Volume 7, Number 3

Summer 1991

California

Coast & Ocean

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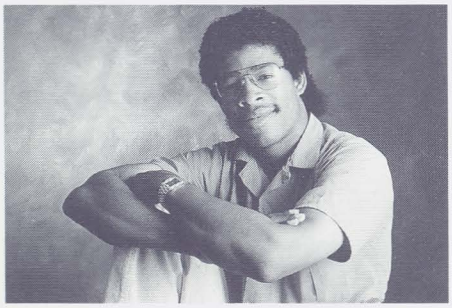

Cover Artist: Photographer Steve Hellon has spent his first year at CalTrans cleaning up after the Loma Prieta earthquake of 1989: prior to beginning his series on the destruction of the Embarcadero Freeway, he covered the demolition of Oakland's Cypress structure. Although he began as a portrait photographer, Steve has enjoyed the transition to photojournalism at CalTrans. "It's fascinating to piece together a story from photographs," he says—as long as the pieces don't come down on you!

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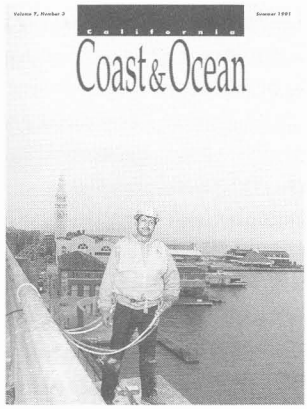
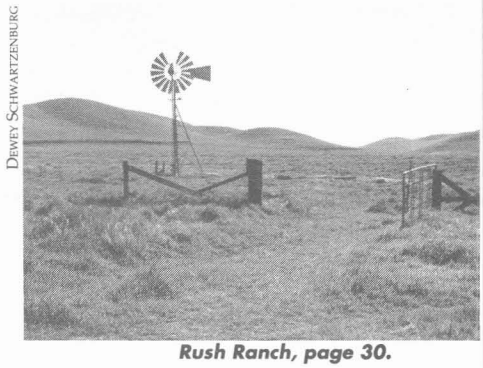


Cover: Antonio Ortega, of SuperStructures, ready to change the face of San Francisco's waterfront. Photo by Steve Hellon.



Rush Ranch, page 30.

Printed on recycled paper.

From the Executive Office

My modest little Persian prayer rug has the classic design of the Garden of Paradise, a lush oasis of trees and lots of water–a fitting vision for denizens of the desert. From recent news stories in this time of fiscal crisis and the fifth year of the great California drought, one might conclude that a profitable venture could be production and sale of California prayer rugs, with a suitably aqueous motif and directions to point it northward toward British Columbia, or at least the Klamath River. But now the dream of tapping the water-logged north to drench this ever-growing state (much of which is semi-arid or real desert) has formidable competition: desalination. The ocean is being viewed as an endless source of fresh water, if only you distill it or push it through filters to remove the salt. Seems like a good idea, especially in times like these, when we have to ration our water consumption and paint our lawns green. Since in this society we are not prepared to control population growth, migration, and development (even assuming we could, which is doubtful), desalination suddenly appears as another great quick fix for a host of issues. Anyway, people don't like to change their habits unless they absolutely must, and so simply finding a new water source enables us to continue business as usual, albeit at higher cost.

Since in this society we are not prepared to control population growth, migration, and development (even assuming we could), desalination suddenly appears as another great quick fix for a host of issues.

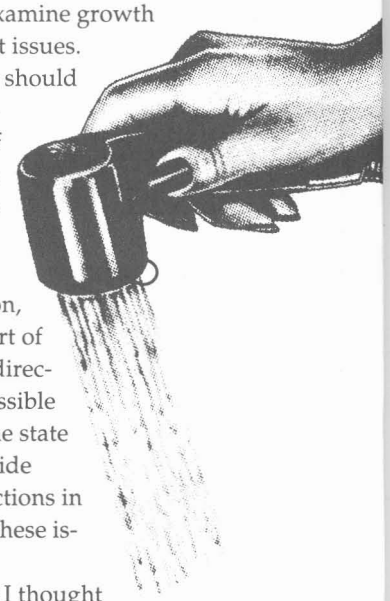
As usual, however, when one rushes ahead in crisis response mode, many questions may be left unanswered and unexplored. This is presently the case with desalination. Little or no attention is being given to numerous issues that could have very profound environmental and economic implications. As Regina McGrath notes in her article in this issue, many questions concerning the potential impacts of desalination technology on nearshore waters and the coast are only just beginning to be formulated. Already nine desal plants are functioning in California or offshore and fourteen more have been proposed, making California the current national leader in promotion of desalination.

Yet we do not know how marine organisms will be affected by large intakes of sea water, and the discharge of concentrations of brine back into the ocean. This is important, when one considers that roughly two-thirds of all marine life originates or uses coastal waters. Similarly, we have not yet examined desal-related energy impacts, and resultant potential air quality effects and growth-inducements in areas where the natural environment cannot sustain more development. These are just a few of the more obvious concerns. The present high short-term costs of desal technology may turn out to be a lot higher over the long run, if unplanned-for negative impacts do occur.

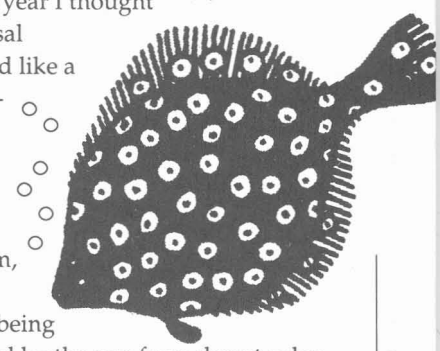
It is ironic that in this age of "fiscal conservatism," when we are pre-occupied with spending cuts, belt-tightening, cutting out the fat, and generally adopting a posture of wishful leanness and meanness, we give no thought to what could be tremendously costly consequences of actions taken now without proper forethought. That's fiscal irresponsibility.

Mercifully, there is a simple answer to this quandary: Do the studies, and monitor closely and in detail each desal project approved because of "emergency" reasons; in short, treat each effort as a trial or demonstration to be evaluated for its benefits and its costs, both financial and otherwise.

In addition, under new leadership we finally have a state-sponsored effort underway to examine growth management issues. This activity should include consideration of desalination implications for growth in the coastal region, and what sort of guidelines, direction, and possible assistance the state should provide local jurisdictions in addressing these issues.



Last year I thought that desal sounded like a promising solution to a nasty problem, with power being supplied by the sun from desert solar power generating installations. Nice and simple. It's a lot clearer to me, now, that our unique American genius for pragmatically seeing a problem and moving directly to solve it needs to be tempered more with sober consideration of the implications. The effects of our technological solutions require rigorous ongoing examination. After all, this is the prudent thing to do, as the root for the word "conservation" attests. We do frown on radical action, don't we? ❐



Faucet Courtesy of Plumbing Dept., Ashby Lumber, Berkeley

Ebb and Flow

Recent Conservancy Actions

The California Coastal Conservancy enabled diverse new projects to begin and others to continue along the entire coastline and on San Francisco Bay. Efforts in the first half of 1991 include:

• In northwestern **Marin County,** a resource enhancement plan for the **Estero de San Antonio** is now being prepared by the Marin County Resource Conservation District (RCD) with up to $100,000 authorized by the Conservancy in January. The five-mile-long estuary, identified by the Department of Fish and Game as one of the 19 most significant coastal wetlands in California, suffers from several problems: poor water quality, sedimentation from watershed erosion, livestock trampling wetland vegetation, and a need for revegetation and enhancement measures in watershed creeks and the estero itself. The plan is being developed with guidance from an advisory committee of landowners, resource agencies, conservation groups, and the RCD.

• In southern **Sonoma County,** one of the largest properties on **San Pablo Bay** will be appraised with the aid of $8,000 authorized to the Sonoma Land Trust. The 2,000-acre **North Pointe Property**, at the intersection of Highway 37 and Lakeville Highway, is for sale and has significant open space, recreational, agricultural, and wetland restoration values. About half the land is rolling grassy uplands; half is diked historic marshes.

• In **San Luis Obispo County,** up to $46,000 in approved assistance is enabling the San Luis Obispo Land Conservancy to prepare an enhancement plan for **Black Lake Canyon**, which drains into wetlands within the Nipomo Dunes. The canyon, dunes, and wetlands provide outstanding contiguous habitat for many species of plants and wildlife, including one plant that grows only in Black Lake Canyon. The Land Conservancy intends to set up an ecological preserve within the Canyon, working closely with willing landowners, the county, and others; it will also evaluate whether limited public access is appropriate.

Mostly privately owned, Black Lake Canyon has been a problem for the county for many years because of zoning restrictions. The plan will serve as a guide to resolving conflicts by offering landowners alternatives to regulation, such as Land Conservancy acquisition of properties either in fee or by easements.

• In **Orange County**, with assistance of up to $75,000 from the Consevancy, the nonprofit Laguna Greenbelt Inc. is preparing an enhancement plan for the **Laguna Canyon watershed**, concentrating on the area around the Laguna Lakes in the upper watershed. The plan will take advantage of an opportunity to restore and enhance the Laguna Lakes, the only known natural lakes in Orange County. The drainage system of Laguna Canyon relies on water percolating from the upper to the lower canyon through these lakes, several freshwater marshes, and a series of fens—a habitat system rare in Southern California—which support many waterfowl and birds. Neglect and poor management have led to a number of problems (sedimentation, pollution from runoff, and invasive nonnative plant species), and the drought has added to the decline of the lake ecosystem. The plan will analyze the watershed's natural resources and operations, recommend restoration and enhancement projects, identify specific measures to minimize upstream impacts, recommend public access and interpretive improvements compatible with habitat constraints, and develop a long-term management plan for the lakes. Laguna Greenbelt Inc. , will coordinate the plan with the active involvement of the city of Laguna Beach, Orange County, the Irvine Company, and the Coastal Conservancy.

• By approving the El **Segundo Dunes Interim Restoration Plan,** and authorizing disbursement of up to $75,000 to the **City of Los Angeles** for implementation, the Conservancy has enabled the city to restore portions of a 200-acre dune preserve, owned by the Los Angeles Airport Commission, by removing invasive vegetation, and revegetating with native plants. The project site, west of Los Angeles International Airport, supports over 900 species of plants and animals, including the federally listed endangered El Segundo Blue butterfly. A recent study of dune habitat,

City of Manhattan Beach

Getting Down to Business

Conservancy Board Member Reginald Dupuy strikes the first blow to demolish the Manhattan Beach Pier. The Conservancy funded a portion of the costs of pier restoration, to be completed in 1992.

funded by the Airport Commission, warned that the El Segundo dune ecosystem is in a state of collapse, undermined by past developments, sand mining, and invasive vegetation. A number of endemic species face extinction without prompt habitat restoration. The interim restoration plan, when implemented, will provide a critical link between past small-scale restoration attempts and a future full-scale restoration program for the dune preserve.

