dogs more easily than on anything, including civil liberties and children."

Almost everyone agrees that no pets or domestic animals should be allowed in wildlife sanctuaries and nature preserves. Beyond that, however, consensus breaks down. "I've been accosted, licked, almost knocked over, and completely soaked by dogs running loose on the beach. I hate it. Dogs on the coast are a pain," says a former dog owner. "On the other hand, I have a friend who calls dogs over to him and plays with them."

Some people contend that dogs have no place in any public beach or natural area, some would tolerate restricted access, and some would accept well-behaved dogs accompanied by responsible owners almost anywhere. Rules vary from county to county, park to park, and even from hour to hour in some cases. They range from complete canine exclusion to complete acceptance, with many variations in between.

No matter what the rules are, however, many perfectly conventional and otherwise law-abiding citizens tend to turn into scofflaws when they arrive at a beach with their dogs. They simply cannot resist letting their animals run. Dogs that heel obediently on the sidewalk get a gleam in their eyes, start panting, put back their ears, lob out their tongues, and strain on leashes with all that open space around them. It seems cruel to defy nature, with the wild wind blowing in from the sea.

In Imperial Beach, an elderly man who lives alone with an old dog last year stopped at a neighbor's to borrow a spray can of red paint. He returned it a half hour later. The next morning the neighbor saw that the sign listing beach prohibitions ("No motor vehicles, no fires, no nude bathing, no dogs") had been altered. "No dogs" was covered by a red streak of paint.

In the face of such anarchistic attitudes, as well as other problems, the State Department of Parks and Recreation has adopted a severe policy. It prohibits dogs in almost all state parks except in campgrounds, picnic areas, and on some roads, and in these areas requires that they be leashed.

The National Park Service is more flexible, excluding dogs from sensitive resource areas, allowing them under voice control in some other places, especially within the GGNRA, the nation's first urban national park. At the Marin Headlands, a dog trail map is available, and one ranger even sets out a water bowl at the visitor center door.

Interviews with rangers, park managers and others along the coast indicate that the trend is toward excluding dogs, in large part because exclusion is easier to enforce than restricted access. Reasons given include: dogs harass wildlife and disturb it by their mere presence by leaving a scent; they make a mess; they frighten and sometimes bite people; they can get lost or injured, and—perhaps most importantly—many dog owners refuse to cooperate with dog rules. With both human and canine populations increasing, sheer numbers are also a factor. "When you reach a certain density, the dog becomes a *canina nongrata*," said Eickenhorst.

Excluding dogs also tends to exclude people who will not go to parks without their dogs, either because they know their pet needs the outing more than they do, or because they fear going to remote places alone. The dog may be no protection at all, but a lot of people think it is.

In response to arguments for dog exclusion, dog owners and their supporters contend that dogs do far less damage to parks than people do. They don't leave plastic litter, nor do they rip up the soil with mountain bikes, nor do they make fires, breaking branches to burn them. They do not chase birds with near the effectiveness of cats, which are a menace in many wetland reserves near residen-

tial areas, nor do they particularly cause erosion, as horses do on some trails.

Emotions are fierce on both sides of the issue. For park managers, alienating dog owners means diminishing the constituency for public parks. Dog regulations are therefore a perennial headache for them.

Canina Nongrata

Judging from responses to our request for comment on dog policies, most park rangers favor excluding dogs. "Coastal parks and open space are coming under more and more human pressure as the lands surrounding them develop. The wildlife is forced to live in a shrinking world," said Ranger Randy Hogue, Mount Tamalpais State Park. "It's harder to survive in a smaller space. Man brings his domestic animals into their last refuge and life gets even harder.

"Last year was a typical year. I saw two dogs run down, ham-string, and gut a doe. I don't know how long it took the doe to die; it was quite a while though. A deer was chased by dogs into the surf at Stinson Beach and drowned. Another was chased into the surf that day and was able to survive in the water long enough for the dogs to leave. A third deer chased by dogs at the Steep Ravine Environmental Campground also drowned trying to escape. Last year, while I was out jogging, two dogs chasing a deer came blasting up an embankment at me with blood lust in their eyes. I had to defend myself with rocks." Ranger Hogue sent a photograph of a dead deer, hamstrung and part of the hind quarter eaten. "Ironically, just this past week I found the 'no dogs allowed' sign vandalized on the Redwood Creek trail," he wrote, and "a short distance down the trail, the fresh remains of a fawn killed by dogs, with the all too familiar dog kill trademark, illustrated in the photo."

Such killings are usually the work of dogs running in packs or at least in twos. Some are feral dogs, but many are roaming pets, away from home or campsite. "Pets that get together, people have very little idea what they do," said Ranger Eickenhorst. A domestic, properly trained house dog will often go back to his predator instincts if given a chance. Many if not most dogs, off leash, will chase rabbits, ground squirrels, quail, snakes, deer, and birds. Though most may not catch anything, being as out of shape as many of their owners, they disturb resident animals.

"You watch a big dog come along and the shorebirds take off," says Rod Parsons, chief ranger, Gaviota District of the State Parks and Recreation Department. "Our cycle is day and night, but for the birds, when it's low tide, it's dinner time. If they can't feed then, they miss it. You watch people on the shore—even joggers running along the surf line—and the shorebirds will just kind of ripple away and continue feeding. But a dog drives them off.

"We have harbor seals, juvenile elephant seals, and other marine mammals. Dogs chase them and interfere with natural processes. A dog is a predator. And on trails, where you have wolves, possums, grey foxes, just the scent of a predator is intrusive." It may keep more timid wildlife from inhabiting areas that normally provide living space for them.

As far as dogs disturbing people, "things always boil down to the one percent syndrome—abuse by one percent results in restrictions of the freedoms of the rest of us, the ninety-nine percent," says Ranger Eickenhorst. "In my experience, most people who takes dogs out to recreate with them are responsible. But there are those few. . ."

Rangers speak of dogs knocking down children, spraying sunbathers with sand, and especially about dog messes that all too few owners pick up. Dog bites are rather rare, but they do occur. "Dogs in an alien environment tend to become aggressive and unsure," explains Paul M. Koenig, director of environmental management for the San Mateo County Parks and Recreation Division. "This leads to fights with other dogs, perhaps resulting in injury to both dogs and human visitors."

"We have a million visitors a year to our nine miles of beach, and we have 250 campsites. Last year we had four dog bites, and of these, two required stitches," said Parsons. "I just got our first bite of the year. It was a small lap dog. A nine-year-old boy was playing with a Frisbee in a campground. It landed between two campsites, in the bushes. He ran to retrieve it, and this small dog, which was not on a leash, ran over and bit him. It left a bruise and made a mark."

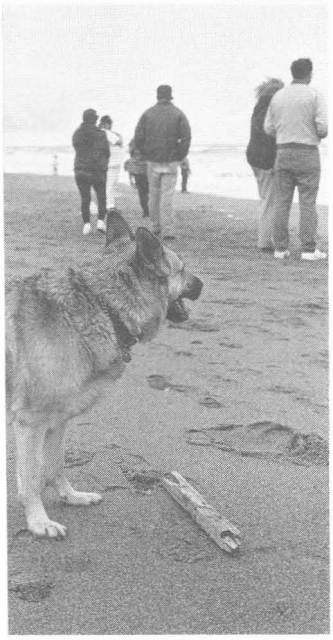
CAROL ARNOLD

Dog's Own Good

Some rangers also argue that dogs should be kept out of parks for their own benefit, because they could get kicked by a deer they are chasing, attacked by a disturbed raccoon, bitten by ticks, or afflicted by foxtails. If they run off and wander into a sheep or cow pasture, they

can legally be shot. In addition, rangers have come upon more people than they care to remember who have inadvertently abused their dogs by not knowing how to take care of them in parks.

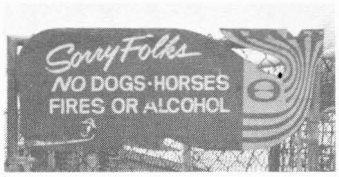
"The dog is a sprinting animal, not a long distance runner, and running a long distance can be hard on the feet," says Ranger Hogue. "I've seen some dogs almost die. One dog we had to impound. The man was on a bicycle and his dog was leaving bloody footprints. And this past weekend, some people had a dog loose on a trail. It was very hot. The dog—a fairly young dog—was really hurting and panting violently. It's lucky I had a canteen with me. And then there are the people who come to the park, see the 'no dogs' sign and leave their dog in the car on a hot day, without water, in the sun."


USHA MOSS

Bad Dog People

On the whole it appears that the rangers' worst dog problems are not caused by dogs but by dog owners, who "in general tend to be very defensive and take things personally when asked to comply with dog regulations," wrote Ranger Richard Wendt of Prairie Creek Redwoods State Park. He recalled one dog owner, on Big Sur, who "was warned to keep his dog on a leash by three different people, given a ticket by me after three warnings. His dog was off leash again and bit a small child that evening. All this happened in the same day. While the dog owner was refusing to identify himself to me, his wife was throwing pots and pans all over the campsite and yelling to me, 'You spoiled our vacation!'"

That owner was certainly of the "one percent." Most unpleasantness is of a more ordinary kind: refusals to obey leash laws or to keep dogs out of no dog areas. "You ask that they put the dog on leash and they usually do it. But you look in the rear view mirror as you drive away and they're taking it off," one ranger said. "I love dogs. It's the owners that drive me crazy."



Compromise Possible?

Dog rules in various jurisdictions seem to be based on diverse experience and politics rather than on research. Nobody interviewed had any systematic data to offer in support of their position on the dog issue, only anecdotal reports and opinion, often presented as fact.

The GGNRA seems to have the most notably tolerant attitude. "Since it's an urban area, we've made some allowances," explained naturalist/interpreter Don Scott. At Fort Funston, parts of Ocean Beach, and Baker Beach in San Francisco, dogs are allowed under voice control, which means that a dog has to respond when called. Though most dogs don't seem to do that, "I don't know of anyone who cites for it," said Ranger Bob Burgoon, who personally finds dog behavior "a pain in the *gluteus maximus*." Biting is not much of an issue. Hundreds of dogs are often out on the beach, peacefully. The "pain" is mostly a matter of owner carelessness. People allow dogs to dig up vegetation and almost never pick up droppings, Burgoon said.

In some other areas, dogs may visit some beaches but are strictly excluded from others. In San Diego, leashed dogs are welcome on city beaches before 9 A.M. and after 6 P.M., and may run free at Fiesta Island and "Dog Beach," the north end of Ocean Beach, at all times.

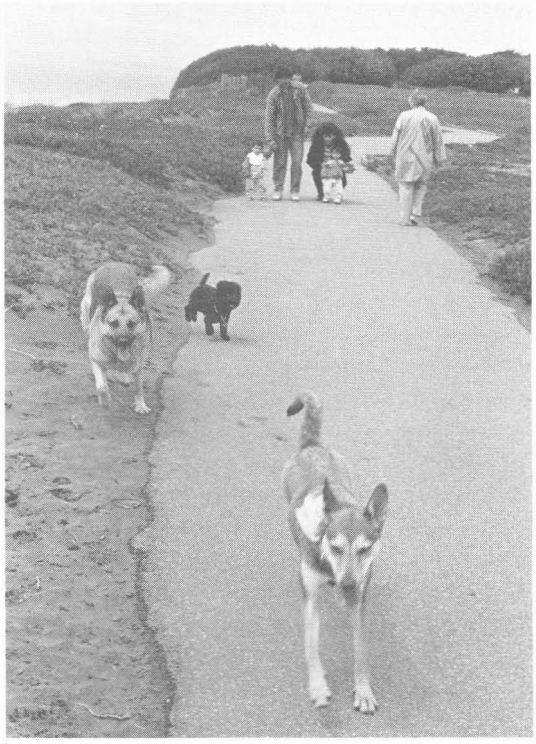
No matter what the rules are, someone complains. "We used to have 'no dogs allowed' and we had lots of complaints from senior citizens who couldn't get out to designated areas, so we allowed the dogs back and a lot of people give our staff guff," said Richard Marling, landscape resources superintendent for the city of San Mateo. "It's the normal citizen reaction. When we disallowed them in parks, people would still bring them." The solution? "Education and appreciation," said Marling. "We do the best we can."

"Peer pressure would be marvelous," said Eickenhorst. "If responsible owners would not just walk by irresponsible owners but would speak to them. I do it, not just in uniform but also out, and I get very few negative responses. Maybe it's the way I approach them, very nonconfrontationally. I used to be for dogs on the beach but I changed," he said. "It's because of the irresponsible few that everyone is penalized."

As restrictions tighten, some fresh ideas for solutions are emerging. One would establish annual park permits. Applicants would take a written test, similar to the driver's licence test, to show they know essential do's and don'ts. The permit price would be pegged to costs incurred by the parks.

Dog owners could organize to help maintain order and cleanliness in parks

Continued on page 52.


USHA MOSS

Pull out here and fold down

Del Norte County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks and beaches	•										
Pelican State Beach					•			•			
Crescent City parks and beaches				•							
Redwood National Park						•				•	
Crescent Beach	•										
Enderts Beach	•										
Del Norte Coast Redwoods State P.					•	•				•	

Humboldt County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks and beaches			•								Must be leashed in campgrounds
Redwood National Park								•	•		Allowed in motor campgrounds and on roadways
Prairie Creek Redwoods State P.						•				•	Leashed in wave slope area on beach; forbidden on dunes
Dry Lagoon State Park							•		•	•	
Patrick's Point State Park						•			•	•	
Trinidad State Beach							•		•	•	
Little River State Beach							•		•	•	
King Range Ntl. ConservationArea				•							Must be leashed in campgrounds

Mendocino County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks and beaches	•										
Sinkyone Wilderness State Park		•									
MacKerricher State Park					•	•				•	
Jug Handle State Reserve		•									
Caspar Headlands State Beach					•						
Russian Gulch State Park					•	•				•	
Van Damme State Park					•	•				•	
Elk State Beach					•					•	
Manchester State Beach					•	•				•	

Sonoma County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
State parks, Russian River Dist					•	•				•	Forbidden on hiking trails, environmental camps, Reef Campground
Sonoma County Beaches	•										
Gualala Point Regioal Park	•										
Sea Ranch P. A. Trails/Beaches	•										
Salt Point State Park	•										
Stillwater Cove Park	•										
Fort Ross State Park		•									
North Jenner Beaches	•										Refers to state-owned, small beaches, mostly without official names
Sonoma Coast State Beaches					•	•				•	Goat Rock, Wright, Duncans Landing, Gleasons, Salmon Creek, Bodega
											Head, Bodega Dunes, and several smaller beaches
Westside & Doran County Parks	•										

Marin County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks and beaches											*See footnote
Point Reyes Ntl. Seashore:											Forbidden at Abbotts Lagoon
Kehoe, South, and North beaches	•										
Palomarin Beach	•										
Limantour (south section only)	•										
Tomales Bay State Park									•	•	
Stinson Beach		•									
Mount Tamalpais State Park										•	Allowed only at Pantoll Campground on leash
GGNRA											Allowed on leash/voice: Rodeo Beach & several trails in headlands
Muir Woods		•									
City of San Rafael	•										Allowed leashed in parks
City of Mill Valley											Forbidden except at Bayfront Park, on Richardson Bay, on leash
City Tiburon											Tiburon has no city operated parks or beaches
											*Forbidden except at McInnis Park in San Rafael. Forbidden at McNears
											Beach, Paradise Beach, and Stafford Lake parks. On leash at Civic
											Center Lagoon Park and Deer Park. Under owner's control at all other
											facilities.

San Francisco County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
Fort Funston			•								Map of city's off-leash areas available at Recreation & Parks, 666-7201
Lands End			•								
West Fort Miley			•								
East Fort Miley			•								
Baker Beach (north end)			•								
Ocean Beach			•								On crowded days owners may be asked to leash dogs
Golden Gate Promenade			•								Must be leashed in parking and picnic areas
Crissy Field			•								Must be leashed in parking and picnic areas
Sutro Heights	•										
Fort Mason	•										
Aquatic Park											Not permitted on beach, allowed in other areas on leash
Victorian Park											Not permitted on beach, allowed in other areas on leash
Fort Point		•									
Phelan Beach		•									
Alcatraz		•									

East Bay Counties

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
East Bay Regional Parks											*See footnote
Point Isabel Dog Park			•								Owners are strongly urged to pick up poop
Point Pinole	•										
Crown Beach									•		Dogs forbidden on beach, wetlands and marshlands
Hayward Shoreline	•										(San Leandro Bay) on leash in park
City of Vallejo	•										Leashed in all parks, but forbidden at Blue Rock Springs Park
City of Martinez		•									
City of Pinole		•									
Benicia State Park	•										
City of Richmond	•										
City of Berkeley	•										Forbidden on beach at Shorebird Park and on Berkeley Pier
Oholone Park			•								This park has on off-leash dog run
City of Oakland		•									
City of Alameda											Leashed in parks, but forbidden from the beach
City of San Leandro	•										Off-leash area on Shoreline Trail, between fence and water
City of Newark	•										
City of Fremont	•										
City of San Jose											Rules vary from park to park

San Mateo County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks		•									
Daly City		•									
City of San Mateo	•										Owners must clean up after dog or face fines of $100 and up
Redwood City		•									
City of Mountain View	•										Forbidden in Shoreline Park
City of Palo Alto	•										Fined $100-$150 for unleashing in preserves (Baylands Natural Preserve)
Gray Whale Cove State Beach		•									
Montara State Beach	•										
Half Moon Bay State Beach											Leashed on Dunes & Venice beaches and campsite only of Francis Beach
San Gregorio State Beach	•										
Pomponio State Beach	•										
Pescadero State Beach	•										
Bean Hollow State Beach	•										
Gazos Creek State Beach	•										
Año Nuevo State Reserve		•									

Santa Cruz County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks	•										There are no beaches run by the county
City of Santa Cruz:											
Harvey West, DeLaveaga	•										
& several smaller city parks	•										Forbidden from San Lorenzo, West Lake, and Neary Lagoon
Natural Bridges State Beach		•									
Lighthouse Field State Beach		•									
14th Ave. Beach	•										
New Brighton State Beach		•									
Seacliff State Beach		•									
Rio Del Mar Beach											Allowed on leash south of Aptos Creek
Manresa State Beach	•										
Sunset State Beach		•									
Palm Beach	•										

Monterey County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks	•										Up to 2 leashed dogs per visitor; there are no county beaches
Zmudowski State Beach	•										In designated areas
Moss Landing State Beach	•										In designated areas
Salinas River State Beach	•										In designated areas
Marina State Beach	•										In designated areas
Monterey State Beach	•										In designated areas
City of Monterey					•						Leashed at recreation, community centers; forbidden at some parks
Asilomar State Beach	•										
City of Carmel											Forbidden except under voice at Mission Trail, Forest Hill, city beach
Carmel River State Beach	•										
Point Lobos State Reserve		•									Forbidden even in car
Andrew Molera State Park	•										
Pfeiffer Beach	•										
Pfeiffer Big Sur State Park						•				•	
Julia Pfeiffer Burns State Park										•	Forbidden in environmental campgrounds; leash in 200-yd paved area

San Luis Obispo Cty.

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks and beaches	•										Forbidden at Cayucos beach
William R. Hearst State Beach					•	•					
San Simeon State Beach					•	•					
Morro Strand State Beach					•	•					
Morro Bay State Park					•	•					
Montana de Oro State Park											Allowed only at Spooner's Cove Beach, leashed; strict enforcement
Pismo State Beach					•						
Pismo Dunes Preserve	•										

Santa Barbara County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks and beaches	•										
Gaviota State Park								•			
Refugio State Beach								•			
El Capitan State Beach								•			
UC, Santa Barbara campus	•										
City of Santa Barbara											Leashed in parks, forbidden on all beaches except Lighthouse Arroyo
Carpinteria State Beach						•		•			
City of Carpinteria beaches								•			Permitted on beach west of Ash St. and beach east of the state park

Ventura County

County parks and beaches											Leashed in overnight beach campgrounds; forbidden in day use areas
Emma Wood State Beach						•		•	•		$1 fee for dog to enter park
City of Ventura	•										Allowed leashed in city parks & city beach at Marina Park
San Buenaventura State Park								•	•		Allowed leashed in picnic areas; $1 fee for dog
McGrath State Beach						•		•	•		$1 fee for dogs
City of Oxnard parks and beaches	•										
Point Mugu State Park											Leashed: North Beach of Leo Carillo State Beach, La Jolla State Beach,
											and Sycamore Canyon campground

Los Angeles County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County beaches		•									Permitted leashed on bordering sidewalks & Venice Boardwalk
County parks	•										
State parks	•										
State beaches		•									
City of Santa Monica		•									No dogs in parks or beaches
City of Los Angeles											Leashed in parks; off-leash before 9am & after 4pm Laurel Canyon Park
Santa Monica Mountains Ntl. Rec.	•										
Catalina Island											Forbidden only in campgrounds, beaches & Crescent Ave. in Avalon,
											allowed leashed everywhere else

Orange County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County beaches		•									
County parks	•										
City of Seal Beach								•			
Bolsa Chica State Beach								•			Permitted leashed on bike path
Huntington City Beach											Leashed between Goldenwest St. & Bolsa Chica S.B.; forbidden elsewhere
Huntington State Beach								•			Allowed on bike path on leash
Santa Ana River County Beach		•									
City of Newport Beach beaches											Leashed before 9 & after 5, Sept. 15-June 15; forbidden in summer
City of Newport Beach parks	•										
Crystal Cove State Park								•			Permitted leashed on bike path; also forbidden at environmental camps
City of Laguna Beach											Leashed on beaches at all times from Sept. 15-June 1 and in summer before 8 A.M. & after 6 P.M.; city provides pooper scoopers for $0.25 each
Aliso Beach County Park		•									
Salt Creek Beach Park		•									
Doheny State Beach					•			•			Also permitted leashed in picnic area
Capistrano Beach		•									
City of San Clemente parks		•									
City of San Clemente beaches		•									
San Clemente State Beach					•			•			

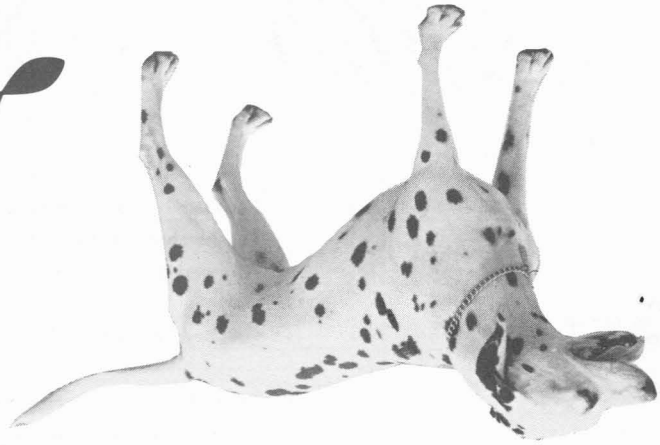
San Diego County

	Allowed on leash	Dogs not allowed	Voice control	No restrictions	Leashed on beach	Leashed in campsite	Leashed on roads	Leashed in pkg. lot	Prohibited on beach	Prohibited on trails	
County parks	•										Forbidden in Agua Caliente Desert; there are no county beaches
San Onofre State Beach					•			•	•		Permitted leashed on Trail 6 & small beach that it leads to
City of Oceanside beaches & parks		•									
City Carlsbad beaches & parks		•									
Carlsbad State Beach								•			
South Carlsbad State Beach					•			•			
Leucadia State Beach		•									
Moonlight State Beach		•									
San Elijo State Beach					•			•			
South Cardiff State Beach	•										
City of Solana Beach											Forbidden in parks, beaches, view points and accesses
Fletcher Cove		•									
Tide Beach Cove		•									
North Seascape Surf Beach Park		•									
Del Mar Shores Beach Park		•									
City of Del Mar											Allowed leashed in parks; for beaches, see footnote 1
Torrey Pines State Beach		•									
Torrey Pines State Reserve		•									
City of San Diego											Park rules vary; for beaches, see footnote 2
City of Coronado											Park rules vary; allowed leashed at north end of city beach
City of Chula Vista parks	•										
Silver Strand State Beach							•				
City of Imperial Beach											See footnote 3
Border Field State Park				•		•			•		Forbidden in bird estuary

1. Leashed in city parks. City beach: north section, off leash Oct. 1 to June 1, leashed summer; main section: leashed Oct. 1 to June 1, forbidden in summer; south section: leashed all year. 2. La Jolla, Mission, Pacific, and Ocean beaches: leashed before 9 A.M. and after 6 P.M. Off leash any time Dog Beach and Fiesta Island. 3. Leashed north of Palm Ave. to city of Coronado border and south of Imperial Beach Blvd. Forbidden between Imperial Beach Blvd. and Palm Ave.

A Dog Owner's Guide

To The California Coast



Compliments of the State Coastal Conservancy

Before taking a dog on a trip, remember:

- Bring vaccinations up to date, test for heartworm, give preventive pills. Make sure good ID tag is well attached.
- Take water for the dog in the car and on a hike, a six-foot leash, a bag to pick up poop.
- A car heats up quickly. Dogs cannot sweat to cool off. It is dangerous to leave dogs alone in cars on warm days.
- A long hike may be too strenuous for your dog. Know his physical condition. Rough terrain, hot pavement can hurt soft paws.
- It's unwise to leave a dog in a campground.
- A dog that wanders into a cow or sheep pasture may legally be shot.
- A dog chasing deer may get lost. He could kill the deer.
- Shorebirds may miss a meal if dogs disturb them.
- Digging in the tidal zone may be all right, but digging up plants is not.
- Your dog may frighten other people, even if you know he would not hurt anyone.
- Check the dog for ticks and foxtails after walks or at day's end.
- Your dog needs daily exercise.

Research by: Kristi Farnham
Jan Jue
Tyronea Marshall

A Greening on the Sundown Coast

by Wesley Marx

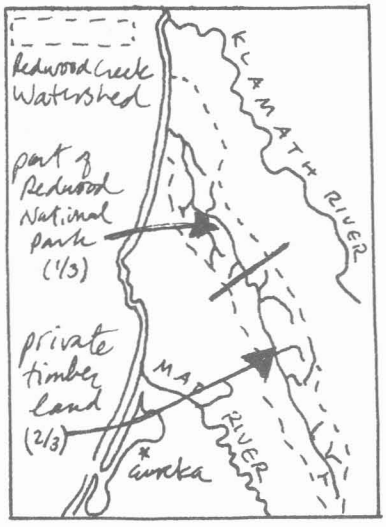
ROBERT BELOUS

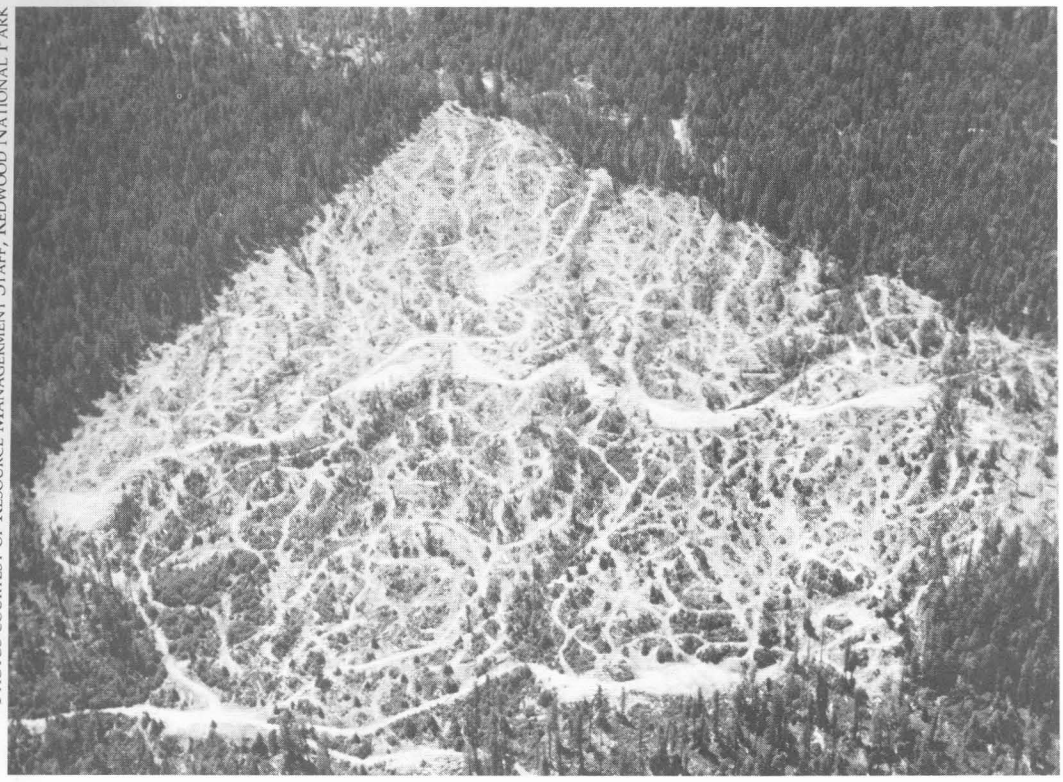
In 1978, the logged hillsides upstream from the world's tallest trees were hard to envision as National Park land. They looked more like ground zero for a Hollywood nuclear epic. Landslides had thundered down, ripping up shrubs that had sprouted after ancient trees had been hauled to sawmills. Gullies caused by roads carried tons of sediment, and Redwood Creek, where king salmon once ran thick enough for farmers to pitchfork, was choked with mud. Yet that year Congress added over 36,000 acres of this collapsing coastal watershed to 58,000-acre Redwood National Park in Humboldt and Del Norte counties.