• The **City of Long Beach** will demolish and replace two 80-year-old wood stairways in **Long Beach's Bluff Park**, at the ends of Molino and Coronado avenues, with $120,000 from the Conservancy. The city will contribute $120,000 to the project, and the Long Beach Conservation Corps will perform some of the work. The deteriorated stairways have become a public safety hazard. The new stairways will be built of concrete, with aluminum railings and lighting. The bluff will be stabilized and landscaped to stop erosion and slippage.

• Using up to $300,000 in Coastal Conservancy support, the **City of Petaluma** is preparing a detailed, comprehensive resource enhancement, urban waterfront restoration, and public access plan for five miles of the **Petaluma River** within city limits. The city has begun an ambitious and visionary program designed to center its downtown around the Petaluma River, to protect and restore natural resources along the river and its tributaries, to provide continuous public access along both banks, and to take essential flood control measures. Because many new proposals for riverfront development have been made, the city needs a detailed template to identify property needed for public access and wildlife habitat, and to provide schematic designs for access and wildlife improvements, standards for compatible development, and mechanisms for securing property dedications and implementation funding.

• In the third phase of its Nipomo Dunes Enhancement Program, the Coastal Conservancy approved the **Nipomo Dunes Preserve Management Plan** and authorized initial implementation. The Nature Conservancy received up to $552,000 to undertake an appraisal and to construct the Eric Seastrand Memorial Visitor Center south of the Santa Maria River near the beach, a boardwalk at Oso Flaco Lake, and other facilities at the West Main Street and Oso Flaco Lake entrances to the preserve. The Coastal Conservancy has worked closely with The Nature Conservancy to establish the Nipomo Dune Preserve. Presently comprised of about 4,000 acres of sand dunes, wetlands, and beach, the preserve may be expanded if agreements with landowners can be negotiated. It will be managed by the Nature Conservancy under agreement with the Coastal Conservancy, State Department of Parks and Recreation Off-Highway Motor Vehicle Division, and the **County of Santa Barbara**, all of whom hold interests in land within the preserve.

• **Santa Cruz County** is building access improvements at three of its north coast beaches, and fencing environmentally sensitive areas at Laguna Creek. The county will construct restrooms, parking, and access ramps accessible to wheelchair riders and the blind at Davenport Landing; construct access trails and parking and restore dunes at Scott Creek; and install trash cans, signs, bus stops, and emergency phones at all three beaches: Greyhound Rock, Scott Creek, and Davenport Landing. These scenic beaches receive 3.3 million visitors a year but they lack amenities, management, and safe, legal access. The Coastal Conservancy has provided up to $325,000 toward the $400,000 total estimated cost of the access and habitat protection improvements; the county will spend $75,000 for parking improvements at Scott Creek and will also provide regular maintenance and law enforcement, estimated to cost at least $5.2 million over the next 20 years. The county may also incur costs in the acquisition of access easements at Davenport Landing or Laguna Creek.

• The Coastal Conservancy adopted the **San Lorenzo River Enhancement Plan** and authorized the disbursement of up to $200,000 to the **City of Santa Cruz** to implement the lagoon management component. The plan provides an important framework for flood control improvements and ecological restoration on the lower 2.2-mile reach of the river through the city. It establishes the compatibility of riparian habitat within the flood control system and provides detailed recommendations for revegetation and vegetation management standards. In addition, the plan establishes a program for managing and enhancing the biological value of the seasonal lagoon at the river mouth. Because of this plan, which includes specific flood control recommendations, the city and the U.S Army Corps of Engineers have agreed to a joint pursuit of a new flood control plan for the river. Revegetation will take place after the improved flood control works are built. Only the lagoon management component is being undertaken at this time. The San Lorenzo River Lagoon provides vital habitats for anadromous, marine, and freshwater fish species, invertebrates, and waterfowl. The lagoon is especially important to the declining population of young steelhead trout. Implementation of the recommendations for a lagoon water level control program

will be a significant step toward recovering aquatic resources in the river and upstream.

• The Manila Community Services District received up to $170,000 to help implement Phase I of the Conservancy-approved **Manila Dunes Access Plan** by acquiring the 82-acre Rudd property, along the North Spit of Humboldt Bay in **Humboldt County**. The District proposes to form the Manila Dunes Recreation Area to provide public access and recreational uses, protect and restore dune resources, establish a hostel, and build an interpretive center.

•In May, the Coastal Conservancy authorized up to $800,000 to the East Bay Regional Park District to assist in the acquisition of 5.1 acres of the 132-acre **Sulphur Creek property,** on the **Hayward Shoreline,** for resource enhancement and public access.

The property is valued at $6.1 million, and will be purchased using funds provided by the District, Oro Loma Sanitary District, Wildlife Conservation Board, U.S. Fish and Wildlife Service, and the Conservancy.

All parties to this acquisition will enter into an agreement to ensure that the property will be operated, managed, and maintained for wildlife habitat preservation, resource enhancement, and public access purposes.

• The **City of Half Moon Bay** received $300,000 to build a three-mile section of the approximately six-mile-long Coastside Trail. The blufftop trail will run along the entire length of the city's shoreline and provide beautiful views of the coast for hikers, bicyclists, and in some areas equestrians. It will link Pillar Point Harbor, Half Moon Bay State Beach, and the public recreation facilities to be developed by the Conservancy and the California Department of Parks and Recreation at Cowell Ranch, south of Half Moon Bay. The trail will also be a major addition to the Coastal Trail system and will be of great regional significance in an area that receives over 2 million visitors every year.

DEWEY SCHWARTZENBURG

Birdwatching, Airport-style

Millbrae's recently completed Bayfront Park, at the south end of San Francisco International Airport, is a favorite spot for watching airplanes take off and land. And, despite the noise, it is also possible to see birds here. The Coastal Conservancy provided one third of the $86,500 needed to develop this park, while the City of Millbrae and the Westin Hotel, across the street, split the rest of the cost.

• The **City of San Diego** will receive $100,000 to develop an enhancement plan for the **Famosa Slough and Channel**, an important urban open space and wildlife resource in the Point Loma district of the city near the junction of West Point Loma and Famosa boulevards, adjacent to the San Diego River and Mission Bay. The property, a remnant of the original Mission Bay marshland, has been the subject of intense controversy for over a decade as its owners attempted development. The city plans to restore the Slough and Channel to its full potential as an urban wildlife preserve, without development. A very significant feature of the plan, to be developed by consultants for the city of San Diego, will be to reconcile public access needs with the protection of wildlife resources.

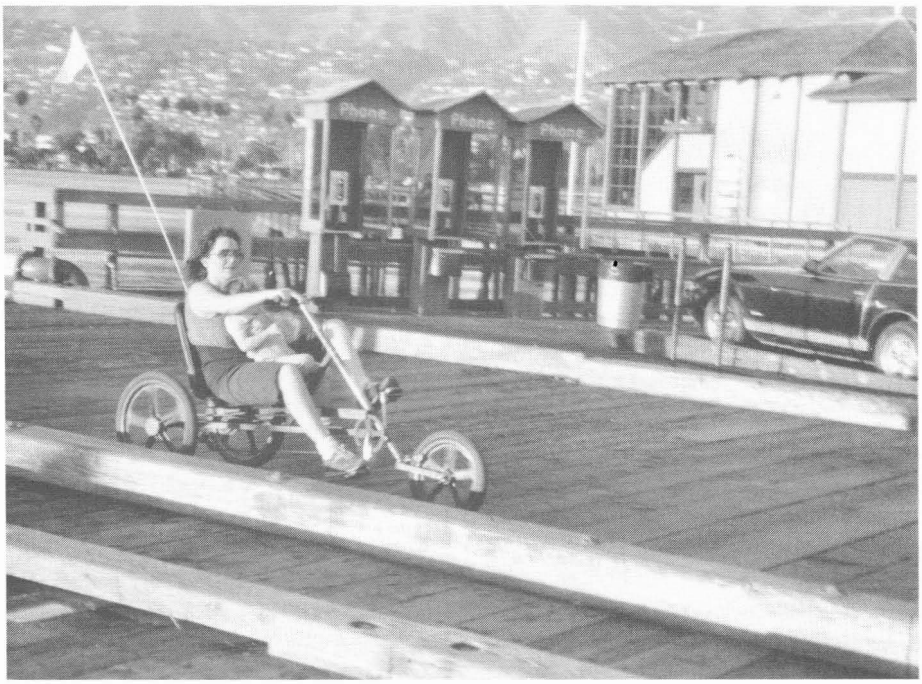
• The **City of Trinidad, Humboldt County,** received $10,000 for appraisals of selected privately owned parcels in **Trinidad Harbor**. The seven parcels under consideration are key to preserving and enhancing public access and fishing activities in the harbor area. They adjoin the Trinidad Pier and boat launch, and include most of the harbor/pier parking area, the Seascape Restaurant, a small two-bedroom house, and portions of Trinidad Head and all of Little Trinidad Head, the two promontories that define Trinidad Bay.

• The Greenspace land trust received $23,000 for preparing a resource enhancement plan for **Santa Rosa Creek** in northern **San Luis Obispo County.** Running from the hills above the town of Cambria to the ocean, this creek supports one of the most southern runs of native steelhead and in 1972 was deemed the most productive steelhead run south of San Francisco. The tidewater gobi, a candidate for the federal endangered species list, also has been found in this creek. In recent years, however, Santa Rosa Creek has suffered from some commercial development where it passes through town, and from erosion upstream. The plan will address the following problems: How and where can habitat be restored for steelhead and other creek-dependent species? How should protective conservation easements be acquired along the creek? At the creek's mouth, how can the need to keep the county's Shamel Park from being undercut by the creek be met

with minimal creek disturbance? Further up the creek, how can present grazing practices be balanced with creek protection? And how can Cambria residents and visitors learn more about how to protect their creek?

• The **City of Oakland** received $90,000 for preparing an enhancement plan for **Lake Merritt**. The lake provides a number of recreational and cultural resources, and the rare opportunity to view many species of shorebirds and waterfowl in the midst of an urban center. The only urban heron rookery in the state is on the lake's habitat islands. Though it was once a fully tidal estuary with extensive tidal wetlands, Lake Merritt now has no marsh habitat. Water quality problems, sedimentation, and nuisance algal blooms detract from natural resource and aesthetic values. The Conservancy's funds, together with city funds, will be used to investigate alternative options for remedying these problems and imprving wildlife habitat. Options include dredging parts of the lake, installing basins to trap incoming sediment, controlling shoreline erosion, improving water management, and perhaps creating a marsh between habitat islands.