It was a belated move to protect the world famous Tall Trees Grove, which includes a 600-year-old giant that rises to 367 feet and would shade out a 30-story skyscraper and a football field. A decade earlier, when the park was created, "we tried to warn Congress that to protect the trees you needed to protect the surrounding watershed," recalls Lucille Vinyard of Trinidad, who has worked with the Sierra Club and other groups for the park. The boundaries drawn, however, reflected a political compromise between the lumber industry, conservationists, and budget-conscious federal officials. Only after the slopes had been logged, and the ancient redwoods were in imminent danger from landslides and flooding, was more of the watershed acquired for protection. Congress then gave the National Park Service the environmental equivalent of "Mission: Impossible"—reclaim this devastated land before it destroys the Tall Trees Grove.

The Redwood Creek watershed is modest in size but dramatic in character. The creek is only 55 miles long from its headwaters to the Pacific Ocean, but it drains about 280 square miles of land. Some steep slopes rise as high as 5,000 feet. Some 74 tributary streams tumble down, and in big rainfall years the mild-looking stream turns into a raging torrent.

To many people it was obvious that timber cuts on such a steep watershed would accelerate runoff and erosion. In 1955 and 1964, the Bull Creek portion of Humboldt Redwoods State Park suffered severe damage from timber-induced silt loads and flood debris. As Susan Schrepfer noted in *The Fight to Save the Redwoods: A*





PHOTOS COURTESY OF RESOURCE MANAGEMENT STAFF, REDWOOD NATIONAL PARK

Erosion from logged hillsides threatened to undermine the Tall Trees Grove in Redwood Creek Basin. This 240-acre logged area was part of the 48,000 acres added to the park in the 1978 expansion. Of this acreage, over 75 percent had been logged as clear-cuts at some time, and the rest of the acreage was purchased by the park, tree by tree. The narrow white lines are tractor skid trails used to drag logs off the hill. The wider lines are roads for logging trucks.

History of Environmental Reform, 1917-1978 (University of Wisconsin Press, 1983), "The acquisition of the flats at the base of the privately owned watershed invited disaster."

The timber industry, however, was adamant. It was prepared to forsake control of the Tall Trees Grove, which is on the alluvial flats of a horseshoe bend, but not of the surrounding watershed. With heavy machinery, the steep hillsides could be made to yield their stands of redwood and fir. The state of California, with Ronald Reagan as governor, assured that the mechanized harvests would be carefully regulated, so that the industry would be a good neighbor. President Lyndon Johnson signed a bill creating a park that included the Tall Trees Grove but excluded most of the basin. Later, one isolated redwood grove would be named after Lady Bird Johnson.

During the next decade, families that staked their yearly vacation on a glimpse of the Tall Trees had to run a gauntlet of logging trucks and stump-filled hillsides to get to them. One park overview was named Devastation Point. Going into the redwoods was like going to Disneyland and getting the Texas chain saw massacre instead. Meanwhile, timber harvesting practices in the watershed—some no longer allowed—un-leashed slides and mud flows that intruded into the park. Slugs of silt raised the level of the creek bed five feet.

The elevated creek bed posed a three-fold threat to the Tall Trees Grove, as explained to me by park geologist Mary Ann Madej. Rising groundwater could drown the shallow root system of the redwoods. Bank erosion by the rising creek waters could topple the trees. "Some redwoods up creek of the grove have already been lost because of such erosion," notes Madej. Eventually, flood overflows could deposit damaging sediment in the grove itself. "We knew these cutover acres would have to be restored if the park was to have a decent future," says Vinyard.

In 1978, Congress and President Carter agreed, thanks in part to prodding by Rep. Phillip Burton of San Francisco, by adding 48,000 acres in the watershed, over 36,000 of which had been clear-cut, to the park and appropriating $33 million for reclamation. The upper two-thirds of Redwood Creek basin remained in the control of the timber industry, however. California, then under Gov. Jerry Brown, assured that the timber industry's hillside act would be cleaned up and that National Park officials could review timber harvest plans and inspect harvest sites in the upper basin. It appeared that the redwoods had been saved. . . again.

Mission: Impossible

The scope of the reclamation project before the Park Service was immense. Nothing like it had ever been tried in an area with such unstable geology. The rugged watershed is the crunched up product of two major tectonic plates—the North American Plate and the Pacific Plate—colliding head-on. Redwood Creek winds along the trace of a fault. The park's first

plan of attack was a labor-intensive replanting program. A team of geologists, botanists, and rangers began to hike up the slippery slopes. "At first, a lot of time and labor was expended to replant barren slopes," explains park geologist Dave Steensen. Bundles of willow twigs, called willow wattles, were buried on the bare slopes in hopes they would sprout and green up the hills. But this European technique proved time-consuming and not very effective on the drier slopes. Moreover, winter rains could quickly wash away these good intentions and carve out deeper gullies.

"We began to realize that old logging roads, not the cutover land per se, were major culprits of erosion," says Steensen. Roads dammed or diverted hillside streams, forcing winter flows onto the barren, slide-prone slopes, and creating highly erodible gullies.

The restoration team then shifted to a new tactic. It would stabilize or "put to bed" 300 miles of haul roads and 3,000 miles of tractor trails. At the same time, it would also excavate and restore the original stream beds.

The new plan required heavier tools. "We couldn't do this with just hands and shovels," Steensen explains. The Park hired some of the huge crawler tractors and hydraulic excavators, which were being used to build more logging roads in the upper basin, to put old roads in the park to bed and restore stream beds.

Once a roadbed was "outsloped"—recontoured into the hillside—the plan called for its replanting with grass or trees to resist erosion. However, the restoration team noticed that this might be unnecessary, that it might even be counterproductive: Bald spots along the retired roadbed were being quickly colonized by coyote bush, salal, Douglas fir, redwood, and other members of the surviving forest community. This same community can reseed the barren slopes once the runaway stream flows are returned to their jilted beds. Plant grass and you would only slow the process of natural reseeding, the restorers concluded. Instead, they decided to lay down straw mulch, up to 5,000 pounds per acre, to protect the seedbed from sheet and rill erosion. They also planted thousands of trees.

By 1983, such treatment forestalled erosion of some 6.6 million cubic feet of sediment—enough to fill up a 150-mile-long parade of dump trucks, according to park ranger Robert Belous. Today, about half the old road system has been put to bed and the greening continues. Even from infamous Devastation Point the view is green, ranging from the light bright green of new growth to the darker shades of taller, old and advanced growth, which can reseed the abused lands. Visitors now can believe they are in a National Park and not in a war zone.

A Hopeful Beginning

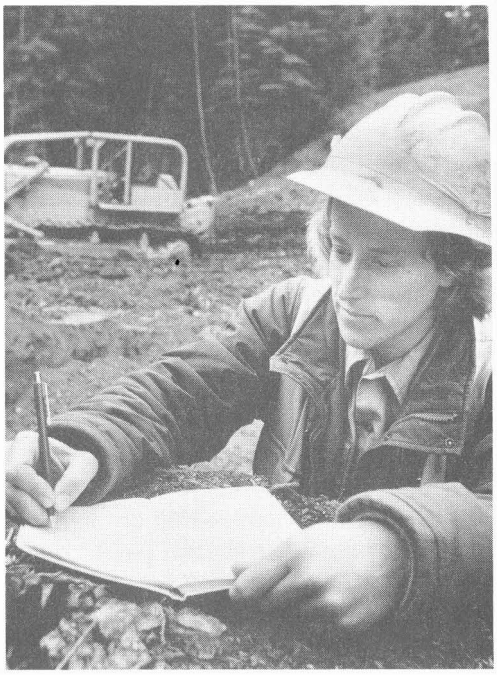
On a recent winter day, Steensen and fellow geologist Darci Short took me to K and K Road, which once was a virtual industrial freeway that opened the ancient forest to harvest. Foot by foot, mile by mile, this roadbed is being rolled up like a carpet, leaving a trail of decaying straw and thrusting green shoots. As the road goes, so goes easy access, whether for loggers, park car caravans, or firefighting units. This is a second-chance forest that is being put on its own again, free to confront lightning fires, slides, and droughts on its own evolutionary terms. When I return, it will be on foot.

As we walked along a creek bed shaded by alders, we could see that another major resource was getting a new lease on life: Remnant runs of salmon and steelhead might soon be reclaiming ancestral spawning grounds. Silt flows within park boundaries have receded, and the waters of Redwood Creek are beginning to clear.

Other reclamation opportunities are being pursued. In summer 1989, Short supervised the removal of an old dam on Lost Man Creek, so salmon can regain more upstream spawning habitat.

Historically, the juvenile salmon have drifted downstream into Redwood Creek estuary where they could feed and gain strength before leaving for the rich pastures of the Pacific Ocean. In the 1960s, flood control dikes were installed, cutting off flows to an arm of the estuary, South Slough, once used by salmon. Ergo, another restoration opportunity. In 1988, "we installed a gated culvert in the dike to restore the flows," says park hydrologist

During the next decade, families that staked their vacation on a glimpse of the Tall Trees had to run a gauntlet of logging trucks and stump-filled hillsides to get to them. One park overview was named Devastation Point.



Recontouring a road to recover topsoil and natural hillslope drainage pattern. In foreground, Redwood National Park geologist Louise Johnson with supervisory geologist Terry Spreiter. At right: Heavy equipment removes soil from a stream valley that had been buried during road construction before the land was made part of the park. In the foreground, Redwood National Park geologist Louise Johnson.

Randy Klein. The flow levels can be controlled to prevent flooding of pasture next to the slough. Today, with South Slough in circulation again, some 117,000 salmon a year that spend summer in the estuary have a much better chance of survival.

Another important aspect of the restoration effort is the battle against invasive weeds that crowd out natives and can harm animals. Botanist Mary Hektner's arsenal in this battle include a flame thrower and a small, gold-colored beetle. "The flame thrower destroys alien weeds that choke off native wildflowers," she says. "The beetle chews up a toxic weed, the tansy ragwort, which can cause liver disease in grazing animals." Neither weapon may suffice, however, for one of California's most invasive aliens: pampas grass. "It is tenacious. We may have to use herbicides," says Hektner.

Like other aspects of restoration, bringing back native plants requires persistence. Some vanquished weeds could return by hitchhiking on straw used to mulch the recovering roadbeds and slopes. "We screen sources of straw to reduce this problem," says Hektner. "With local sources we could wind up with the tansy ragwort again."

Management by Fire

While the Park Service hopes to restore the watershed ecology so it can care for itself, in at least one instance active management appears to be required.

The name of the ridgeline road that overlooks the recovery process—Bald Hills—does not refer to clear-cuts, but to a series of prairies and oak woodlands that crown the upper slopes. Here one can straddle two climate zones, the fog-wreathed zone at lower elevations that provides the fossil redwoods with their last moist holdout on the planet, and the sun-splashed, blue sky zone of grasslands and spring wildflowers rippled by sea breezes. The sunny scene is, in part, a cultural artifact.

"The Native Americans, by periodic burnings, created and maintained these prairies as foraging grounds for deer and elk," says Hektner. "Later, ranchers raised prize-winning sheep here." Without being put to the occasional torch, these prairies could be overtaken and shaded out by the uphill advance of Douglas firs, depriving today's deer and elk herds of food. The Park Service has decided that in this case it would intervene in natural processes and mimic the prescribed burnings practiced by Native Americans.

Lessons in Restoration

Today, the park recovery process attracts national and even global interest. Forestry experts from China, Norway, and Ecuador visit to observe the mechanical

excavators, the golden beetle, and the human healers at work. Closer to home, the return of green slopes and clear water has helped to encourage community-based efforts to restore the Eel, the Mattole, the Noyo, and other battered watersheds along the northern California coast.

Before the advent of industrial logging, the coastal watersheds of Northern California supported more than a half million spawning salmon, according to the California Sea Grant program. Since then, salmon runs have declined by as much as 80 percent, according to the California Advisory Committee on Salmon and Steelhead Trout, a state legislative advisory body. "Hatcheries have never been able to offset the loss of habitat," notes committee consultant William Kier. That is one reason why California, once salmon-rich, must import wild salmon from Alaska and Canada, fish-ranch salmon from Norway and Chile, and smoked salmon from Scotland. Legislators, including Sen. Barry Keene, Assemblyman Dan Hauser, and Rep. Douglas Bosco, have been lobbying for permanent funding sources that would help more coastal watersheds to regain their natural salmon heritage.

In this year's June election, voters approved Prop. 117, the Wildlife Protection Initiative, which will provide $30 million a year to improve and restore wildlife habitat, including salmon and trout watersheds. This investment could pay some handsome dividends. The state Salmon Advisory Committee estimates that a doubling of the current salmon and steelhead stocks could generate 8,000 new jobs and add $150 million a year to business revenues.

Geologic Frankensteins

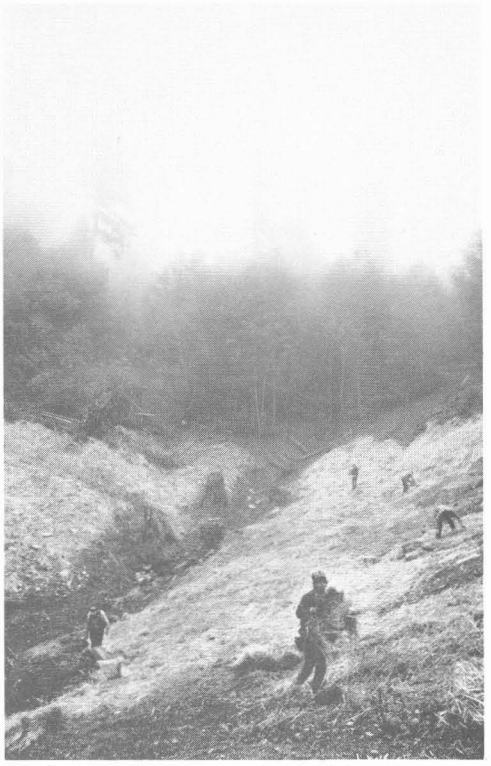
Besides demonstrating the potential for reclamation, the lessons being learned at Redwood Creek could prevent other watersheds from turning into geologic Frankensteins. "More careful siting and maintenance of hillside logging roads could avert future mud slides and more lost salmon runs," says park geologist Danny Hagans. If California required timber companies to keep road culverts open permanently—instead of just a few years—the risk of stream diversions would diminish. If dips were required at stream crossings, streams would continue to flow in their natural channels when culvert systems fail or become plugged. If careful geological investigations were routinely conducted before timber harvest plans were approved, unstable hillsides could be better identified, where the risks of slides and massive silt loads might outweigh short-term benefits of logging. Based on their extensive investigations, park geologists have been urging the California Department of Forestry and the State Water Resources Control Board to adopt such policies.

Logging Upstream

And with good reason. The upper Redwood Creek basin, which lies outside park boundaries, is currently being logged. "If road building is not carefully controlled, this area could become a loaded gun pointed at the park," says Hagans. In a rerun of the frenetic 1970s, the gains in controlling erosion within the park could be offset by activities upstream. Given the federal deficit, it is unlikely that Congress will step in again to buy up another cutover segment of the basin and undertake another round of reclamation.

What about those state assurances that the Park Service could review upper basin harvest plans? "Beginning in early 1983, a change in administrative procedures implemented by the California Department of Forestry (CDF) effectively precluded National Park Service participation in the field review of timber harvesting and road construction plans on lands upstream of the Park Protection Zone but within the Redwood Creek Watershed," reads the Park Service's 1988 Tenth Annual Report on the status of Redwood National Park. According to this report, the state Department of Forestry only allows park participation if the timber company consents. "With rare exception, landowners regularly and routinely refuse access to park professionals for either

"If road building is not carefully controlled, this area could become a loaded gun pointed at the park."



After stream channels had been excavated, straw was spread on the slopes to protect them from the impact of rain and provide a bed for natural seeding from surrounding trees.

Top: After two winters of natural alder recovery. Regrowth by alders depends on the conditions of the slope. Dry southern slopes, unstable road fill and rocked logging roads cannot be expected to regrow quickly. After about 30 years, the alders will give way to conifers. Bottom: Newly completed stream excavation.

pre- or post-harvest inspections," reads the report. In other words, the park professionals get to inspect the harsh consequences of harvesting—more sediment loads entering the park—and little else.

As the Redwood Park experience indicates, our emerging ability to restore coastal watersheds and wetlands can still remain hostage to careless development practices. A group of north coast environmental organizations has placed on the November ballot an initiative called Forests Forever. This initiative (Proposition 130), if passed by state voters, would require the state to tighten up its timber regulations, including restoration of logging roads and protection of watercourses. The timber industry has countered with another initiative (Proposition 138), which it calls "Global Warming" and the Planning and Conservation League derides as "Big Stump."

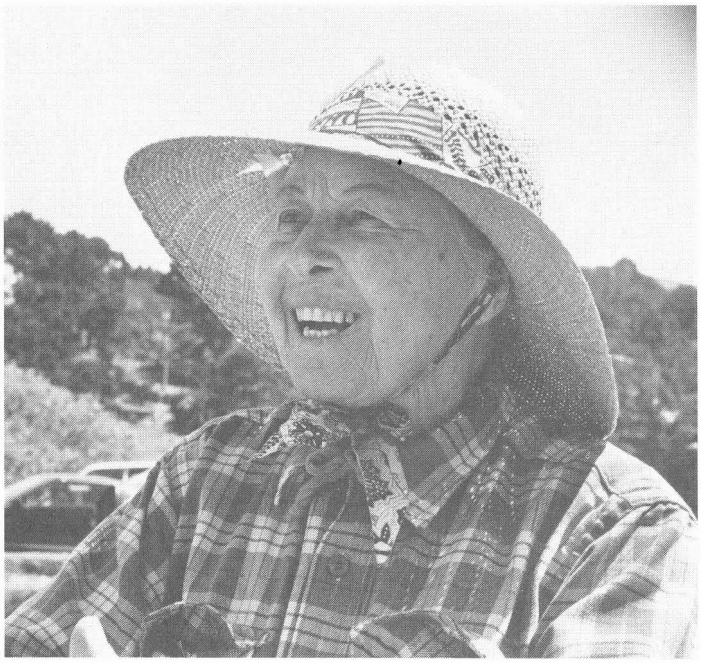
Across the continent, in Florida, another National Park is being threatened by careless watershed practices. Sugar cane growers dump dirty, nutrient-rich irrigation runoff into the fabled "river of grass" that sustains Everglades National Park. The nutrients trigger a major botanical revolution as native sawgrass is being crowded out by dense stands of cattails. Wading bird populations have dropped by 80 percent. For decades, the Park Service and environmental groups have urged the state to require sugarcane growers to clean up their dirty discharges. Finally, they have a critical ally. The U.S. Department of Justice has filed a landmark suit, which if upheld in court, would require Florida to protect the Everglades from such upstream mischief. This is one lawsuit that beseiged park managers will follow with great interest. ❐

Wesley Marx is author of The Frail Ocean; The Oceans: Our Last Resource; *and the introduction to* Pacific Coast: A Rugged Harmony.

Someone Special

For almost 35 years, Elizabeth Terwilliger has enticed countless children into discovering the natural wonders around them.

by Avril Angevine



PHOTOS BY DEWEY SCHWARTZENBURG

"Circle time!" calls Mrs. Elizabeth Terwilliger, piercing the morning calm of Mill Valley's Strawberry Marsh with a whistle blast. As two dozen slightly bewildered children swarm around the grandmotherly dynamo in plaid shirt, jeans, and straw hat, she launches into yet another episode of the wild, wacky, and wonderful Mrs. T. Show. It's a multisensory nature extravaganza in which Mr. Crane, Mrs. Badger, and Mr. Stinging Nettle introduce children, some of whom have seldom walked off concrete, to the world of nature, presenting it as amazing yet ultimately logical. At age 81, Mrs. T. can walk as fast, and as far, as an eight year old, while keeping up a relentless patter that would leave Robin Williams gasping. She's been at it for almost 35 years and has inspired tens of thousands of northern California children with a lifelong reverence for all things that live under rocks, fly in the sky, swim in the sea, and blossom in springtime.

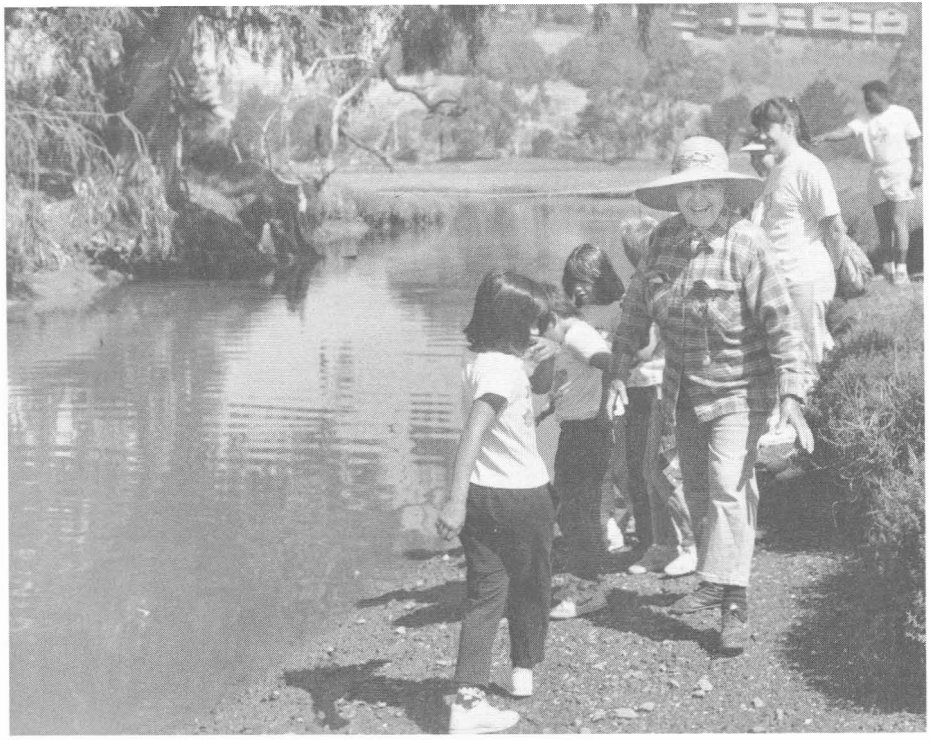
The stage has been set by Mrs T. (as she is affectionately known to generations) and her half dozen docents by dragging a battery of funky, furry, stuffed creatures from the rear of a van—a golden eagle, a slightly dilapidated great white egret, a snow goose with beak and legs painted flamingo pink, a laundry basket full of diving birds, some with plastic six-pack rings around their necks, and even lunch for Mr. Heron: a rat, a mouse, a snake, a vole, and a tastefully saran-wrapped lizard on a paper plate. These are all animals the children have some chance of seeing during the first part of the day, near the marsh. The animals are set in a circle at the roadside, and the children, today eight to ten year olds from a Marin County school, descend on them in a manner that easily explains the creatures' condition. They touch, twist and prod them; one drapes a much-repaired snake around his neck, another cries "Oh my God—a shark!" as he confronts a foot-long sturgeon. There is an occasional caution from the school staff but not from Mrs. T. or her assistants, who encourage the kids to get up close and personal with the exhibits.

The children are now hooked. As they gather in a circle, Mrs. T. blows her whistle again and the curtain rises on a performance that will last for the next three hours and never lose its audience. It's not a lecture. It doesn't even seem planned. Mrs. T. talks about what the children can see in front of them, both in the circle and in the marsh around them, usually addressing the animals directly or speaking for them. In what is certainly a pedagogical method unique to herself, she has them repeat everything she says and does—even sentences that are miles too long for them, even asides to the staff. Stranger still, they enjoy it. It's impossible not to be swept along with her, for the information is fascinating and memorable, and the pacing breakneck.

Mrs. T. hugs her own stocky, five-foot frame and pats her upper arms. "Put some brown on your head and arms and your grey suit," she calls, and the children do it. "Hi, Mr. Crane!" she continues. "You didn't mind your mama! She told you not to go near the telephone wires and you did. We found you dead. And it cost $250 to stuff you!"

A sea gull swooping overhead catches her attention. Her arms flap gently out to her sides, rising and falling gracefully, and as her young protégés pick up the motion she leads them in a chant: "Never in a hurry for a sea gull, always in a hurry for a duck." As if on cue, a mallard skims across the marsh into view. "Something special," she cries, and suddenly 25 pairs of arms are flapping madly.

Circle time finishes, and Mrs. T. and her team each take a teacher and four or five children toward the marsh for a closer look. Mrs. T. takes the hands of Clifton, a small six year old in a Giants cap and overalls, and Brandy, the most outgoing of the group. Also along are John, Amy, Henry, Sara, Tanya, teachers

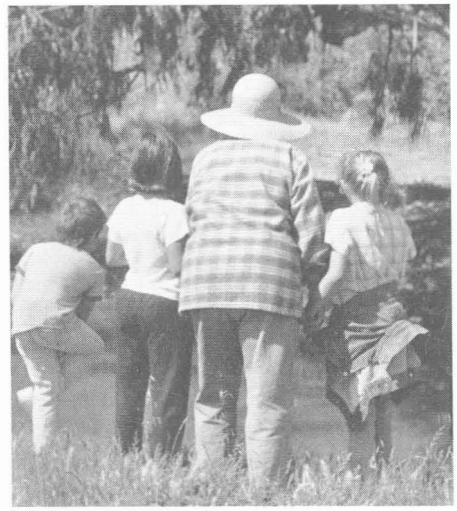


Jolene and Fran, and a visitor with her four year old's fluorescent stegosaurus backpack containing lunch and trusty notebook.

Mrs. T. bends down to show her pupils how to recognize animal tracks: five fingers for raccoon tracks, four for a cat (add nails and it's a dog), and two make a deer. Then she marches down to the edge of the channel joining the marsh to San Francisco Bay to show us, by casting small sticks into the water, that wind direction and current direction are not necessarily the same.

"Something special!" she pipes. We sight one, two, no, three bat rays in the water, lazily rising to the surface, then disappearing. It's not just the children who are in awe: A docent says that in ten years, she has never seen a bat ray here. We pause in wonder, but there are new treasures to be experienced: We taste the salt on cord grass and pickleweed, feel the fuzz of cattails, then gently lay it by the trail—a blanket, we are told, for baby birds and mice.

There's always "something special" intruding into the world of Mrs. T.—a village of creepy crawlies hiding under a rock on Mt. Tam, a family of spittle bugs clinging to a weed in Muir Woods, a bat ray breaking the still surface of a shallow channel at Strawberry Marsh. But no one who's ever met her, including the nearly 100,000 children a year who spend a day with her, have any doubt that the most special thing of all is Mrs. T. Combining



an unselfconscious enthusiasm for her subjects with an almost missionary zeal, she retains a childishness that connects with her young charges in a way that most childcare providers can only envy. She shows them that they, she, the lizards, the skunks and the plants that "smell like tortillas" are all equal, all important, all connected.

Backed by over 100 volunteers and the growing resources of the Elizabeth Terwilliger Nature Education Center in Tiburon, Marin County, Mrs. T. is the Bay Area's incarnation of Mother Nature. Along the way, she has been a trailblazer in nature education. (As a direct descendent of Kit Carson and Daniel Boone, she evidently has trailblazing in her blood.)

For her crusades on behalf of open space, wildlife preserves, bike paths, and especially, childhood education, she has been honored at the White House with President Reagan's Volunteer Action Award and virtually canonized by the local press. Yet none of the attention seems to have affected her in the least: She greeted the president as she would have a ten year old, by making him hoot like an owl and imitate a vulture in flight. At ground-breaking ceremonies for the new visitor center at Muir Woods National Monument last winter, she stole the show from speechifying dignitaries by making them all caw like ravens and flap their arms like turkey buzzards. Like the scores of children who flock to her nature walks, legislators and National Park Service officials obeyed. One doesn't fool with Mrs. T.

Indeed, Mrs. T. has become such a Bay Area institution that it hardly seems possible she was born in Hawaii and didn't arrive in the Bay Area until she was a young mother of two. Trained as a nurse, she had spent much of her youth avoiding the "indoors life" of a proper young lady, preferring adventures and the great outdoors.

Left to her own devices by the rigorous schedule of Dr. Calvin Terwilliger, an orthopedic surgeon, she joined conservationist campaigns, as much from necessity as inclination, she says. "When you have a tiny house and tiny yard and two small children, what are you to do?" To her, the answer was obvious: create parks and playgrounds.

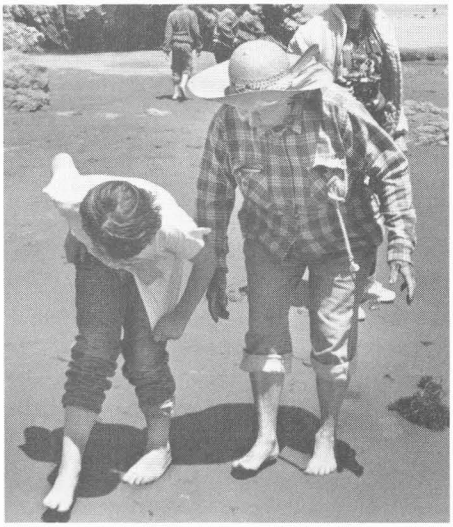
As she came to know the trails and shores of southern Marin through frequent family outings, more friends and friends of friends joined her until some sort of organization became mandatory. In 1975, Mrs. Terwilliger and her legion of volunteer moms and nature guides established the nonprofit center that bears her name. Now more than 100 volunteer guides conduct field trips every week for children from more than 1,000 schools, as well as family outings by bike, canoe, and foot—many of them led by Mrs. T. The center also sends three vans with stuffed animals and other aids to schools in northern California. Another half-million school children or more see one of five Terwilliger nature films every year.