• The East Bay Conservation Corps will continue its work in the Coastal Conservancy's **Sensitive Habitat Area Signing Program**, with up to $100,000 authorized in May. In the past two years, the East Bay Conservation Corps has installed the Conservancy's interpretive kiosks and panels in 14 of the 15 coastal counties and in many locations around San Francisco Bay. The Conservancy and its grantees provide these installations free of charge so that local governments and nonprofit organizations, which usually have extremely small resource education budgets, can inform the public about local resources. ❐



RASA GUSTAITIS

Coast Weeks

Thousands of Californians will flock to beaches, bays, and estuaries between September 21 and October 14 to take part in the many activities of Coast Weeks.

The kickoff, September 21, will once again be Coastal Cleanup Day. Crowds of adults and children will move along the nation's shorelines, collecting debris left by beach visitors or washed in with the tide. Last year's collections showed that Americans are getting the message. Figures compiled by the California Coastal Commission and the Center for Marine Conservation show that glass, metal, and plastic beverage containers constituted less than 7 percent of trash picked up, as compared to 13 percent in 1989. Glass bottles constituted only 3.6 percent, compared with 7.4 percent in 1989. The increase in redemption value is undoubtedly also a factor.

Coast Weeks will feature many educational hikes and tours, study groups, and restoration projects. It is also an opportunity to celebrate creative year-round work on behalf of the coast and the planet. During last year's coastal cleanup, Venice High School students were honored by Governor Pete Wilson for a project that traded neighborhood trash for trees in a Costa Rican rain forest. By collecting recyclables for three months, the students raised $1,438, which they sent through The Nature Conservancy to Costa Rica, for buying more forest land for the Guanacasta national park.

The project was the brainchild of Don Feinstein, a computer consultant and recycling activist, who visited Costa Rica four years ago and, after returning, participated on a National Public Radio panel with Costa Rica's president, Oskar Arias. Asked how Americans could help his country save its rain forests, Arias replied that "we could reach into our pockets and buy forest land to give to the Costa Rican park service," Feinstein recalled.

"I saw a way to make something happen," said Feinstein, when he heard about a local school's recycling project. He approached two high school principals with his plan. Venice High School responded by starting a school recycling program. One source of recyclables was, of course, the beach.

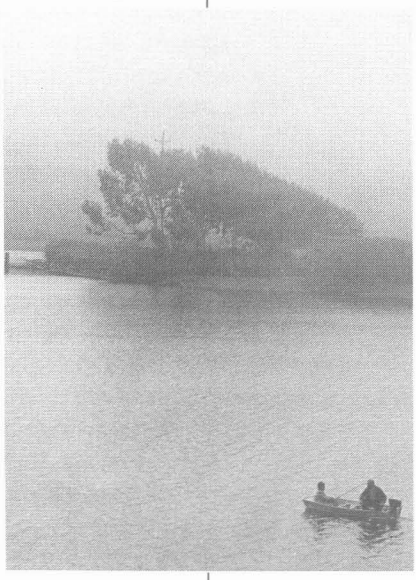
The California Coastal Commission is preparing a calendar of Coast Weeks events. Groups and organizations planning activities and wishing to be included should notify Jennifer Hightower at the Commission, 45 Fremont St., Suite 2000, San Francisco, CA 94105. (415) 904-5200. Deadline: August 1. Calendars will be available from the Commission around August 20.

Conference Log

State of the Estuary

Californians use 25 percent of all the water consumed in the United States, the most profligate water user among nations, J.R. Schubel of the Marine Sciences Research Center in New York told the State of the Estuary Conference. This fact has more than a little to do with the problems of the San Francisco Bay-Delta Estuary, he explained to the scientists, policy makers, environmentalists, and members of the public gathered in San Francisco and Berkeley May 30–June 1 to discuss major environmental threats and actions required to restore the Bay-Delta to health.

The estuary's problems have been compounded by the high water use, along with water diversions and five years of drought. Because of low flows from the Sacramento and San Joaquin rivers, fish and wildlife populations have declined, and pollutants remain in estuarine waters for a longer time. Clams in Suisun Bay contain ten times the level of chromium that would be found in clams taken from clean water, as well as high levels of cadmium, copper, nickel, and selenium, according to marine biologist Samuel N. Luoma, chief of the U.S. Geological Survey 's Water Resources Division. "The trend is downhill for most of the species we've looked at over the years," reported Perry L. Herrgesell, fish and wildlife manager for the California Department of Fish and Game at the Bay-Delta Project in Stockton. Last spring the striped bass population was the lowest since data began to be collected in the late 1960s; the starry flounder population was the lowest in ten years; and Delta smelt were scarce. Native stocks of chinook salmon were down, as were chinook phytoplankton and zooplankton.



W.E. Chandler

Retired Justice John Racanelli, who in 1986 wrote a crucial decision overturning Bay-Delta water standards set by the State Water Resources Control Board, criticized the Board for failing to fulfill its "public trust" responsibilities by not adopting new water quality standards in a timely fashion. He said that the delay in setting standards was particularly distressing given the declining fish populations, and that it could prove fatal to some species.

The San Francisco Estuary Project, which sponsored the conference with more than 50 other organizations, is scheduled to complete a Comprehensive Conservation and Management Plan in November 1992, listing management actions needed to restore and protect the Bay and Delta. The House of Representatives has approved Representative Nancy Pelosi's request for a $3 million appropriation for completing this project. Highlights from a 150-page State of the Estuary Report to be published later this summer were presented by Mike Monroe, technical program manager for the project. This report summarizes data compiled during the past three years on five primary threats to the estuary: diversion of freshwater flows and altered flow regime, increased pollutants, reduction in wetlands and decline of biological resources, dredging and waterway modification, and intensified land use.

The San Francisco Estuary Project was established in 1987 as part of the EPA's National Estuary Program and funded under the Clean Water Act and is expected to lead to actions similar to those taken to protect Long Island Sound and the Chesapeake Bay. Senator Bill Bradley of New Jersey has already introduced SB 484, the Central Valley Project Improvement Act, which would oblige the Central Valley Project to cooperate with the Fish and Wildlife Service and to mitigate damage to natural systems. If passed, it could have a significant impact on California.

Also at the conference, Lieutenant Governor Leo McCarthy released a 208-page report on the Delta by the State Lands Commission and announced that two public hearings will be held later this summer leading to the development of a comprehensive Delta Management plan. This plan is separate from the plan being developed by the Estuary Project, but the two are expected to avoid duplication.

Conference proceedings are available from the San Francisco Estuary Project for $20. Highlights are available at no cost. Call (415) 464-7990 or write to the San Francisco Estuary Project, P.O. Box 2050, Oakland, CA 94604-2050.

Joan Patton

Joan Patton is communications program director at the San Francisco Estuary Project.

Coastal Ocean Uses

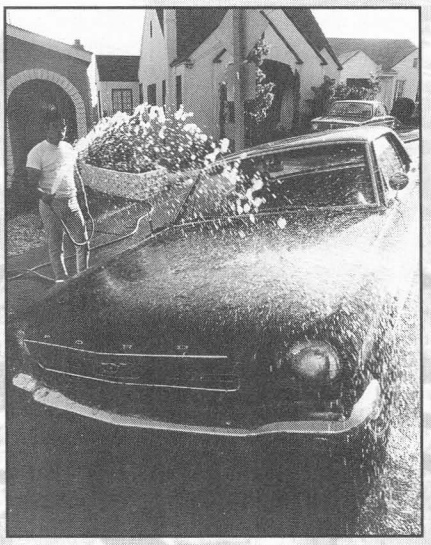
The potential to use and develop the nearshore ocean in an environmentally sound manner was the theme threading together 47 presentations at the Second

Continued on page 45

Ocean to Faucet

California is rushing to expand freshwater supplies by desalting sea water, without taking environmental issues fully into account.

by Regina McGrath



Facing the fifth year of drought, besieged by unrelenting population pressures, several California coastal communities are now looking to the Pacific Ocean as a source of future freshwater supplies. In light of shrinking alternatives, the high energy cost of desalination no longer seems prohibitive. Indeed, some advocates contend that costs can be offset by other advantages. They view the ocean as a limitless reservoir, free for the tapping, not dependent either on rainfall or the political vagaries that have stopped water diversion projects in recent years.

"The drought has changed the mind-set of this community on desalination," remarked Dale Hekhuis, chairman of the Monterey Peninsula Water Management District, which is studying a proposal for a plant.

On June 4, Santa Barbara voters approved the construction of the state's first large-scale desalting plant, designed to produce 9 million gallons of drinking water a day. The Los Angeles Metropolitan Water District of Southern California, Morro Bay, and Marin County are among jurisdictions considering 13 other proposals. A $600,000 feasibility study is underway for the largest plant in North America, to

be built near Tijuana and supply both electricity and 100 million gallons a day of water to San Diego, Los Angeles, and parts of Mexico. The Southern California Edison Company's 132,000 gallon a day plant for Santa Catalina Island went into operation in June.

California already converts ocean water to fresh for industrial and household uses on a small scale, at five coastal and nine offshore desalination plants: at Pacific Gas and Electric Co.'s Diablo Canyon nuclear power plant, the naval base at San Nicolas Island, Morro Bay Power Plant, Moss Landing Power Plant, Chevron's Gaviota oil and gas processing plant, and several offshore oil and gas platforms. The total volume of freshwater provided by all these plants, however, is trivial. Florida has over 100 desalting plants, but they convert brackish water drawn directly from ground wells rather than sea water drawn from the ocean. The large plants now under consideration would be the first in the nation to tap the ocean in a major way.

In a recent interview, Sylvia Earle, chief scientist for the National Oceanic and Atmospheric Administration (NOAA), observed that "the ocean is not just water. The ocean is a living system as complex as a rainforest, and what we do to it must take the impact on its character into account."

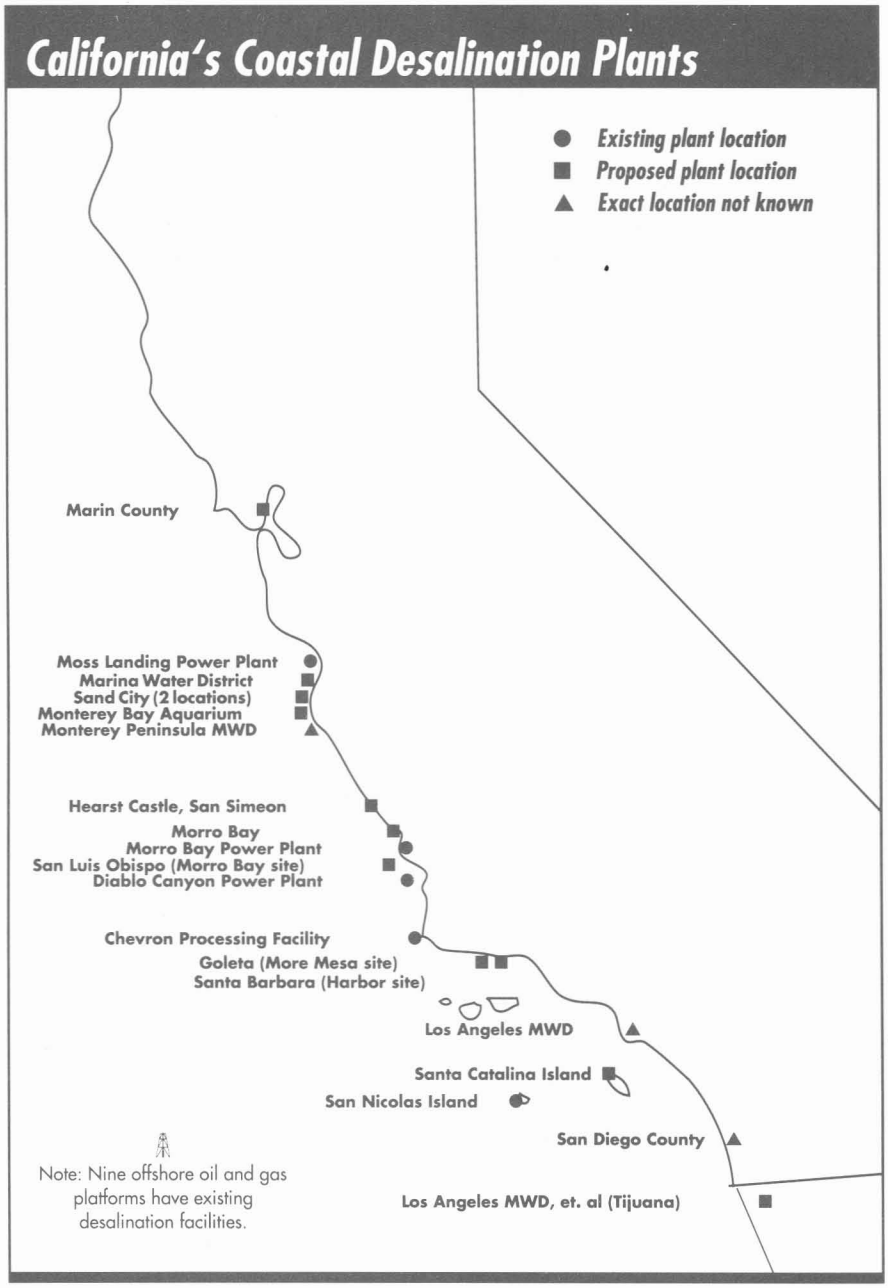
In the rush to expand water supplies by means of desalination technology, however, lsome possible side effects have commanded scant attention. Just as, in the past, dams were built on rivers without provision for anadromous fish to reach their spawning grounds, so now desalination projects are moving ahead before full consideration of their effects on the nearshore ocean and the coast.

On April 29, for instance, a conference on desalination was held in San Francisco, sponsored by the Association of Bay Area Governments (ABAG). Speakers were primarily industry representatives and dealt with technology, costs, and economic feasibility. One speaker, from Woodward-Clyde Consultants (an engineering firm currently performing siting and environmental studies for four proposed desalination plants in the state), addressed permitting requirements. No one presented an independent assessment of environmental effects—even though the California Coastal Commission had just completed a preliminary draft report, "Seawater Desalination in California," which raised concerns.

Asked about this omission, ABAG's George Barbour Jr., director of training at ABAG's Training Center for Excellence and one of the conference moderators, replied: "The agenda filled up quickly—we put the whole thing together in two months—and we didn't have space. But that would have been an interesting subject."

It's a subject that begs for investigation. Worldwide, 28 countries extract salt from sea water to produce drinking water, with about half the capacity located in the Mideast, particularly in Saudi Arabia. But environmental impact studies are scarce, or nonexistent.

In Saudi Arabia, "you just locate a plant, build it, and whatever has to go back into the ocean goes back," said Victor Van Der Mast,



Map courtesy of the California Coastal Commission.

Drought and inset photos courtesy East Bay M.U.D.

San Onofre Nuclear Plant Harms Marine Life

Almost two years ago, a committee of scientists appointed by the California Coastal Commission submitted its final report on its ground-breaking 14-year study of the San Onofre Nuclear Generating Station's effects on marine life. The Marine Review Committee (MRC) found substantial adverse effects. At a public hearing on July 16, the Coastal Commission was to consider staff proposals for mitigating these. The power plant's owner is Southern California Edison Co. (SoCal Edison).

The Commission created the MRC in 1974 in response to an appeal against a permit issued by the regional coastal commission and directed it to "carry out a comprehensive and continuing study of the marine environment offshore from San Onofre," with special attention to the effects on zooplankton and larval organisms. One member was appointed by SoCal Edison, one by the appellants (Groups United Against Radiation Dangers, Environmental Coalition of Orange County, Friends of the Earth, et al.), and the third by the Coastal Commission. When the Marine Review Committee submitted its final report, these members were, respectively: Byron J. Mechalas, of Southern California Edison; Rimmon C. Fay, Pacific Biomarine Laboratory Inc., of Inglewood; and William W. Murdoch (chairman), Department of Biological Sciences, University of California, Santa Barbara.

The $46-million MRC study, funded by SoCal Edison, broke new ground in the assessment of environmental impacts. The scientists developed new techniques to sort out the plant's impacts from natural variability. The study is expected to serve as a basic reference in many contexts.

Mechalas and Murdoch agreed that the power plant's effects on the marine environment are substantial and should be prevented or mitigated, but that they do not constitute a "large-scale ecological disaster." Fay disagreed, characterizing the fish loss as "intolerable" under the Coastal Act of 1972.

The power plant generates 2,636 megawatts (MW) of electricity, using pressurized-water nuclear reactors. Fresh water is boiled in a closed loop to produce steam to drive turbines. With all three of its units operating, the facility takes in almost 2 million gallons of sea water a minute to cool the condenser and discharges it into the ocean about 20°F warmer. That's enough water to cover a square mile 14 feet deep every day.

The committee found that the San Onofre plant takes in 45 tons of fish and kills at least 21 tons per year in its intake system, as well as about 1,400 tons a year (dry weight) of zooplankton. It estimated that the population of several midwater fish declined between 1 percent and 10 percent because intake pipes suck in billions of fish larvae each year.

The $46-million study broke new ground in the assessment of environmental impacts.

The discharge of sea water has increased turbidity of nearshore waters, causing a 6 to 16 percent decrease in the level of natural light at the bottom. This in turn has caused the kelp bed area to decrease by 60 percent. Loss of habitat caused the fish population near the bottom of the kelp beds to fall by 70 percent, and the abundance of 13 species of snails and of the white sea urchin by 30 percent to 90 percent, according to the report.

No substantial adverse effects were found on a range of bottom-dwelling organisms, and some bottom-dwelling fish increased in abundance, according to the majority.

The members also disagreed in their recommendation of mitigation measures. Fay recommended that cooling towers be built, which could reduce the intake of water by 90 percent and thus limit the fish loss by that amount.

Mechalas and Murdoch rejected cooling towers on several grounds, including cost, estimated as $1 billion for construction and another $1 billion over the life of the plant in decreasing plant capacity. A decrease in capacity would require fossil fuel plants in the Los Angeles basin to make up the loss, thus increasing air pollution, according to Mechalas and Murdoch. Fay told *Coast & Ocean* that cooling towers are standard for nuclear plants on rivers and lakes, and that "only speculative information" was offered as to their projected costs and effects.

Instead, the majority recommended one or a combination of four techniques to reduce or mitigate the impacts: (1) Reduce the flow of cooling water through the plant or through other coastal power plants owned by SoCal Edison; (2) Construct a high-relief artificial reef to maximize fish production, and/or (3) Restore wetlands; (4) Upgrade the facility's systems designed to exclude fish, or return the fish to the ocean.

The Coastal Commission staff report stated that "cooling towers are the only prevention technique that could result in essentially full marine resource protection." However, it recommended no structural changes, but rather a mitigation package that includes a wetland restoration project, installation of behavior barrier devices (mercury lights, phonic devices) to repel fish from intake pipes, construction of an artificial kelp reef outside the influence of the plant's plume, and monitoring for mitigation projects.

Fay charged that "The Commission's staff recommendation in effect endorses a form of pollution that has a significant impact on the state's coast." A spokesman for SoCal Edison said, "We're completely supporting the mitigation proposal."

Regina McGrath

project manager for Bechtel National Inc. On the island of Malta, brine effluent from a desalting plant is discharged into the Mediterranean from a pipe atop a bluff, creating a man-made waterfall that is proudly displayed to tourists, according to John Baum, environmental scientist with Ambient Technologies Inc." You're not going to find much environmental impact data anywhere else in the world," he said. "No one has seen the necessity of doing it." He thinks some idea of long-term impacts might eventually emerge in the Virgin Islands, where desalting plants being built by his firm (based in Miami but wholly owned by the Israeli government) are regulated under federal guidelines.