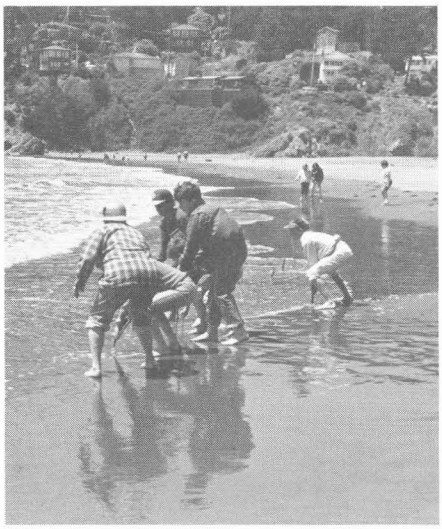
At the heart of it all is Mrs. T.'s unique

understanding of how children learn to relate to the natural world—not through abstract "teaching" but by direct, hands-on, full-sensory participation.

"Discovery is just pure joy," she says. "I tell mothers that if they stay home with their children they'll remember washing windows, cleaning floors, and dusting furniture. But if they take the children outdoors, they'll have wonderful memories. There's so much to see, touch, learn—and learning is really living. You have to get out there, look and see, use all your senses. That's how children learn: by touching, smelling, and seeing.

"Children are natural actors," explains Mrs. T. "Lots of people have knowledge





to share, but by giving the children hand motions, and having them repeat, Mrs. T. helps them remember," says a Santa Rosa teacher who has taken Mrs. T.'s trips three times. And by teasing, by laughing, taking her shoes off at the beach, bubbling over with her own genuine energy, and treating children as children in a world that would make them radical mutant ninja dudes, Mrs. T. spurs them to action.

As the group reassembles at Muir Woods, the upland animals are taken from the van: badger, fox, skunk, squirrel. Mrs. T. divides them according to what they eat for lunch (salmon, rat, acorn) just like a six year old at a doll tea party would do. Now comes the most astonishing part of an astonishing day, the race through Muir Woods, which on

this beautiful spring day is packed with sleek blond German tourists who gape at Mrs. T. and her panting entourage. "Something special!" A dead garter snake on a fence. "A gardener snake?" asks Henry. Mrs. T. motions toward a sea of green arching over the fence. "Ouch plant! Ouch plant! Your edges look like a saw. Stinging nettle! If we touch you, it will sting for three days!" As we pass a public telephone, she brushes aside the traditional search of the coin-return cavity: "Don't touch! Only for emergencies." And as she stoops to pick up an abandoned paper cup, she says: "This is my country. I want to keep it beautiful." The children are still repeating.

We are nearing lunchtime, the end of their trip. Clifton has bits of grass and weeds in the chest pocket of his overalls. Some of the kids are dragging. A teacher gives one straggling girl a quick hug and whispers, "the challenge is to keep up with Mrs. T." The child's legs are half as long as Mrs. T.'s. The visitor's are longer, and she's struggling, too.

As the flock scrambles after Mrs. T., who's discovered yet another "something special," an astonished middle-aged tourist says to his wife, "that's the tour *I* want to go on."

The goal of the Terwilliger Nature Education Center is "to teach children an awareness and appreciation of nature so that as adults they will be able to make responsible decisions to protect and preserve their natural environment." For more information, write the Center at 50 El Camino Drive, Corte Madera, CA 94925-2057, or call (415) 927-1670. ❐

Avril Angevine is Art Director of Coast & Ocean.

Lessons in response to an oil spill

The Fight for A Restored Wetland in Huntington Beach

by Gordon W. Smith

The newly restored Talbert Marsh was opened to full tidal influence in a public ceremony February 17, 1989. One year later, on February 7, 1990, the tanker *American Trader* punctured one of its tanks with its own anchor while mooring off Huntington Beach. It spilled 394,000 gallons of Alaskan crude oil, threatening the revived marsh with destruction.

For the small group of volunteer directors of the Huntington Beach Wetlands Conservancy, which owns the marsh, the next four weeks would present a harrowing series of crises and surprises. They would also yield lessons in crisis management and the complexities of public/private organizational cooperation.

The Talbert Marsh is at the mouth of the Santa Ana River, on the inland side of the Pacific Coast Highway. Cut off from the ocean for decades and choked with fill, it had barely sustained remnants of salt-tolerant pickleweed. Most people who knew the area did not even think of it as a wetland. To passers-by it appeared to be just another vacant lot collecting trash.

With the help of the Coastal Conservancy, some of us who knew that this wasteland was a degraded but most valuable marsh had organized as a nonprofit corporation, acquired the marsh, and undertaken to restore it. Under our supervision, the land was reshaped and contoured, and tidal flow was restored via the Talbert Flood Control Channel. We had watched with pleasure as the newly turned earth slowly changed to rich, wet mud flats, as crustaceans, worms, and clams returned, and with them, the wading shorebirds. The Talbert Channel opens to the ocean a half mile south of the marsh. In the weeks after the spill, that half mile proved crucial in the struggle to keep the oil out of the Talbert Marsh.

Crisis

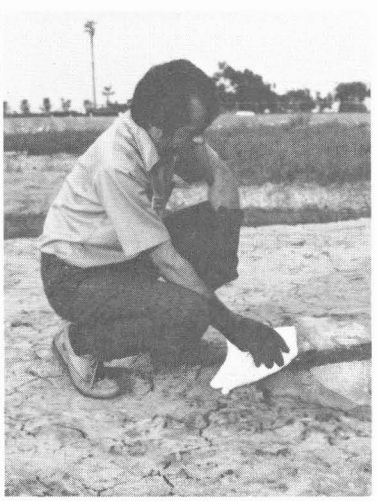
On February 9, two days after the spill, the huge oil slick—a black ooze two miles wide, five miles long—blanketed the water a few hundred yards offshore and was moving toward the Talbert Channel and the Santa Ana River mouth. Our marsh was directly in its path. Only a fraction of the spilled oil had been skimmed from the ocean surface.

Hundreds of cleanup workers in yellow protective suits had been mobilized to attack the oil when it hit the beaches and jetties. Because the weather was calm, oil spill response crews had been able to install several containment booms across the channel. Hard booms with skirts were backed by sorbent booms made of absorbent material in a fiber mesh.

While these booms looked reassuring, we worried that they would not suffice. Coast Guard people told us that booms had proved ineffective in Alaska when currents exceeded six or seven knots. We worried that an incoming tide, funnelled through the 75-foot-wide channel, would sweep the oil into the marsh. Therefore, on the third day after the spill, the Huntington Beach Wetlands Conservancy obtained permission from the California Department of Fish and Game and the Orange County Flood Control District to take the drastic step of closing the channel by bulldozing a sand dike across it. Though blocking the tide could well damage the mud flat life that had reappeared during the preceding year, not doing so seemed far riskier.

A contractor working on a sewer outfall pipeline project next to the channel agreed to do the job. We were fortunate, as we had a good relationship with him from months of coordinating our projects. He

For the volunteer directors of the Huntington Beach Wetlands Conservancy, the next four weeks would present a harrowing series of crises and surprises. They would also yield lessons in crisis management and the complexities of public/private organizational cooperation.



GARY GORMAN

Author Gordon Smith at work in Talbert Marsh

Photos by Gordon Smith

Top: Crews used hot water to clean oil off the Talbert Channel jetty.
Bottom: Bags of oil-soaked absorbents used to wipe off the rocks piled up on Huntington State Beach as the cleanup progressed.

completed the 12-foot berm (measured from channel bottom) shortly after midnight. The next morning, crude oil was lapping against the ocean side.

This was only the beginning of what proved to be a month-long crisis. The new dike had to be breached twice. First, a complication linked to the sewer outfall construction developed: county water quality officials, monitoring dissolved oxygen behind the dike, found that it had dropped so low as to endanger fish. Therefore, the dike was opened to allow the tide to drain the stagnant water and bring in ocean water with a fresh oxygen supply. The plan was to close the breach again after one tidal cycle, but when the bulldozer was about to do that, at low tide, it broke down. Before another machine arrived the following morning, the oily foam had worked itself past about a dozen containment booms to the last barrier: a concrete bridge that carries the outfall pipe across the channel. Fortunately, the incoming current subsided as the oil reached the bridge.

On the tenth day after the spill (and, incidentally, the anniversary of the official marsh opening) heavy rains brought so much water through the two flood control channels that drain into the marsh that the Pacific Highway was in danger of flooding. After the berm was breached a second time, to let the water through, the entire dike was swept out to sea.

Five days later, on the 15th day after the spill, when it became apparent that significant amounts of oil were still coming in with the tide, another dike was constructed across the mouth of the channel, halfway between the highway and the surf line. By this time, however, enough of the thick black crude had been carried in past the dozen or so containment booms to create a black ring at high tide line in parts of the marsh.

The weather turned harsh again on the 18th day after the spill. Heavy southern swells generated by a storm off the coast of Mexico demolished the dike again, even though it had been built well in from the normal winter surf line. High waves swept residual oil out of jetty rocks and from under sand layers on the beach, and a sheen appeared on the marsh water surface. Several birds were oiled.

On the following day, we watched vacuum trucks and dozens of cleanup workers labor to remove oil from the marsh interior. The Conservancy's members had struggled for weeks, day and night, to prevent this intrusion; the sight was disheartening to us.

We monitored the cleanup process, mindful of the fragility of the mud flats and the endangered Belding's Savannah sparrow nesting in the pickleweed. We asked the crews to stay on the rocks and clean only on open water. We ourselves, with rakes, scooped up oily debris that had settled on the mud flats, leaving the remaining oil to weather away in time. Yet another, the third, dike was built at the very entrance to the marsh, about a fourth of a mile further inland than the previous one. It stayed in place until about a month after the spill, when we were satisfied that oil had been scoured off the jetty and rocks, and our marsh was safe.

Lessons

In the end, we realized that the Talbert Marsh, and we its defenders, were lucky this time. Biologists believe that no long-term damage to the ecosystem was sustained, even though tidal flow was interrupted, on and off, for almost a month. We also learned some important crisis response lessons that could benefit anyone concerned with protecting a sensitive natural resource from unforeseen calamity.

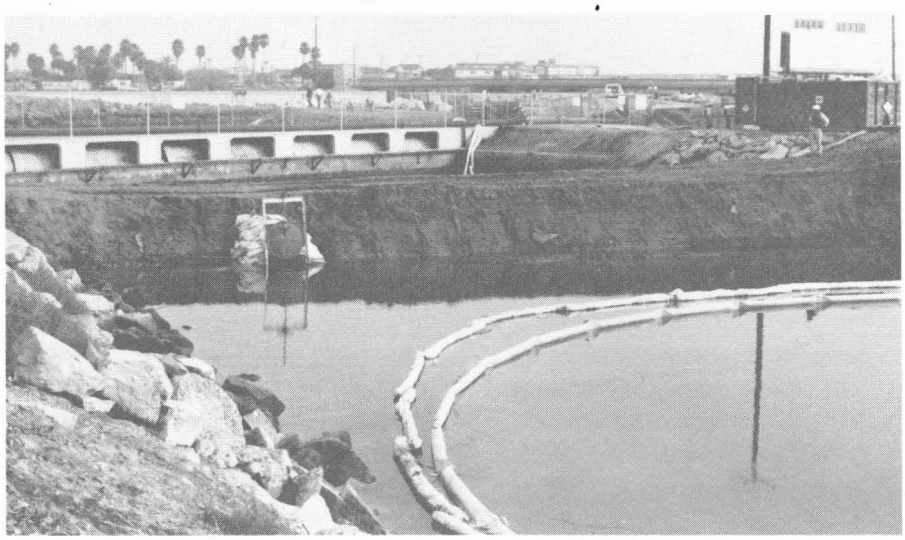
The first and most important lesson is

not to rely on anyone else's emergency response planning. Plans existed for responding to the oil spill, but we were amazed how primitive and inadequate the cleanup methods were. The skimming process on the ocean surface was heavily criticized by the Coast Guard and others because it was too scanty. The cleanup cooperative supported by the oil industry had too few skimmers available in the first hours and days after the spill to recapture spreading oil. Coast Guard Commandant Admiral Paul A. Yost told reporters: "I'm not satisfied with the skimming capability we have in the United States—especially the high seas capability. We don't have enough." *[Santa Ana Register]* The containment booms were inadequate. The sorbent booms did not absorb the heavy crude oil. On shore, the fibrous diaper-like material distributed for wiping rocks merely shredded and caused more mess. I was astonished, but that is apparently all that is available. The emergency dikes built by the Conservancy were not in any oil spill response plan, of any agency, local, state, or federal.

Consequently, we would advise organizations that have stewardship responsibility for wetlands or other coastal resources to identify potential threats, examine existing response plans, and take whatever measures are necessary to correct or supplement those plans.

The second lesson concerns manpower. It was vital to be present on site, with manpower from within the organization, as long as the crisis lasted. With full-time jobs and other commitments, Conservancy members were hard pressed to maintain a presence at the marsh, but it was quickly obvious that decision-making could not be left to others. We had to attend daily meetings with the agencies and contractors involved in the cleanup effort and keep a visible presence, for the sake of our relations with the public and the news media.

Finally, we have seen the value of personal ties with people in organizations that can be called upon to respond to a crisis such as an oil spill. For example, we were fortunate in having credibility with a contractor who was willing to take on a $5,000 job, building a dike, at our request. (He billed us, we are billing the American Trading and Transportation Co., which has assumed responsibility as owner of the tanker. Costs of subsequent dike building were assumed by the county, which will also bill American Trading.) The Huntington Beach Wetlands Conservancy had also established a good relationship with the county's public works agency, and a spirit of consultation and cooperation prevailed from the very beginning of the crisis. County equipment and expertise proved to be critical in minimizing damage to the marsh.



This is the third dike the Huntington Beach Wetlands Conservancy constructed to defend the marsh from oil-laden tides. Its two predecessors were washed away by heavy rains and high waves.

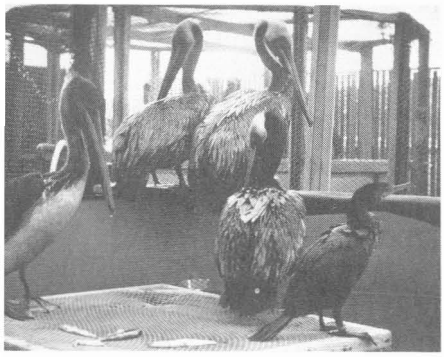
In developing crisis response plans, organizations should make a special effort to make themselves known and to establish credibility, so that when fast and critical decisions are made, they do not find themselves on the outside of the process looking in.

Michael Herz, writing in *California Waterfront Age* (Summer 1989) asked the prophetic question: "Is California ready for its next oil spill?" Clearly, much is yet to be done before a "Yes" can be forthcoming; existing containment strategies for wetland protection are primitive and ineffectual. But, having experienced that "next oil spill," the Huntington Beach Wetlands Conservancy is sharply aware that all coastal resource management and advocacy organizations should get involved in the effort to prepare now, not later. ❐

Gordon W. Smith is chairman and a founding director of the Huntington Beach Wetlands Conservancy. He lives in Huntington Beach and is an administrator with the California State University system.

The Toll of a Routine Oil Spill

by Louann W. Murray



After washing, the birds were held in outdoor pens until natural oils had waterproofed their feathers.