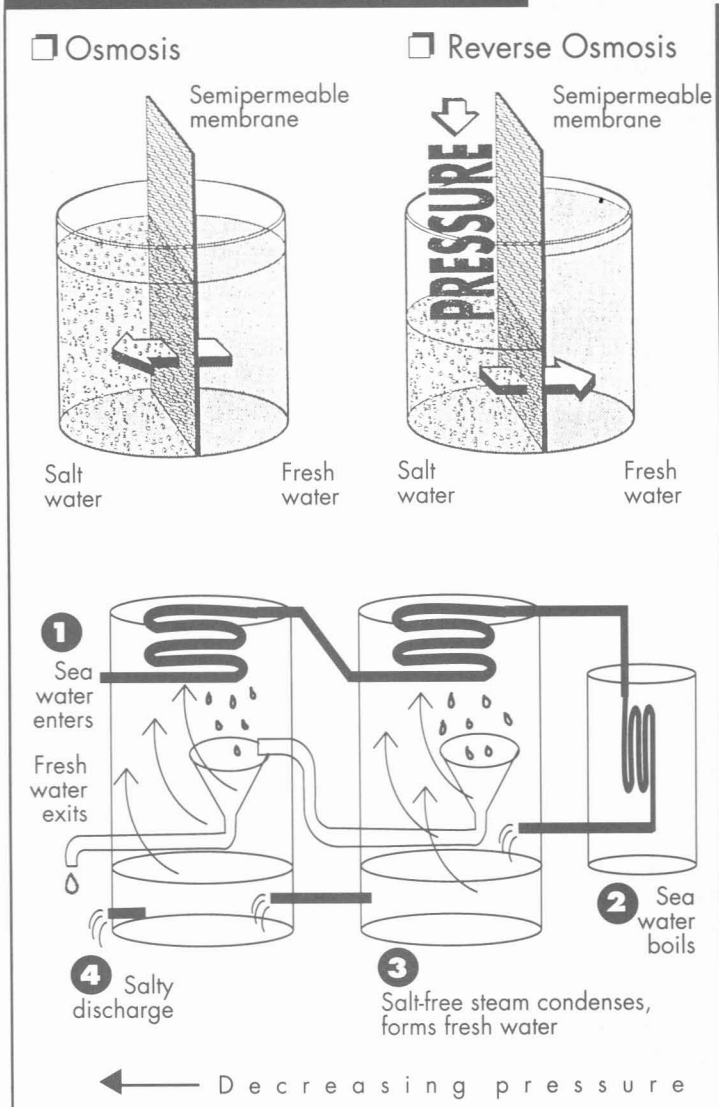
Even if some information did exist on coastal and marine impacts in the Mideast, however, it would not be of much use here because in many areas of the Mideast the shallow nearshore waters may be up to 15° C warmer and much more saline than the waters off California, points out oceanographer Phil McGillivary, of the National Oceanic and Atmospheric Administration (NOAA) Center for Ocean Analysis and Prediction, in Monterey. "I don't know of a marine chemist within NOAA who has looked into the environmental effects of desal facilities," he said. "The problem has arisen so recently, NOAA has yet to develop the funding base needed for appropriate research and policy responses to potential ocean environmental impacts."

Some Vital Questions

Major questions that are only beginning to be asked include: How will marine organisms be affected by the intake of large amounts of sea water? How will the discharge of brine into the ocean affect the temperature and chemical composition of coastal and nearshore waters and sea life? Will chemicals used to pretreat sea water flow into the ocean? Where will sludge be put? Will it aggravate the already severe landfill shortage? When plants are operated intermittently, what will be the effect on marine life? How will air quality be affected by the need for more energy for desalination? What might be the impact of an oil spill on a community that relies on desalination for its fresh water? What are the implications for land use? Will the promise of a secure new freshwater supply encourage growth in areas where the natural environment cannot support much more without serious degradation and loss of natural resources and farmland? What provisions will be made for monitoring and mitigating negative impacts?

Unless these and other questions are addressed in the early stages of desalination project development, the costs of tapping the Pacific might turn out to be far higher than expected, not only in terms of dollars but, more importantly, in the loss of irreplaceable resources. In some instances, Environmental Impact Reports (EIRs) will compel attention to these questions. Answers will be hard to come by, in the absence of studies. But in at least one instance, a plant was approved without an EIR. In Morro Bay, which has an approved local coastal plan, the City Council voted to exempt the city from the EIR requirement in building a temporary desalting plant on the

Two Methods of Desalination



Diagrams Courtesy Pacific Gas and Electric

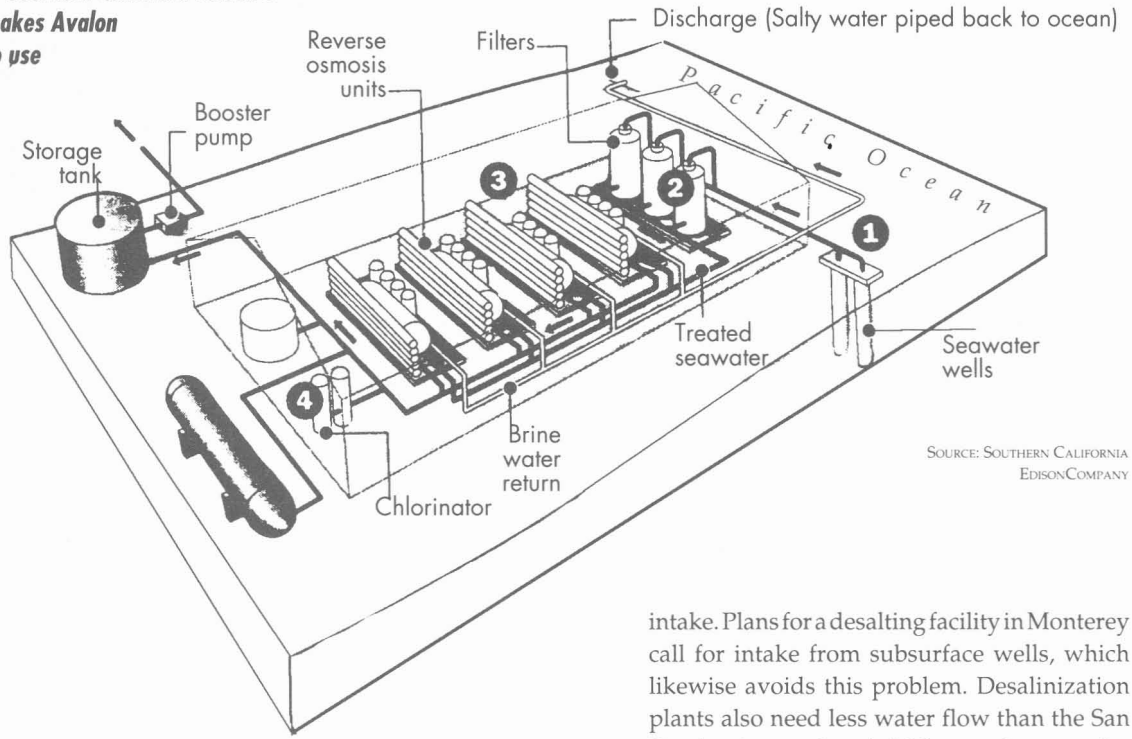
1 Osmosis is a natural phenomenon that causes fresh water to pass through a membrane into salt water. In REVERSE OSMOSIS, pressure applied on salt water overcomes this natural osmotic pressure, forcing water molecules from the salty side into the fresh water, leaving the salt behind.

2 In FLASH DISTILLATION, sea water enters the system, and is heated to boiling. The resulting salt-free steam condenses when it hits the cold sea water pipes, and is pumped out as fresh water. Sea water which didn't boil flows to another, lower-pressure chamber where the process is repeated, for maximum efficiency. Finally, a salty concentrate is discharged.

Anatomy of a Desalination Plant

On Santa Catalina Island, Southern California Edison's new desalination plant makes Avalon the first California city to use drinking water that originated in the ocean. Here's how it works.

1 Seawater is pumped from 2 60-foot-deep wells and piped to the plant.
2 Water continues through 11 filters that strain out silt and large particles.
3 Pumps push the filtered water through a series of membranes in highly pressurized chambers.
4 The salty water is pumped back to shore and into the ocean via a rock spillway. The pure water is chlorinated and pumped into the Southern California Edison system.



SOURCE: SOUTHERN CALIFORNIA EDISON COMPANY

grounds that the drought had created an emergency. The city has no reservoirs, and its wells were going dry. It expects to have its plant on line by August and may operate it until such time as long-term supplies are secured by conservation, wastewater reclamation, or purchasing water from San Luis Obispo County's Nacimiento Lake.

Rimmon C. Fay, of Pacific Biomarine Laboratory, Inglewood, worries that marine organisms will be sucked into the intake pipes of desalination plants, as now happens with power plant intake pipes, particularly in the Southern California Bight. Fay was one of the three members of the expert advisory Marine Review Committee, which conducted a study from 1975 to 1989 for the Coastal Commission on marine impacts of the San Onofre Nuclear Generating Station near San Clemente. The study found that the power plant had a destructive impact on regional plankton and larval fish. (See p.10.)

Various measures can be taken to minimize marine life entrainment in pipes. In the case of Santa Barbara, intake flow rates are reduced by taking water in through a long porous section of pipe rather than simply at the open end of an intake. Plans for a desalting facility in Monterey call for intake from subsurface wells, which likewise avoids this problem. Desalinization plants also need less water flow than the San Onofre power plant (which uses the water for cooling), and its intake systems can therefore be expected to have a lesser impact on marine organisms. To use studies from the San Onofre plant to project potential impacts of desalination plants could therefore be somewhat misleading. Nevertheless, the San Onofre study highlights the fact that marine organisms die in intake systems.

Heavy Chemical Use

All the proposed desalination plants for the California coast for which a process has been chosen would use reverse osmosis to remove salt from sea water, except for the plant proposed for Tijuana, which would use distillation. In this process, sea water is heated, then evaporated to separate out the dissolved salts. In reverse osmosis, chemically pretreated sea water is forced through membranes at high pressures, trapping the salt and passing the fresh water through. The chemical load involved is not trivial. The draft EIR filed for Santa Barbara's 10,000-acre-foot-a-year plant states that the plant will consume daily 480 pounds of antiscalant, 872 pounds of sulfur dioxide, 3,308 pounds of carbon dioxide, 4,020 pounds of sodium hydroxide, 952 pounds of zinc orthophosphate, 1,106 pounds of chlo-

rine, 4,400 pounds of ferricchloride, and 440 pounds of polyelectrolyte. Because primary membranes are cleaned periodically by backwashing the filters, some of these chemicals could be flushed into the sea, according to the Coastal Commission's preliminary draft report on desalination. Santa Barbara's plant is expected to generate one to two truckloads of sludge a day, according to the draft EIR. The chemical treatment reduces, but does not eliminate, corrosion and fouling of the membranes.

With either process, to produce one gallon of fresh water requires that up to five times that much ocean water be pumped through the plant. It will either be taken directly from the ocean, or from wells drilled on beaches, above the surf line. Up to four-fifths of that water will be discharged into the ocean. It will be saltier than what was taken in, may be warmer, and, in the case of reverse osmosis systems, may contain toxic metals and chemicals. A major quantity of sludge will also be produced, which will have to be disposed of somewhere.

The Coastal Commission's draft report states that intake and discharge could change shoreline currents, increase turbidity, cause sedimentation and consequent smothering of biota, and lower light levels, harming kelp beds. It cautions that intake and discharge pipes could have adverse impacts on benthic habitats such as surfgrass and rocky tide pools. And it warns that drawing water from wells might cause salt water to intrude on freshwater aquifers.

At least three proposed reverse osmosis plants would discharge brine, diluted with treated wastewater, through existing outfall pipes at sewage treatment plants. NOAA's Phil McGillivary worries that as a result, certain trace metals might concentrate in the surface microlayer above the discharge plume and prove to be toxic to some species of plankton, fish eggs, and larvae which inhabit the ocean surface during part of their life history. These metals could also be driven by wind or current into the intertidal zone as surface foam. "It is likely that mixing brine and organic matter from sewage will cause trace metals to move around freely to reestablish their chemical equilibria. Under such conditions, some metals, such as copper, can rapidly accumulate in the ocean surface microlayer. Fish eggs could drift into the plume of high copper concentrations, which is quite toxic to them," McGillivary said. He also is concerned that changes in the balance of iron, nitrogen, and phosphorus could change the phytoplankton community to one that is not only unappetizing to fish but actually toxic. "This could drive adult fish out of nearshore areas," he warns.

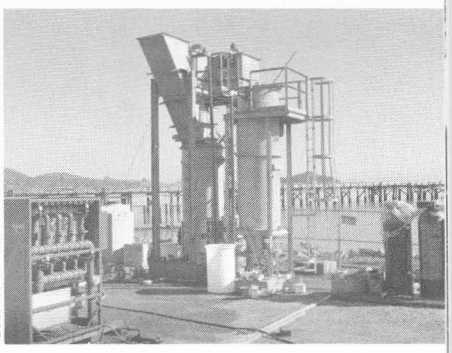
In addition, said McGillivary, a mixture of brine and organics could produce particles of a different size than those the plankton feed on. This could eliminate plankton that are food to larval fish, and also reduce the light reaching inshore kelp beds. Kelp could die, and larval fish, forced beyond productive nearshore waters, might not survive.

High Power Demand

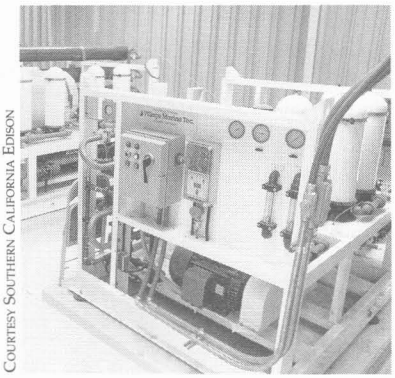
Whether desalting is accomplished by reverse osmosis or distillation, the energy costs are high. According to an article in Aqueduct, a magazine published by the Metropolitan Water District of Southern California, in Saudi Arabia one of every 30 barrels of oil pumped is used to desalinate water by distillation. "It takes the energy equivalent of five barrels of oil per acre-foot to pump fresh water through the California Aqueduct, but 30 barrels to desalt the same amount of ocean water," this article states. That comparison may have little meaning, however, when the option of pumping more through the aqueduct dries up.

In a reverse osmosis plant, "energy costs contribute, typically, 40 percent of the cost of water produced," according to an analysis by Pacific Gas and Electric Co. A distillation plant uses twice that much energy, because water must be heated, then cooled. Distillation plants also require more land than reverse osmosis plants. On the other hand, they do not require as many chemicals because there are no membranes to foul, although they do use chlorine, scale inhibitors such as polyphosphate, and they remove oxygen from the sea water to prevent corrosion.

With either process, expanding the water supply by desalting means a steep price rise. Participants in ABAG's conference reached a consensus that desalinated water (from the sea not beach wells) will cost an average of $2,000 an acre-foot in California, or $6.13 per thousand gallons. (An acre-foot equals 326,000 gallons, enough to cover an acre of land to the depth of one foot, or to supply water for two Southern California households with yards for one year.) By contrast, the Monterey Peninsula Water District now pays about $600 per acre-foot to procure water from groundwater and



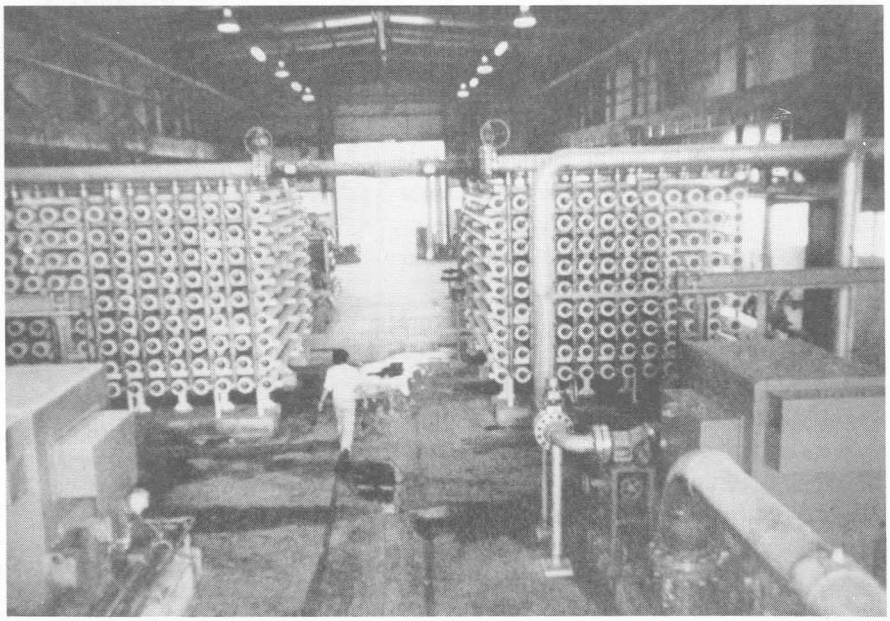
Courtesy Marin Municipal Water District



Courtesy Southern California Edison

Marin Municipal Water District's Pilot Desalination Plant was located on San Francisco Bay, at the base of the Richmond-San Rafael Bridge (upper). On Catalina Island, Southern California Edison's reverse osmosis desalination plant began operation in June. By August, it will provide 200,000 gallons of water a day to islanders accustomed to paying three to four times the typical Southern California water rate.

Courtesy Fluid Systems Corporation



Courtesy Fluid Systems Corporation

Reverse osmosis plant in Um Luji, Saudi Arabia, with pressure vessels and membrane on the right and control panel on the left (upper). Membrane/pressure tube assemblies at Um Luji, a 1.2 million gallon a day seawater reverse osmosis system (lower).

surface storage. The price per household would jump by 30 percent to 40 percent with desalination. The district's power consumption would rise by an estimated 3 megawatts a year for a 3 million gallon a day plant to 7 megawatts for a 7 million gallon a day plant.

In Saudi Arabia, Ghana, India, and elsewhere, solar power has been used in desalination. No such use is proposed here. Mike Batham, research engineer at the California Energy Commission, contends that coastal fog and moisture would make solar collection difficult, and that solar plants require too much land to be economical in the coastal zone. Others have suggested that solar collectors for coastal plants be built inland, in the desert.

What's on the Boards

Site selection is obviously a touchy issue on the coast, which helps to explain why the new plant to serve San Diego and Los Angeles counties, as well as an area in Mexico, is proposed for construction near Tijuana. This 500-megawatt combined electricity and desalting plant, under study by four water and power companies and two consulting firms, is the only one now proposed to require construction of a separate, new power plant. It would be fired by natural gas and cost up to $2 billion. Other proposed plants would be sited either next to existing power plants, so as to use waste heat that is now mostly discharged into the water, or next to existing sewage treatment plants, so brine can be diluted with wastewater and discharged through existing outfalls to the ocean.

The plants will be bulky. According to Victor Van Der Mast, project manager at Bechtel National Inc., the reverse osmosis plant in Jeddah, Saudi Arabia, which is three times larger than any other plant of its kind in the world with capacity for 15 million gallons a day, is 660 feet long and 330 feet wide—about the size of four football fields. Built next to existing power or sewage treatment plants, these new facilities may be less obtrusive than they would be on separate sites. As adjuncts to existing power generating facilities, projects are also likely to have less trouble with the permitting process.

Among proposed plants, those for Santa Barbara, Morro Bay, Monterey, and Marin County illustrate some coastal and nearshore issues raised by desalination.

Santa Barbara Moves Ahead

On May 9, by a vote of 11 to 0, the Coastal Commission approved Santa Barbara's plan to build a 10,000 acre-foot/year reverse osmosis plant. The city's voters endorsed the plan overwhelmingly on June 4. Plans call for the plant to take water through an existing pipe and discharge brine through the El Estero wastewater treatment plant when the desalting plant starts up, probably early next year. The effluent brinewater mix will depend on the volume of water being desalinated, but is expected to range between 0.7-1.6 times the salinity of seawater. The draft EIR for the project made no reference to prior studies of environmental effects of desalination.

Whether the Santa Barbara plant will be required to pursue an effluent discharge permit or will be able to use existing sewage effluent permits was unclear at publication time. The existing permits do not require collection of baseline data nor monitoring beyond what the regional water quality control board now requires for the wastewater treatment plant. This includes bioassay tests, sediment sampling, and coliform sampling, but not water temperatures and salinity changes.

Morro Bay's temporary plant, with a capacity for 650 acre-feet a year, is being built next to the city's wastewater treatment plant. The Monterey Peninsula Water District is considering building a permanent 3,000 acre-foot a year plant that would also discharge brine via an existing wastewater plant. Both plants will pump sea water from wells drilled in a beach. Sand acts as a natural filter, so pretreatment costs will be lower than they would be for a direct ocean intake. According to Bill Boucher, associate civil engineer with the city of Morro Bay, the plant under construction is small (90 feet by 100 feet), but would be at least twice that size if pretreatment facilities, such as settling ponds and flocculation (collection) tanks, were required. It will consume about 160,000 kilowatt hours in six months if run at capacity, which Boucher does not anticipate. The plan is to operate it as needed.

How intermittent operation will affect sea life is unclear. Fish with higher salinity tolerances are expected to predominate near the discharge plume. But what will happen when the plant is shut down because the city has enough water from other sources? Will marine life adjust to irregular fluctuations in salinity?

The Monterey Peninsula's sewage treatment plant is eight miles inland, so a pipeline would have to be built from the beach wells, at a cost of perhaps $1 million per mile, according to Dale Hekhuis, of the Monterey Peninsula Water Management District.

Neither in Monterey nor in Morro Bay are the beach wells expected to interfere with freshwater aquifers. Jim Cofer, general manager of the Monterey district, said that the beach wells will be about 50 feet deep, just inside the surf line, while aquifers are either further inland or deeper (90 to 180 feet deep). Boucher said Morro Bay's aquifer is about 1,000 feet to the north of where the wells will be sunk. No interference with sand flow is expected in either location.