The 400,000 gallons of oil that spewed from the punctured hold of the tanker *American Trader* off the coast of Huntington Beach on February 7 was a small spill compared with the 11 million gallons dumped in Alaska by the *Exxon Valdez*. The Huntington Beach spill was just one of about 10,000 oil spills that occur in the United States annually and did not even rank among the top ten. Yet to those of us who were involved in the cleanup and rescue of wildlife, the effect was enormous.

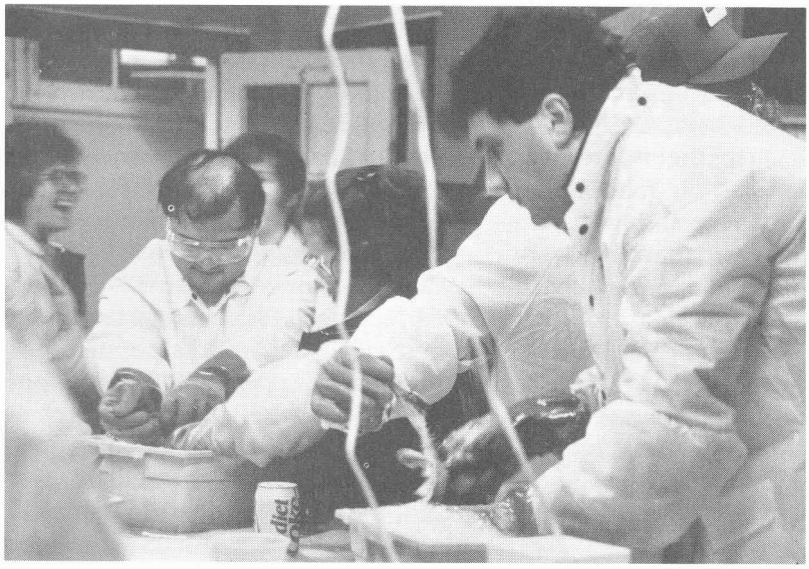
Daily we watched the number of rescued birds climb and saw the number of dead soar, until the California Department of Fish and Game had counted over a thousand birds injured or dead. The impact on our wildlife did not become real to me until late in the crisis, however, when I visited the Services Warehouse on Terminal Island in Long Beach where the International Bird Rescue Research Center (IBRRC) team was treating the birds. Nearly 400 birds were there at the time, over a hundred of them endangered Brown pelicans. Dozens of oiled birds huddled and shivered in plywood pens covered by sheets, awaiting their turn to be cleaned. Pelicans protested force feedings by spitting back the electrolyte solution. Grebes shrilled as they were dunked in warm detergent solutions and gently washed by pairs of volunteers. The cries and shrieks of the pathetic victims were far more vivid than the bar charts showing the number of dead and live birds recovered each day.

My husband, Vic Leipzig, and I were involved in the bird rescue operation from the start of the crisis. Early in the evening of February 7, three hours after the oil began flowing from the punctured tanker, we got a call from Esther Burkett, our local Department of Fish and Game biologist. She told us that a team of professional bird rehabilitators from IBRRC was flying in to take charge of the bird cleanup and would arrive by morning. This nonprofit bird rescue organization, formed in 1971 and based in Berkeley, was under contract to British Petroleum Co., owner of the *American Trader*. Because Vic and I are involved with the protection of local wetlands, Burkett expected that we would be getting calls from people who had found oiled birds. She told us how to handle the birds that would soon start washing up.

Vic, executive director of the Bolsa Chica Conservancy, drove to Life Guard Headquarters on the beach, where a command center was being set up. He was met there by Dr. Joel Pasco, a local veterinarian who is active in bird rehabilitation. Around midnight, a TV news crew located the first stunned bird, a Western grebe, and Vic brought it in for cleaning. Half a dozen Surf scooters and grebes followed later.

The next day, Vic set up a volunteer organization to locate and retrieve injured birds. By the time big numbers of oil-soaked birds started washing ashore, the volunteer program was a smooth, well-run operation, with two training sessions daily, followed by issuance of protective equipment required by the Occupational Safety and Health Administration: oil-resistant gloves and boots, goggles to protect eyes

All photos by Louann W. Murray



At left: Volunteers wash the oiled birds in warm water with Dawn dishwashing detergent.
At right: A Brown pelican in shock is taken for its electrolyte feeding at the Terminal Island facility. The holding pens were covered with towels so the birds would not become frightened by the sight of humans.

against attacks by sharp bird beaks, and fluorescent orange hats to identify the trained volunteers to the life guards who were now patrolling the closed beach to keep out the public. In the first week after the spill, patrols combing the beaches found 322 live birds and 170 dead ones.

The birds were held in boxes and pens at the life guard station in Huntington Beach until they were trucked by Fish and Game to Terminal Island. Trained volunteers at the station monitored temperatures and fed the birds every four hours.

The IBRRC people along with the British Petroleum oil crisis response team had constructed the rescue station inside an old warehouse on Terminal Island, with the help of blueprints from the *Exxon Valdez* spill facility. It was a remarkable facility with holding pens, outdoor pools, cages, dryers, water purification systems, laboratories, a surgery, a sick room, generators, lighting, heating, plumbing, FAX machines, copy machines, and cleaning and medical supplies, all acquired or built within two days. To save time, the response team had telephoned instructions to contractors from the airplane as they flew in. The atmosphere at the rescue center was very professional. Despite the bustle of human activity, the rooms were as quiet as a hospital ward, except for the shrieks and squawks of the bird victims.

How to treat the birds?

The treatment of the birds was controversial. According to a 1989 article in *Wildlife Rehabilitation Today*, "Basics of Oiled Bird Rehabilitation" by Lynne Frink of Tri-State Bird Rescue and Research of Wilmington, Delaware, birds that have been exposed to crude oil go into shock. Oil destroys the waterproofing on their feathers and their body temperature drops. The oil is also toxic and affects the pancreas and liver and can cause ulceration and hemorrhaging of the gastrointestinal tract. It is therefore important to prevent the birds from preening. Tri-State recommends wrapping the birds in towels or diapers to prevent ingestion of more oil, force-feeding electrolyte solution (both to rehydrate the birds and to wash the oil out of the GI tract). They postpone washing the birds for 8 to 24 hours until the body temperature has returned to normal and the bird is out of shock.

The first night of the spill, Dr. Pasco directed that the birds be washed in warm water immediately to remove the toxic oil and bring the body temperature back to normal quickly.

The IBRRC team, however, like the Tri-State people, did not recommend immediate washing. Instead, they kept the birds hydrated and waited until their temperature stabilized before washing. This technique was developed by trial and error over the 20 years that IBRRC has been cleaning birds, and according to the staff, it gives the best survival rates.

After the birds had recovered from shock, they were bathed in warm water with Dawn liquid detergent. Their heads were gently washed with toothbrushes and rinsed with WaterPiks. The cleaned birds were placed in pens with warm air

In the first week after the spill, patrols combing the beaches found 322 live birds and 170 dead ones.

blowers. After about a day, when natural oils had once again waterproofed their feathers, they were transferred to outdoor swimming pools filled with softened water, which helps the birds recover more quickly than they do in tap water. Birds were held for several days before release. Some critics said that birds were being returned to the wild too quickly. In support of this argument, eight birds that were treated, tagged, and released were found dead within a few days. Nicolette Heaphy, an IBRRC staff member, said holding the birds too long in captivity is also detrimental, and that when to release is a judgment call.

Small Spill, Big Consequences

The overall toll from this relatively minor spill was enormous, according to testimony given at a public inquiry conducted by the State Lands Commission. Reed Smith, state on-scene coordinator, Department of Fish and Game, said that 65 percent of the 1,021 birds that were handled as of March 4 died from effects of oil. Many of these were brought in dead. Of the 565 birds that were brought in alive, 349 survived, according to figures from IBRRC. How many birds died and sank at sea or were oil-slicked and not rescued cannot be known.

On the 14th day of the crisis, Vic and I saw four oil-soaked Western grebes at the Huntington Beach wetlands. I was able to retrieve only one. It was tagged #1099 and was the last bird to be brought into the Terminal Island facility. It recovered and was released. Vic had rescued the first bird, I had brought in the last.

There will be far-reaching effects on the birds that escaped the oil slick as well. Mated pairs were separated, and survivors may not have been able to find new mates this season. Reproduction will be further affected in other ways. There may be genetic damage, for benzene in crude oil is a mutagen. Residual oil in the wetlands may be carried back to nests, affecting the hatch rate. Young may be fed oil-tainted fish and invertebrates.

Millions of invertebrates—sponges, worms, abalone, mussels, clams, crabs, starfish, sea urchins, lobsters, octopuses—may have been killed on the ocean floor. While the oil was still sloshing up on the beaches, the grunion ran a month early. Thousands of grunion were lost.

If the oil had drifted into Anaheim Bay or Newport Bay, the consequences would have been even more serious. Five endangered species use these wetlands, including the California Least tern, Belding's Savannah sparrow, Brown pelican, and Peregrine falcon. Biologists estimate that 60 percent of the world's population of Light-footed clapper rails live in Upper Newport Bay. The oil is in the food chain, and the danger to these species may not be over. Although most local wetlands were spared, the 25-acre Talbert Marsh of the Huntington Beach Wetlands was slicked when oil slipped over and under protective booms. The effects of this relatively small spill will continue for some time. However, the ecosystem will eventually recover as microbes biodegrade the oil.

Ominous Future

Two disturbing facts now loom before us. Only 21 percent of the oil was recovered from this spill, according to a report submitted to the California State Lands Commission by OCEANOR, an independent consulting firm. (Chuck Webster, a spokesman for British Petroleum, noted that the figure given by OCEANOR applied only to ocean skimming and did not include the amount recovered from the shore or from booms.) Yet the skimming operation was considered a textbook recovery performed under ideal conditions. The average recovery figure for open oceans worldwide is 8 percent.

Given the number of oil platforms and the amount of oil tanker traffic off the California shore—and the fact that double hulls are not yet required by the United States—a major spill of the coast of California is highly probable. These facts point to a need for better safeguards to prevent spills, for better technology to clean up the oil before it spreads, and for more controlled studies of various treatments for injured wildlife. ❐

Louann W. Murray is a biologist and environmental activist in Huntington Beach.

Plan ahead: **The Association of Avian Veterinarians has a list of its members who will volunteer their assistance in an environmental emergency involving birds. The list is available to agencies with authority to mobilize oil spill response. Write Adina Rae Freedman, AAV, P.O. Box 299, East Northport, NY 11731.**

From Other Shores

MEXICO

Preserving the Land of the Mayas from Modern Conquistadors

by Jon Stewart

Mexico's storied Yucatán Peninsula, washed by the waves of both the Gulf of Mexico and the Caribbean, is a land of extremes. With no minerals, no rivers, and very little soil covering its limestone foundation, it is literally dirt poor; yet with millions of acres of rain forest, hundreds of miles of teeming coast, and tens of thousands of acres of life-producing marsh and wetland, the Yucatán is one of the richest, if most fragile, environments in all North America. It is, of course, also home to the oldest and one of the richest cultures of precolonial history, that of the 3,000-year-old Mayan people.

The peninsula's diverse ecosystems, which include the longest barrier reef in the Western Hemisphere, make the Yucatán a critical habitat to nearly 500 species of resident and migratory birds, more than 150 species of butterflies, and dozens of endangered animal species, including the Howler Monkey, the jaguar, the sea manatee, storks, and four of the world's eight species of sea turtles. Needless to say, it is equally critical to the thousands of Mayans who still scratch a living from its thin soil in their own centuries' long battle against extinction.

For 500 years, ever since Columbus first sailed up its coast in 1502, the Yucatán—both the land and its people—has fought a losing battle against foreign exploitation. The once-proud Mayan culture, which developed more cities than all of ancient Egypt, has been ravaged by foreign disease, gunpowder, and religion. Slash-and-burn agriculture now consumes at least 2.5 million acres of rain forest a year in the state of Quintana Roo, along the Caribbean coast of the Yucatán.

The greatest threat to this still rich and beautiful land, however, is new: tourists, the 20th century version of the Spanish conquistadors.

The threat emanates principally from the seaside resort of Cancún, which has developed within the past 15 years as a major tourist mecca, providing such pleasures as are also offered by Miami Beach, Atlantic City, and Oahu. Cancún (meaning "Nest of Serpents" in Mayan) is Mexico's fastest growing city, with more than 300,000 permanent residents, mostly living off the more than 20,000 luxury hotel rooms and thousands more condos and time-share units that now line the glorious beaches.

The so-called "Cancún to Tulúm Corridor," a 130-kilometer (81-mile) strip of coast that reaches south to the ancient Mayan seaport of Tulúm, provides more tourist accommodations than any single place in the entire Caribbean, including all of Puerto Rico. As many as 65,000 additional hotel rooms will go up in the next three decades, according to some estimates.

From the isolated little resort it was 15 years ago, Cancún has grown into an avaricious monster, consuming mile after mile of beach front and thousands of acres of wetlands that are essential to the survival of most of the migratory bird species of North America.

An isolated beach on Sian Ka'an's Caribbean shore.

PHOTOS: TOM GRAF

The Cancún resort strip has already expanded to the very boundary of one of the Yucatán's best hopes for environmental survival, a 1.3-million-acre biosphere reserve known as Sian Ka'an

From Other Shores

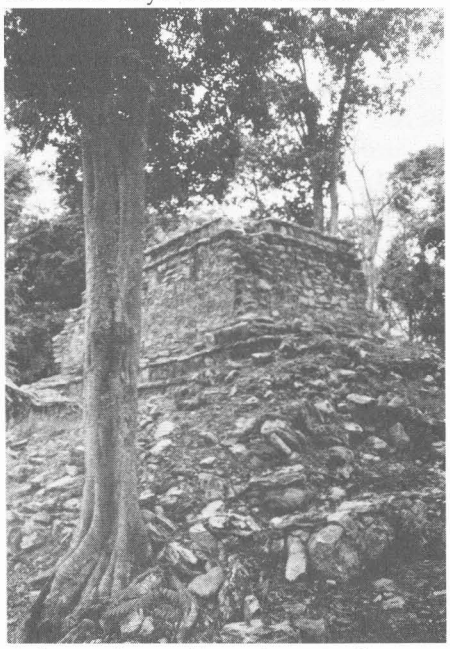
(Mayan for "Gateway to Heaven"). Stretching some 90 miles down the coast, it is home to about 1,000 scattered Mayan fishermen and farmers, at least 30 identified archaeological sites, and nearly every species of flora and fauna and marine life native to the Yucatán.

"The threat of tourism gets closer every day," says Adela Samper, a spokesperson for the nonprofit Amigos de Sian Ka'an. "You must understand, Mexico has no comprehensive policy for protection of coastal areas. We have more than 10,000 kilometers of coast and no coastal protection."

Four years ago, following half a decade of concerted research and lobbying by a handful of Mexican scientists and environmentalists, the government of Mexico granted biosphere status to Sian Ka'an, making it a candidate for UNESCO's international Man and the Biosphere Program. The following year UNESCO formally recognized the biosphere reserve. To meet UNESCO's criteria, a reserve must have one or more core areas set aside for pure conservation and limited scientific research. The core areas are surrounded by broader "buffer zones" in which people may live and exploit the region's natural resources, but only according to a master plan that emphasizes sustainable development above all.