Some experts, however, say conclusive answers can only be discovered through experience. Coastal engineer Choule J. Sonu, president of Tekmarine Inc. of Pasadena, said very little is understood about sand flow. "It will be very difficult to measure the kind of cumulative impact that a desalination plant will have. It won't be obvious in one or two years," he observed.

To try to gain some information about these and other issues, the Coastal Commission report suggests that communities considering desalination may want to build a pilot plant and operate it for a while. So far, only Marin County has done this. As part of a feasibility study for a plant the size of Santa Barbara's, it ran a 2,500 gallon a day pilot plant for three months. Consulting engineers Boyle Engineering Corp. and the Marin Municipal Water District reported that four bioassay tests showed that "no noticeable effects" on marine organisms were expected. Larry Grabow, a chemist with the water district, said the tests, conducted by MEC Analytic Systems of Tiburon, showed that the brine had the beneficial effect of diluting the level of ammonia in the wastewater when discharged with it into the Bay. NOAA's McGillivary commented that these tests are not enough: "You have to look not just in the water column, but also at the critical habitat of the microlayer. Moreover, this sort of sampling does not look at whether turbidity in the Bay has changed."

How to Proceed with Care

The drought has created a sense of urgency that works against efforts to proceed with caution. It has also fueled the traditional advocates of water projects. At the above-mentioned ABAG conference, Ernest O. Kartinen, managing engineer of Boyle Engineering Corp., predicted a statewide shortfall of 4 million acre-feet a year by the year 2010. Using 1987 figures from a study done for the Metropolitan Water District of Southern California, a major advocate of supply expansion, he projected that a water shortage of 15 percent would mean the loss of 1 million jobs and $40 billion, or a 6 percent decline in the gross state product. Warren Cole, of the statewide planning branch of the Department of Water Resources, anticipates a shortfall of 2.8 million acre-feet in 2010, with conservation of 900,000 to 1 million acre-feet a year, mostly in urban areas. The way to solve the problem? "Bring in more water or take farmland out of production," Cole says.

The ocean is not just lots of water. The ocean is a living system as complex as a rainforest, and what we do to it must take the impacts into account.

Sylvia Earle

Mitigating the Impact of Desalination Plants on Marine Life

The California Coastal Commission's draft report recommends:

- Designing and siting intakes and outfalls to avoid sensitive locations.
- Minimizing fish entrainment by low flow velocities at intake.
- Designing and siting outfalls to diffuse discharges into the ocean.
- Putting outfalls into the open ocean, not into estuaries or areas with limited water circulation.
- Siting onshore intake pipes to minimize groundwater drawdown and salt water intrusion.
- Considering landfill disposal for all or part of the liquid discharges.
- Removing waste contaminants before disposal.
- Mixing brine with sewage or power plant cooling water discharges.
- In such mixing, maintaining a desirable proportion of each discharge to enhance dilution.
- Monitoring before the plants begin to operate, to determine pre-existing conditions, and during operation to determine impacts. ❐

These are preliminary recommendations only.

SOURCE: CALIFORNIA COASTAL COMMISSION

"Urban areas can afford desalinated water if it's melded into the cost of the existing system, but there's no way a farmer can afford it."

In response to such projections, others point out that the state's farmland is already disappearing at an alarming rate and that the least costly and most promising untapped water source is conservation. Vast amounts of water are lost because of wasteful use in agriculture, inappropriate cropping patterns (such as growing cotton, rice, and alfalfa in dry regions with imported water instead of planting olives, almonds, and pistachios), through inappropriate development (scattered residential complexes in the dry agricultural valleys, with lawns where cactus would naturally grow), and by wasteful use (leaky faucets, forgotten sprinklers). A recent study by a California utility found that considerable savings in both energy and water can be obtained through simple residential conservation measures such as the installation of low-flow showerheads and horizontal-axis washing machines.

Meanwhile, state legislators are getting the message that desalination is something many communities have decided they want. Last spring (1991), Senator Mike Thompson, of the 4th Senate District in Napa County, introduced SB 1087, which was later combined with a water reclamation bill (SB 778) that would provide $100 million to $150 million to fund projects to desalinate brackish groundwater, something that has been successfully done in Florida, at far less expense than ocean water desalination. (Brackish water is drawn from freshwater ground wells that have been contaminated with sea water.) Assemblyman Richard Polanco, of the 55th District, which covers part of Los Angeles County, has introduced four bills to encourage desalination. Aide David Peters said Polanco is convinced that "desalination is probably not as environmentally harmful as other ways to get water in this state. It's a given that people are going to try very, very hard to make more water available." One of Polanco's bills, AB 2112, would put a $1.7 billion bond act on the ballot to finance desalination programs in the state. It would include $50 million to study the use of alternate energy sources to power desalination plants.

In light of such enthusiasm, environmental impact studies are urgently needed, points out NOAA's McGillivary. "I'm not prophesizing gloom and doom here. I'm saying that we need better data, or at the very least, better EIRs." The Coastal Commission's draft report recommends that before and during the operation of a desalination plant, an inventory be taken of marine organisms in the area of the outfall, and that laboratory experiments be conducted on the effects of mixing sea water, brine, and wastewater. "It won't require that much work to get a preliminary handle on this, and we may find we aren't hurting anything," McGillivary said. "Laboratory studies that examine the effect on particle size from mixing sewage water and brine. would be very useful to elucidate potential outfall effects on the coastal ocean."

If the environmental effects prove to be negligible, then desalination may provide not only drinking water, but also other useful byproducts. McGillivary said that Israel raises an alga (*Dunaliella*) in briny lakes. This alga stores glycerol, which can be harvested for industrial uses. Waste brine could also be used to raise brine shrimp, a staple food of aquarium fish.

When compared with damming rivers or further depleting freshwater aquifers, desalinating sea water might be the least environmentally damaging way to increase water supplies to some communities. But we won't know until we put both water conservation and the environmental costs of desalination on the balance sheet. ❐

Regina McGrath is associate editor of Coast & Ocean.

"It's a jungle out there"

SPECIES WARS

Just as medical scientists wage war against infectious microbes and viruses that cause human disease, wildlife managers now battle invasive alien species that wreak havoc on native ecosystems. Along the coast, the wild pig and the introduced red fox have become major pests. Efforts to control them, however, have run into opposition from people who want these two invaders around. The pig is a rototiller gone mad to resource managers, naturalists, and many farmers, but it's a valuable and protected big game species to other landowners and to hunters who will pay up to $750 to take a wild pig. The fox is destroying what is left of the California clapper rail population and some other endangered birds, but it's cute to many urban dwellers who protect it and feed it, aggravating the problem. In the following pages we consider these two controversies, which raise broader issues about managing nature in a time of booming human population growth that continues to destroy wildlife habitat. In the next issue we will consider the questions raised here from some other perspectives.

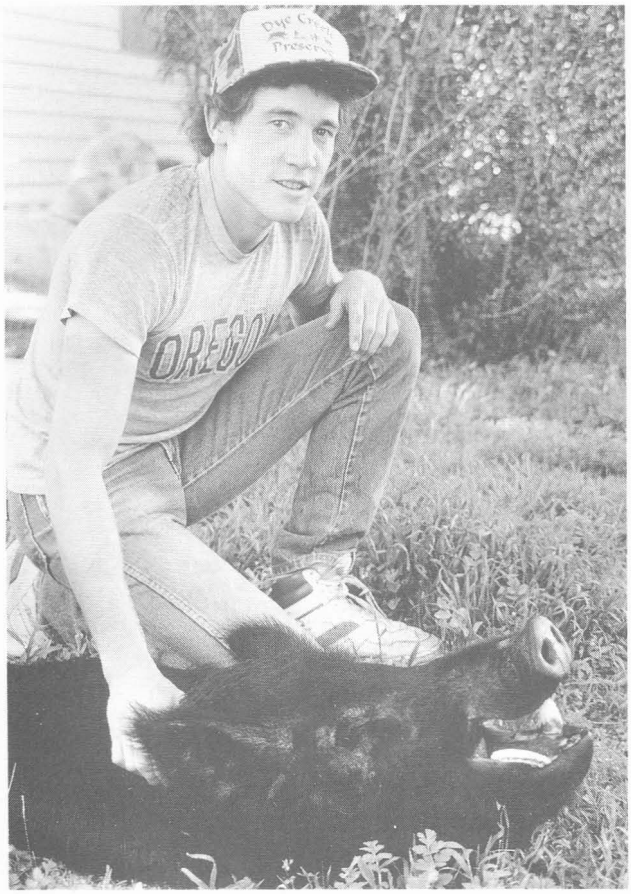
-Rasa Gustaitis and Regina McGrath

Species Wars

They are smart, fast, champion breeders, and have powerful friends in Sacramento.

Wild Pigs: Prize Game and Primo Pest

To politics, religion, and sex, add wild pigs as a topic to be avoided at the dinner table. To hunters they are a favorite big game animal, more popular than deer. To people seeking to preserve native plants and prevent erosion they are rototillers out of control. To ranchers and farmers they are major pests, and to the State Department of Fish and Game they are a public relations and management nightmare.



GEORGE STROUD

Is hunting the answer to the wild pig question? In Tehama county, many residents believe that hunting pigs is an acceptable, and effective, method of control.

Wild pigs are more challenging to hunt than deer, and their meat is "better for you than the pork you buy in the store," said Gerald Upholt of the California Rifle and Pistol Association. "It's not as greasy but tastes good and looks the same," according to a Santa Cruz County rancher. "Older boars are a bit tough, but they make delicious ham and stew."

Most people would rather not meet a wild pig, however. They can weigh 300 pounds and may have three- to four- inch tusks. "They could rip your flesh and muscles and bleed you to death," according to Bob Todd, chief ranger at Mount Diablo State Park. "I know of hunters who tangled with wild pigs and had serious injuries." Fortunately, they are shy, and "if they smell a person, they're off. Though if you get in between a sow and her piglets, you could be in danger."

California has no statewide management plan for wild pigs (which include feral pigs, wild boar, and hybrids), although it does for, among others, tule elk, pronghorn antelope, and deer. Legislative efforts to provide more effective controls have foundered on stiff opposition from hunting interests. Not even a comprehensive population survey has been done, though Fish and Game estimates that 60,000 to 70,000 pigs now roam and root in at least 37 counties, especially along the coast, having expanded both their range and their numbers up to three-fold since the mid-1960s. The drought has diminished the population lately, but one wet year could boost it back, for these pigs are prolific breeders. A sow may have two litters a year, averaging four to six piglets. In a good year (enough water and food) the numbers can triple; to keep them from rising, roughly 70 percent of the pigs must be removed each year, according to Reginald Barrett, professor of wildlife management at the University of California, Berkeley, who has studied wild pigs since 1967 and expects to complete a study on pigs in state parks by the end of summer. (His car license plate reads "DR SUS." *Sus* is Latin for pig.)