The biosphere concept is relatively new to the conservation movement, and unique in the way that it integrates human and natural ecosystems. It recognizes that pure conservation along the national parks model, wherein people observe but never use the land and resources, is often inappropriate in the setting of a third world country where the struggle for human survival and economic development relegate environmental preservation to a low priority. The UNESCO program permits government leaders of these countries to get technical and financial support from United Nations' agencies and international nongovernmental organizations that work with biosphere reserves.

"The idea of a biosphere," says Samper, "is to work very closely with the local people, to gain their trust and help them find ways to survive and even improve their lot without doing further damage to the land." At Sian Ka'an, this approach has established a demonstration farm that coaxes Mayan farmers away from traditional slash-and-burn agriculture to intensive methods and crop rotation. It has also involved establishing fishing and lumbering co-ops with careful monitoring of harvests to ensure sustainability.



A thousand-year-old temple at Muyil.

The biosphere concept includes promotion of tourism that will benefit the reserve. Amigos has an "ecotourism" director and conducts tours of part of the reserve for up to six people at a time. These excursions provide the best public access available to the heart of a region that has changed relatively little since the Pleistocene Era. They certainly provide the best alternative to a day on the crowded beaches of Cancún.

The hope is that the Sian Ka'an example will spread. Last year, the government granted biosphere status to another Mayan area, on the Yucatán's Guatemalan border. It is even larger than Sian Ka'an and adjoins Guatemala's first biosphere, in the northern Petén, as well as a region in Belize that is a candidate for biosphere status. Together, these three reserves, totaling about five million acres—twice the size of Yellowstone National Park—may eventually comprise a three-nation Mayan Peace Park, in which archeological treasures, fragile rain forest and protected wildlife would all be accessible to "ecotourists" arriving along a network of carefully regulated bus lines and futuristic monorails.

Editor's note: Of the 46 biosphere reserves in the United States recognized by UNESCO, seven are in California, three of these incorporating coastal areas: the California Coast Ranges Biosphere Reserve, the Channel Islands Biosphere Reserve, and the Central California Coast Biosphere Reserve, which includes Point Reyes National Seashore; Golden Gate National Recreation Area; the Farallon Islands National Wildlife Refuge; Gulf of the Farallons National Marine Sanctuary; Mount Tamalpais, Tomales Bay, and Samuel P. Taylor State Parks; and the Marin Municipal Water District. Bill Gregg, coordinator of the U.S. Man and the Biosphere Reserve Program, said that of these, the Central California Coast Reserve is the one in California that most closely fulfills the U.N. reserve ideal because it successfully meshes resource protection with extensive citizen participation. The 850,000-acre reserve was officially designated in February 1989. ❐

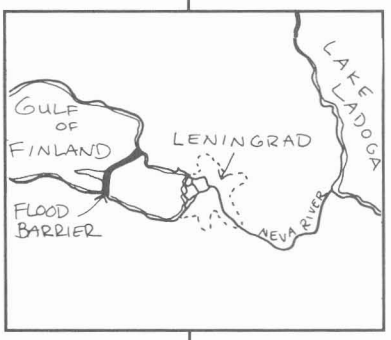
Jon Stewart is an editor at the San Francisco Chronicle.

THE SOVIET UNION

Leningrad's Flood Control Barriers Might Be More Hazardous Than Floods

by Rasa Gustaitis

Soviet scientists visiting San Francisco were keenly interested in the U.S. Army Corps of Engineers' Bay Model. They knew it had prevented a terrible mistake from being made on San Francisco Bay in 1956 by demonstrating that damming it was a poor idea. Unfortunately, said microbiologist Vladimir Bresler, no such model was built before construction began on the massive Leningrad flood control barrier. Consequently, that city of 5 million inhabitants may now face a hydrological catastrophe. "If the barrier is completed, Leningrad will cease to exist," Bresler predicted. "There will be epidemics. Some of the population will die and the rest will be evacuated."



The massive concrete, stone, and sand fill barrier is being built across the delta of the Neva River, separating it from the Gulf of Finland. Under construction for almost ten years, it will be 28 kilometers [17.4 miles] long, linking Kotlin Island with the north and south shores of the gulf. Leningrad is highly susceptible to flooding because it stands on 42 islands and is crisscrossed by almost a hundred canals.

Two ship locks and six sluice gate structures are included and are to remain open most of the time to allow polluted Neva water to flow out and oxygen-rich gulf water to flow in. Government studies have shown that this will be sufficient to maintain the water exchange. But critics say it is already clear that the hydrological cycle is disastrously disrupted. "The barrier is not yet finished and already we feel the results," said Bresler, one of five scientists here early this year on a visit sponsored by the Center for U.S.-U.S.S.R. Initiatives, which organizes citizen diplomacy trips between the two countries. "It has disrupted the ecosystem and turned the mouth of the Neva into a stagnating pool. Where it is finished, [the northern section], concentration of E coli [a type of infectious bacteria] is 100 times to 10,000 times higher than sanitary norms. Concentration of salmonella is 1,000 times higher than before the dam."

Controversy over the barrier is as old as the idea itself. It was first proposed in 1824, after a terrible flood swept away more than 300 buildings and killed 569 people. Yet A.N. Krilov, head of the hydrometric service for St. Petersburg at the end of the last century, is reported to have vehemently opposed a flood control dam, declaring that "the eastern portion of the Gulf of Finland, the Neva mouth and delta are the lungs of Petersburg and should never be corked."

Those lungs are now severely afflicted by pollution, compounding the problem. The 74-kilometer [44.6-mile] Neva River flows from Lake Ladoga through Leningrad and into the Gulf of Finland. It carries not only Leningrad's waste water, about half of it untreated, but also a heavy load of industrial, agricultural, and residential pollution from the great lake's 273,300-square-kilometer [109,230-square-mile] watershed. Lake Ladoga is the largest lake in Europe and was once known for the purity of its drinking water. It now blooms with blue-green algae.

If the dam interferes with the Neva's outflow, this pollution will back up. Before the dam, 60 percent of the Neva's flow entered the Gulf of Finland north of Kotlin Island, the rest flowed to its south. A compensating current, brought by easterly winds, flowed inland along the south shore, maintaining the water exchange. When the barrier closed the northern channel, the entire flow was redirected toward the south and the weaker compensating current was cast back to the gulf. "They literally dammed off the oxygen from the mouth of the Neva," observed Sergey Tsvetkov, a geologist-geophysicist and also a member of the visiting group. A stagnant area has developed behind the barrier along the northern coast, he said. On the southern shore, Leningrad's most popular beaches receive a waste-laden current.

A commission of the Academy of Sciences of the U.S.S.R., on which Tsvetkov served, has urged that construction stop until two alternative solutions are analyzed: either completely dismantle the dam or convert it to a bridge with locks that can be closed in the event of flood. The academy has since adopted the commission's report.

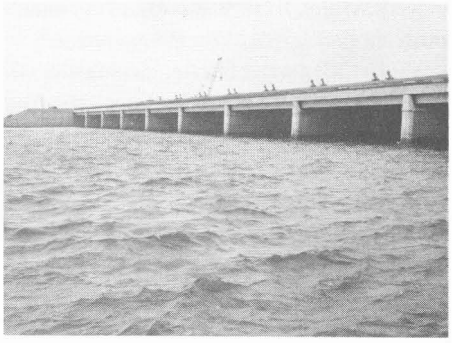
Tsvetkov has also proposed that a Soviet-Finnish National Park be created on the Isthmus of Karelia to preserve the unique ecosystems of that area. Such a park, open from both countries, "would serve as a stimulus for solving the ecological problems of the entire Leningrad region," he recently wrote.

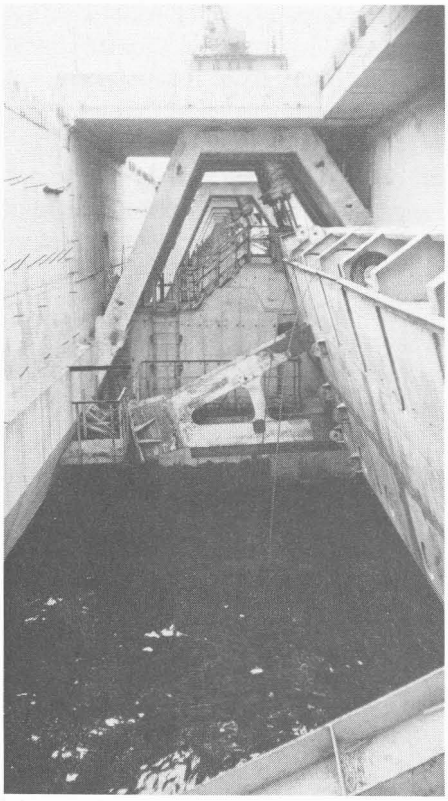
The controversy over the dam has

catalyzed a growing environmental movement in Leningrad, according to W. Edward Nute, of Nute Engineering in San Rafael, who led an American delegation of engineers to Leningrad in 1988 and viewed the barrier. A dreadful mistake could become the seed of some highly creative solutions. ❐

(Bottom): One of six sluice gate structures under construction, with gate operators protruding above. Each structure has several gates. (Right): Sluice gate from inside, on rotating axis. (Below): Open sluice gate.

Photos: W. Edward Nute





Canine Access

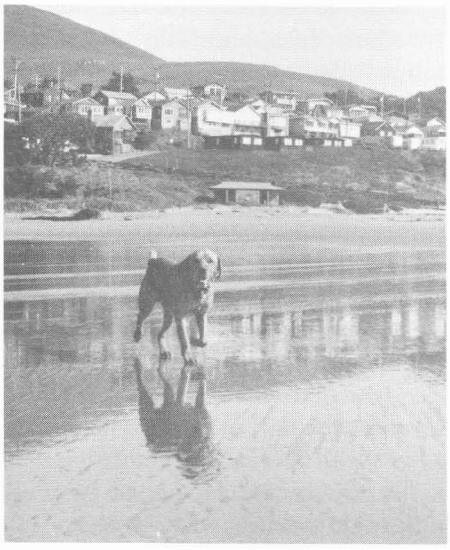
Continued from page 24.

where dogs are allowed—as they have done at Point Isabel, in Richmond.

After two dobermans attacked a ranger at this bay front park in the East Bay Regional Park District three years ago, dog walkers formed Point Isabel Dog Owners (PIDO), and pledged to keep the park clean and tranquil. They have succeeded.

"This park is easier to maintain than others," said Ranger Al Sterling. "Ninety percent of them pick it up." The chore is made easy by the availability of trash cans and of plastic bags in wooden boxes mounted on posts along paths. PIDO members keep the boxes stocked. They will chastise anyone who permits bird chasing or walks away from poop. Some have even taken the Poop Picker pledge to pick up any poop they see. All well-mannered dogs may be off leash except dobermans and pit bulls.

Still, there is the occasional dog owner who believes his dog can do no wrong, said Helen Klebanoff, PIDO's liason with the park district. "At Point Isabel they're confronted, but after one or two times they don't come back, they go somewhere else." She is sympathetic to park rangers' attitudes: "If dog owners don't behave," she says, "they get what they deserve." To deserve better, PIDO's Sylvia Schild (1321 Carlotta, Berkeley, CA 94703) is at work on a booklet to help other citizens follow PIDO's example. ❐



KAREN RUST

Book Reviews

The Big Spill

In the Wake of the Exxon Valdez: The Devastating Impact of Alaska's Oil Spill, *by Art Davidson. Sierra Club Books, San Francisco: 1990. $19.95, 224 pp*

Art Davidson's new book about the big spill, *In the Wake of the Exxon Valdez*, is a horror story that many readers will have to put down frequently while they try to regain their composure.

Unfortunately, the book is not fiction, but a true, footnoted account of the trail of human failings that led up to the *Exxon Valdez* oil spill, then prevented containment of the slick, and finally hobbled shoreline cleanup attempts. Davidson tells the spill story objectively and seldom sensationalizes—the simple facts are frightening enough.

Deceit practiced by an industry devoid of a sense of public accountability, the gullibility of the American public, and the duplicity of the U.S. Department of the Interior all helped pave the way to March 24, 1989.

Once the oil escaped the tanker, confusion about authority and an utter lack of preparedness prevented the slick's containment, and when it came time to clean the poisonous slime from Alaska's beaches, litigation concerns and public relations guided the cleanup campaign more than environmental considerations.

Davidson is promoting no special interests (except, perhaps, reason and compassion), and he is protecting no one, so he names names. The government of Alaska and most of its people were captured by Big Oil long ago, rendering the state's regulatory agencies impotent. (Davidson introduces us to Alaskans who express keen remorse about this.)

The U.S. Coast Guard had been asleep at the wheel for years by the time the spill hit. And after a decade of pro-industry disregard for the environment in Washington, D.C., even the National Park Service and U.S. Fish and Wildlife Service were under the thumb of anti-environmentalists who spent more time trying to discount the gravity of the *Exxon Valdez* oil spill than on saving shorelines and wildlife.

"There was no longer any morality in the conventional, old-time sense. The morality that began guiding everybody's actions was defined by liability laws and the bottom line," Bob LeRescha, a state official, tells the reader.

The environmental toll was tremendous. The 36,460 oil-killed birds, 1,016 sea otter corpses, and 151 dead eagles recovered represent only a fraction of those actually killed by the spill, biologists agree. The less-visible impacts are still being assessed.

The social damage was severe as well, if difficult to quantify. Alaskan Natives in villages in the path of the oil received insufficient attention from Exxon or the press, but they lost the most. Their security always had come from the ocean and the beaches, which fed them and surrounded them.

But when the tides brought oil ashore, fishing and food-gathering were replaced by oil cleanup jobs and food giveaways.

"We fight a rich and powerful giant, the oil industry, while at the same time we take orders and a paycheck from it. We are torn in half," said Aleut Chief Walter Maganack, Sr., during the spill.

Davidson provides few new insights into the spill's effect on indigenous Alaskans, perhaps because he faced the same problem that other non-Native authors face: difficulty in describing the depth of Natives' attachment to nature.

Nonetheless, *In the Wake of the Exxon Valdez* is well-peopled throughout, like all good books, and rich in quotes. Only occasionally do people say things that probably aren't true, like the woman who says that someone else told her that Exxon sent workers out to shoot oiled otters and seals before they could be rescued.

Despite all the evildoers in this book, heroes emerge, some unexpected: bureaucrats, commercial fishermen, a magazine publisher, a Coast Guard admiral, even a top Exxon executive. But most of the heroes were just citizens who cared more about the environment than money or position.

Davidson distills a potentially numbing abundance of information about a complex catastrophe into an unadorned, highly readable account. *In the Wake of the Exxon Valdez* clears away the clutter and proves some key points: America is unprepared for large oil spills, industry is quite able to mesmerize the public, corporations tend to be unethical, oil is a devastating pollutant, laws designating spill-response authority must be changed.

This book is an ideal primer for those just learning about the spill. Those who already know a lot about it will be reminded of many things they wish they could forget.

Reviewed by Joe Bridgman, who was editor of the weekly Valdez Vanguard *when the big spill hit his community. He became spokesman for the Alaska Department of Environmental Conservation Spill Project and is now information officer in the department.*

A Chilling Wind

Midnight Wilderness: Journeys in Alaska's Arctic National Wildlife Refuge, *by Debbie S. Miller. Sierra Club Books, San Francisco: 1990. $19.95, 239 pp*

Debbie S. Miller is both a powerful spokeswoman for Alaska conservation and an evocative writer. Her relationship to this northern land is a love affair, pure

and simple. The vast, uncluttered, wild, and remote landscape of northern Alaska is clearly her heart's home.

In 1975, she and her husband, Dennis Miller, left secure teaching positions in Corte Madera, California, to follow their dream of living in a faraway wilderness. They were drawn north by visions of summer trips into remote Arctic regions where caribou, musk oxen, grizzly bears, polar bears, and wolves still roam free. To earn a living, Debbie signed on as a teacher at Arctic Village, a small native enclave near the southern border of the Arctic National Wildlife Refuge. Dennis went to work as a pilot flying wildlife surveys for the Fish and Wildlife Service; but it was their summer trips across the coastal plain and mountains of the wildlife refuge that caused the Millers to embrace this frozen land and to fight for its life.

Having been to northern Alaska myself, I know how seductive this immense landscape can be. There are really no words to describe the freedom one feels when surrounded by thousands of square miles of unfenced wilderness without trails. But nothing this exceptional comes easily. At the lower end of the Alaskan food chain are insects that swarm around your head in numbers you didn't think possible. On the higher end are large mammals that can chew your arm off.

To Debbie Miller, however, a much bigger threat than any grizzly bear is the very good chance that her beloved land will be devoured by the oil industry. Most of *Midnight Wilderness* is a tribute to the beauty, wildness, and diversity of plant and animal life in Alaska. But when Miller switches to oil fields, she shifts to spare prose. After describing blue-green pools of light glazing the surface of glaciers, or the brilliant, dancing colors of the aurora borealis in the winter sky, or the spectacle of the Porcupine caribou herd during the postcalving season, she tells of the oil industry's presence in the northern landscape.

While exploring an abandoned construction camp near the Prudhoe Bay oil fields west of the Arctic Refuge, her two-year-old daughter, Robin, discovers caribou tracks "amidst the trashed shoreline." The child scrambles up a bank to investigate and finds that discarded junk encircles the old camp.

"Stacked on wooden pallets are rolls of sheet metal, boxes of stovepipe, telephone wire, portable toilets, an old washing machine . . . numerous cans of paint, a rusted water heater, tires, lubricant, antifreeze cans, and crates, one of which is labeled '1975 Mobil Oil Permafrost Cement. Reusable Container. Return to Anchorage.' "

Later in the morning, mother and child walk out on the green tundra thinking that they can escape the trash. "Wrong," Miller finds. "It is all over the place. Every dozen steps or so we stumble upon a piece of plastic, a paper product, or most frequently Styrofoam. . . the ubiquitous cups are sprinkled all over the tundra and stand out like white male ptarmigan on their summer nesting grounds."

One of the most interesting scenes in the book is the discovery of a plane wreck during a weeks' long backpack trip Miller took with a companion. Investigation later determined that the plane belonged to Clarence Rhode, Alaska's Fish and Wildlife Service regional director during the 1950s, who mysteriously disappeared over 30 years before during a flight in the remote bush.

Rhode was an avid spokesman for the creation of an Arctic National Wildlife Refuge. Although his dream did come true two years after his death in 1958, he would not be happy with the recommendation of his former employer, the Department of the Interior, that the coastal plain within the refuge be opened for oil exploration. Miller argues that in a place as sensitive as this, where caribou congregate to bear their young and feed on the rich plant life of the short summer, where polar bears produce tiny cubs in dens near the pack ice, where thousands of migratory birds breed, nest, and fledge before heading south to warmer climes, where arctic char and grayling swim in unpolluted waters, that the presence of drill rigs, waste ponds, pipelines, buildings, roads, and "support" facilities will inevitably destroy the pristine character of one of the world's last true wildernesses.

"A chilling wind moans through the broken window" of an old trailer as Miller and her daughter wait at the abandoned camp for her husband to return in a plane and take them off on another adventure in the Arctic National Wildlife Refuge.

A chilling wind indeed.

Reviewed by Carol Arnold, project analyst for the State Coastal Conservancy.

Golden Gait

Park Guide: Golden Gate National Recreation Area, *Text by Ariel Rubissow, design by Reineck and Reineck. Golden Gate National Park Association, San Francisco: 1990. $12.95, 96 pp*

Into 96 beautifully illustrated pages, the Golden Gate National Park Association has managed to pack a pertinent smidgeon of information about almost every dell, nook, and cranny within the 114 square miles of the Golden Gate National Recreation Area. In some hands, such a compendium could be deadly dull. This pocket guide, however, a slender 4 1/2 x 10 inches, is a butterfly of a book.

As handy as a dictionary and consis-

tently pleasurable to use, the guide is cleverly laid out in small paragraphs interspersed with a wide variety of line drawings, historical photos, colored type blocks, and four-color maps. It is surely going to become the easy-to-use reference every northern Californian and visiting park user will want to install permanently in the glove compartment or jacket map pocket.

Logically arranged, the guide opens with a frontispiece of a hiker on a trail in the Marin Headlands, looking across the blue of San Francisco Bay toward the chalky whites of the Camelot city. If ever there were a tantalizing invitation to come along, this is it. Flip the page and there is a map of our great Golden Gate National Recreation Area spread along the shores surrounding the Golden Gate Bridge, south to the Sweeney Ridge, and north to Tomales Bay.

Like someone crooking a finger that says "come along with me," the following introductory pages give a few park highlights and tips for visitors. This little smörgåsbord of information is followed by another fine colored map that introduces the southern section of the GGNRA, the first half of the book. The list of maps in this section alone reads like a travelogue: San Francisco's northern waterfront, Alcatraz Island, Fort Mason, Fort Point, the Presidio, Baker Beach, Lands End, Fort Miley, Cliff House, Sutro Heights, Ocean Beach, Fort Funston, on down the Peninsula to Milagra Ridge and Sweeney Ridge. The second half of the book goes north and is equally encyclopedic.

Historical, geological, architectural, biological, and botanical tidbits are inserted in the pages adjacent to the pertinent maps. Lightening the text are practical pointers on where to wind surf, for example (Crissy Field offshore, or Ocean Beach), how to identify hawks overhead, what time of day or year is best for walking different trails, self-guided tours of some forts, information on ranger-led tours at others, or at lighthouses. There is even that seldom-specified guidebook information—where to find the toilets.

In its welcoming paragraphs, the guide says "wherever your fancy takes you, the Park will bewitch you with its contrasts." So will this charmer of a book.

Reviewed by Margot Patterson Doss, columnist for the San Francisco Chronicle *and author of many books and articles on walking.*

Endangered Species

The Endangered Species Act: A Guide to Its Protections and Implementation, *by Daniel J. Rohlf. Stanford Environmental Law Society, Stanford: 1989. $12.00, 207 pp*

In 1973, Congress enacted a remarkable piece of legislation. It was a period of rising public consciousness about the impacts of human activities on nature, when much of today's environmental law was being written. Most of these laws sought to limit or control human impact—the Clean Air Act by establishing air quality standards, the Coastal Zone Management Act by encouraging state planning and protection of coastal resources, and the National Environmental Policy Act by seeking to inform the processes of governmental decision-making, to name but a few. With respect to the harmful activities themselves, however, it was generally a matter of balancing competing objectives, of modifying the way things were done, without really addressing the question of whether they should be done at all.

The Endangered Species Act, by comparison, was a dramatic response to an otherwise irremediable problem: the extinction, or potential extinction, of entire species. It boldly outlawed federal agency actions that would jeopardize the continued existence or adversely modify critical habitat of endangered species. It also made illegal actions by others (including private interests) that directly or indirectly harm them. As Daniel J. Rohlf dares to point out, this approach is so radical that it is possible to believe that Congress, in elevating the goal of species conservation "above virtually all other considerations," did not really know what it was doing.

Whether or not Congress intended the rather extraordinary consequences implicit in the Act, there is no question that it has shaken up some major projects. Even so, things don't always work out in favor of the snail darter, the spotted owl, or other endangered species. Here to explain why or why not (and to suggest a little of how it ought to be) is a sort of Everything You Always Wanted to Know About the Endangered Species Act—a clear, readable, and informative exposition of the Act's major provisions with generous discussion of its legislative history, administrative interpretations, and developing case law. It's useful as an introduction to the Act or as a tool for further research or speculation. More than the guide through 16 U.S.C.A. §1531 to §1544 that it aims to be, this book will tell you how things really work and how they got to be that way. (In May the National Wildlife Federation awarded Rohlf its Environmental Publication Award.)

Copies can be ordered from the Stanford Environmental Law Society, Stanford Law School, Stanford, CA 94305. Be sure to include $1.50 for shipping and handling, and add California sales tax. ❐

Reviewed by Marcia Grimm, staff counsel to the State Coastal Conservancy.

Letters to the Editor

Angel Island Eucalyptus Defended

Editor:

Margaret Azevedo's article ["Of Eucalyptus and Ecology"] did not reflect some issues noted by myself and others in the debate about the exotic species removal program on Angel Island.

With one-third of the 416 plant species on the island of exotic status, the decision to focus virtually exclusively on eucalypts was driven by the fact that private loggers were offering to clear-cut the trees and pay Parks [State Department of Parks and Recreation] 10 cents/ton for the timber. In some places this was profitable; on Angel Island, with $40,000 in barging costs and unknown future rehabilitation costs (the Park budgeted at least $50,000), the Park might not turn a profit, but they saw this as an opportunity to subsidize their exotic species removal program. They never checked whether other exotic plant species might be doing more ecological damage than eucalyptus—*i.e.*, there was no attempt to prioritize efforts on ecological grounds. It was only when P.O.E.T. [a group opposing the cuts] forced the Park to conduct scientific studies that they did so; by then eucalypts at Annadel State Park had been removed.

Azevedo is one-sided in her account of the report of these studies. The fact is that 57 percent of the bird species were found in both eucalypts and native oak woodlands, and 8 percent were found only in the eucalypts; total abundance was equal in the two stand types. The principal salamander species was found in three times the density in eucalypt stands than native woodlands. The two monarch bivouac sites in eucalypts found on Angel Island are part of only about 120 bivouac and overwintering sites extant throughout the wintering range of the monarch in western North America, and there is now a state law to map and develop conservation plans for such sites. Much remains to be known about the use of eucalypts in California by native wildlife, but it is legitimate to look before leaping, or clear-cutting.

Not all eucalypt cover will be replaced by native species. In fact, the state park agency indicated that they would be satisfied if half the "restored" acreage were exotic species. Most of the exotics that will come in to the "restored" shrublands will be grasses and herbs with wind-blown seeds that are more prolific and longer-dispersed than eucalypt seeds. If the park agency pursues a blind policy of removing only the more easily controlled exotics, in a few years we will be left with more resistant, harder to control exotics.

Azevedo also states that the legislative mandate of the Public Resources Code does not favor eucalypts. In fact, the code requires the state to replace "exotic plant species capable of naturalizing in California with native or noninvading species." One of the first points made by P.O.E.T. about eucalypts was that they were neither naturalizing nor rapidly invading. On Angel Island, their rate of spread was 1-3 meters per year. Compare this to thistle, broom, and oat grass, which can spread kilometers per years. Until the loggers came, approved management for eucalypts called only for trimming and containment.

The park agency rejected the obvious alternative that would have satisfied many critics: selectively cutting eucalypts and planting natives in the gaps, so that eucalypts would be replaced with natives, without a transition period of bare ground. The park agency rejected this on the ground that the loggers would only find clear-cutting economic. They were managing state parks like national forests, using biodiversity as cover. Are we not seeing here a policy driven by woefully inadequate funds rather than sound science?

Azevedo traces the Park's exotic species policy to Aldo Leopold "in the early 1900s." In fact, the policy she refers to was promulgated by a committee headed by A. Starker Leopold in 1963.

Readers may refer to two of my articles for more information: "Managing for biodiversity: unresolved science and policy questions," 1990, *BioScience* 40: 26-33. Soon to be published: "Park management of exotic plant species: problems and issues,"1990, *Conservation Biology*.

Walt Westman

Walt Westman is an ecologist who has published two technical books and more than 80 scientific articles. He is a staff scientist at the University of California's Lawrence Berkeley Laboratory.

Margaret Azevedo replies:

Dr. Westman caught me out on the Aldo Leopold item. I should have used "preservation" in connection with Aldo, not "restoration." Aldo's concept, according to Webster's *American Biographies*, was "to preserve ecologically sound regions undisturbed by man." As Westman said, it was the son, A. Starker Leopold, who promulgated restoration.

However, I believe it is correct to trace the resource management policy to Aldo since preservation led to restoration, and the Parks Department is interested in both.

The rest of Dr. Westman's critique illustrates a point I made in my article: Here is a clash of values that science can't resolve. Dr. Westman's discussion of scientific aspects of resource management may be quite valid—he has credentials in the field. But it does not establish that the value judgment made by the Parks Department—a preference for its version of a restored habitat over a eucalyptus grove—is wrong, only that his is different. ❐

JAN JUE

No Mystery Here

Although we know you can't fool all of the people all of the time, we were hoping we could at least fool most of our readers with last issue's mystery photo. At last count, however, 23 of our readers had correctly identified it as a section of the Bay Model, without water. One of the correct answers came from coastal planner Mary Boyd-Broemel, from the faraway state of Maine. Loren E. Young told us he was one of the people who had collected data over 26-hour tide cycles around the bay and delta for use in building the model. Tom Wakeman told us it was his office, which doesn't mean his work is a bed of nails, but rather that he is the model director. Speaking of which, there was less consensus on what those pegs are sticking up out of the floor of the model. "The copper strips permit adjustment of frictional resistance to accurately reproduce prototype tides, currents, and salinities," according to a sign on the model. They are not electrically charged, as some readers thought. The 1.5-acre Bay Model, one of the largest hydraulic models in the world, reproduces the rise and fall of tide, flow, and water currents, mixing salt and fresh water, and indicates trends in sediment movement. It lets people see what effect their proposed projects would have on the bay by using the model instead of the bay itself as a laboratory. (To see what happens without a model, read the article on Leningrad, p. 51, in this issue.) The Bay Model is at 2100 Bridgeway, in Sausalito. A ten-minute video explains how it evolved out of an idea to dam the bay in two places to create two freshwater lakes (see Waterfront Age, *Fall 1985, p. 15). Summer visiting hours are Tuesday through Friday, 9-4, and weekends and holidays, 10-6. Ranger-guided tours of the model are available by reservation for groups of ten or more. For more information, call (415) 332-3870.*

Mystery Photo

"Almost heaven, West Vir. . ." Whoa, almost gave it away! (Not really). Guess the location of this amazingly graceful photograph, and win the prize of a lifetime, a free subscription to *Coast & Ocean*.

JOHN MACIUIKA

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