In Mount Diablo State Park, the first of these marauders was sighted only six years ago, yet "there are pigs now on all sides of the mountain," said Todd, who roams the hills and canyons and helplessly watches the damage. "They've turned up acres of land like you might do in your own back yard. They even rototilled a campground, apparently unaware that a couple of people were there."

State parks are required to protect native species. Toward that end, Mount Diablo Park is now phasing out cattle grazing within its 19,000 acres. To get a cow to move out is easy, once the legal challenges are resolved, said Todd. "You just hold some hay in front of it and a cow will just follow." Pigs are a different story. They are smart, fast, champion breeders, and have powerful friends in Sacramento.

Feral Pigs? Why feral pigs? It's a common question. I began incorporating them in my "FARLEY" comic strip in the San Francisco Chronicle because they always got such bad press.. rooting up watersheds, destroying flora and fauna, contaminating water supplies and just being obnoxious. I needed some "bad boy" characters for my strip. I use the feral pigs for special occasions... as personal injury lawyers (DILLY, DALLY, DOOLITTLE & STAHL) .. tour bus drivers going to Muir Woods (ROADHOGZ TOURS), owners of a failing savings and loan (FIRST FERAL SAVINGS & LOAN). They tear up the watersheds in their white BMW with vanity plates (PIGS R US), park in handicapped zones, sport gold nose rings and are loud and obnoxious in restaurants and theaters. People love to hate them. Phil Frank

Rangers at Mount Diablo park believe that the pigs there were deliberately, illegally, introduced on nearby land, for hunting. Such illegal introductions are blamed for a significant portion of the state's pig problem. "We would like to eradicate them, but don't think that's practical, not with all the rugged terrain, brush, steep ravines, creek beds. They also escape to surrounding private lands," said Todd. "But there's got to be some kind of management plan to minimize the impact."

Costly Damage

Other preserves report similar problems, and costly efforts to try to do something about them. "Pigs can root up to one acre a day," said Judd Howell, wildlife ecologist with the Golden Gate National Recreation Area. "We've been fencing off a 2,500-acre enclosure above Bolinas Lagoon because of extensive rooting on the steep slopes above. An aerial survey showed us that 200 acres of grassland were rooted up. The fence is very expensive—several hundred thousand dollars. We have to anchor it, string a bottom strand of barbed wire, and had to set a lot of wooden posts because of the rugged terrain. Once we're finished with the fence, we'll go in and shoot the pigs, using a professional hunter with dogs, in combination with GGNRA staff. We have no idea how many pigs are in those 2,500 acres now, but at least the drought is curtailing their numbers."

Michael Evan Sewell

The pigs tend to forage late evenings and at night, in packs. They favor acorns, competing for them with deer and squirrels, and possibly endangering the survival of native oaks. They eat roots, tree seedlings, mushrooms, worms, birds, eggs, lizards, and snakes, as well as carrion, including dead pigs. They dig with their long snouts, which contributes to erosion and may also increase the nutritive capacity of the soil, thereby favoring invasive plant species over natives. At a 1988 meeting of the California Native Plant Society, Reginald Barrett reported he had found 2,000 bulbs of native plants (mostly blue dick of the genus *Brodaea*) in the stomach of a single pig.

"We feel there is a tragedy in the making in California, and it is scarcely noticed," said Phyllis Faber of the California Native Plant Society. "Pigs affect all wildlife in the belt of oak woodlands when they root up native plants. Not only do they cause the loss of native plants, but they also aid the invasion of weeds." By tearing up the soil, they create opportunities for weedy species.

Farmers are upset because the pigs cause erosion, foul springs, eat crops, particularly grain, and compete with cows and sheep on grasslands. To Frank "Lud" McCrary, a rancher in Santa Cruz County for 60 years, these animals are major pests. He classifies them with starlings, milk thistle, and other nonnative species. "They just don't belong here," he told a county-sponsored meeting on the pig problem held in Watsonville in March 1990. "I feel like we've been invaded by foreign people."

In fact, these troublesome omnivores are not indigenous. Domestic pigs have been going feral since the 1700s. European wild boars escaped from a hunting preserve in Carmel Valley in 1925. Feral pigs and boar interbreed, resulting in a hybrid with long brown hair.

The status of these pigs, however, is peculiar and controversial. They cannot be eradicated, as is done with various illegally introduced fish—and might be attempted with the introduced red fox were that possible—because in 1957, the state Legislature classified them as game animals. Since then wild pigs have been treated, in effect, as a native species, and strict Fish and Game regulations assure their continuance.

Bag Limit

The Fish and Game Commission has provided a year-round season with a limit of one pig per day and one in possession, except in some heavily infested areas, where licensed hunters are permitted two pigs per day as "damage relief." Hunting is allowed on private land, with the landowner's permission; on some federal lands, primarily those under Forest Service and Bureau of Land Management jurisdiction; in a few minor state forests; and in some refuges. On public land, pigs are so avidly hunted that "it's impossible to find them," notes Jim Swanson, Fish and Game

associate wildlife biologist in the Sonoma County area. No hunting is permitted in state or federal parks. Generally, hunter demand exceeds pig hunting opportunities. Nevertheless, sports hunting is clearly not the whole answer to the state's pig problem.

Many landowners hesitate to allow hunters on their property, for varied reasons, including fear of liability. Even if the law were changed to hold them harmless for hunting accidents, McCrary said he "still wouldn't want to take a chance of someone who doesn't know the area coming in to shoot a pig and hitting a house."

Remedies Against Pigs

Landowners and resource managers afflicted by wild pigs now have three other legal options. They can exclude them by fencing, or seek a depredation permit from Fish and Game. Some may also work out an agreement, embodied in a memorandum of understanding (MOU) with Fish and Game, establishing special management programs. None of these options, however, provides a quick and easy cure for the problem.

Proper (and costly) fencing works for small areas, but is prohibitively expensive for large areas, such as state parks. The depredation permit system requires the user to violate either state or federal law. To get such a permit, the applicant must first prove to a Fish and Game warden that wild pigs are threatening to cause or are causing property damage. If this is confirmed and a permit is issued, he has up to 60 days to hunt a specified number of pigs under relaxed rules, that is, at night and without a license. If he gets that far, he faces a Catch-22 situation: He is prohibited from consuming the pig meat himself, selling it, leaving the carcass in the field, or burying it. State law also requires that he avoid "wanton waste" and that the meat be consumed by humans. This leaves one option: preparing the carcass and donating it to some charity kitchen. A private landowner needs only to take it to the nearest road, to be picked up by a game warden or the sheriff. "That's a major hassle," said McCrary. "The pig is usually in some remote area." But even if the permit holder is willing to expend the necessary time and effort, he can comply only by violating federal law, which does not distinguish between wild and domestic pigs, classifying both as swine, subject to inspection, unless they are eaten by the hunter, his family, and nonpaying guests. And, to cap the mounting absurdities, the animal must be inspected before (as well as after) it is killed. Just how a hunter is to arrange that, nobody has yet figured out.

"The USDA Office of General Counsel has determined that there is no such thing as a wild pig in the United States," a federal inspector stated. "We don't normally get involved [in pig meat giveaways] unless there is a complaint. But if there were, we'd say, 'You can't do that.'" Barrett believes the inconsistency between state and federal regulations will probably have to be resolved in court.

The number of pigs killed under depredation permits is tiny compared with the numbers taken by licensed hunters (32,000 in 1989, according to Fish and Game). In 1990, 74 depradation permits were issued, allowing 570 pigs to be taken. How many were actually taken is not known, but Doug Updike, big game coordinator at the department, estimates it at about 100. Written reports were received for only 30 head. In the Swanton area of Santa Cruz County, a depredation permit to several adjacent landowners, extended over nine months with renewals, netted only ten pigs. How many are killed illegally is unknown. Some frustrated farmers may take matters into their own hands and, if caught, claim that the pigs they shot on their property were escapees from their own domestic stock. Because no law requires that domestic pigs be tagged, and some feral pigs look like their domestic cousins, Fish and Game wardens cannot easily prove otherwise.

The MOU opens other possibilities; such as complete eradication of pigs in certain areas. This has been accomplished in Sonoma County's Annandale State Park, where 150 pigs were killed. It was "hard work," said Barrett. "Pigs are at least as smart as dogs and will avoid areas with hunters and traps after they've seen a few of their numbers taken that way. The first pig we took cost us a couple of bucks, but the last one cost $13,000." The state departments of Parks and Recreation and Fish and Game adopted an MOU last May under which the parks department has the authority to determine when pigs are causing damage on park lands and to take appropriate measures. "This will make it easier to do what we need to do," said Mount Diablo's Bob Todd.

An MOU enabled The Nature Conservancy to restore a portion of Santa Cruz Island, which had been severely damaged by sheep, and subsequently by wild pigs. When the Conser-

State law also requires that the hunter avoid "wanton waste" and that the meat of pigs killed under a depredation permit be consumed by humans. By federal law, however, all pigs are "swine," subject to inspection before they are killed. How a hunter is to arrange for such an inspection, nobody has yet figured out.

vancy acquired 90 percent of the 100-square-mile island 24 miles west of Santa Barbara, it was so severely overgrazed that "you could see the problem from 30,000 feet up in the air—the island looked like it had a bad case of cancer, and millions of tons of soil washed into the sea because of erosion caused by the sheep," Barrett said. The Nature Conservancy saw to it that fences around pastures were repaired and then, working pasture by pasture, arranged to have about 34,000 sheep shot. Health regulations excluded the option of using the meat as human food and the carcasses were left, unburied. Pigs ate sheep carcasses and their population grew. Under its MOU, The Nature Conservancy subsequently killed about 1,400 pigs, eradicating them from one 5,000-acre pasture. Fish and Game granted an exception to the "wanton waste" rule governing depredation permits, because it was felt that to remove the dead pigs from rugged areas would have been too difficult. The pasture has now been protected by fencing, but some 1,000 pigs still roam other areas and The Nature Conservancy might apply for another MOU.

Courtesy Multiple Use Managers, Inc.

New Options Sought

Whatever their point of view on the wild pig issue, most concerned with it agree that a statewide management plan is needed. In the case of deer, the state not only has a strategic management plan but also separate plans for 79 herds, said Terry Mansfield, assistant chairman of the Wildlife Management Division at the Department of Fish and Game. To have a plan, both commitment and funding are needed, he pointed out. A comprehensive population survey would be a start.

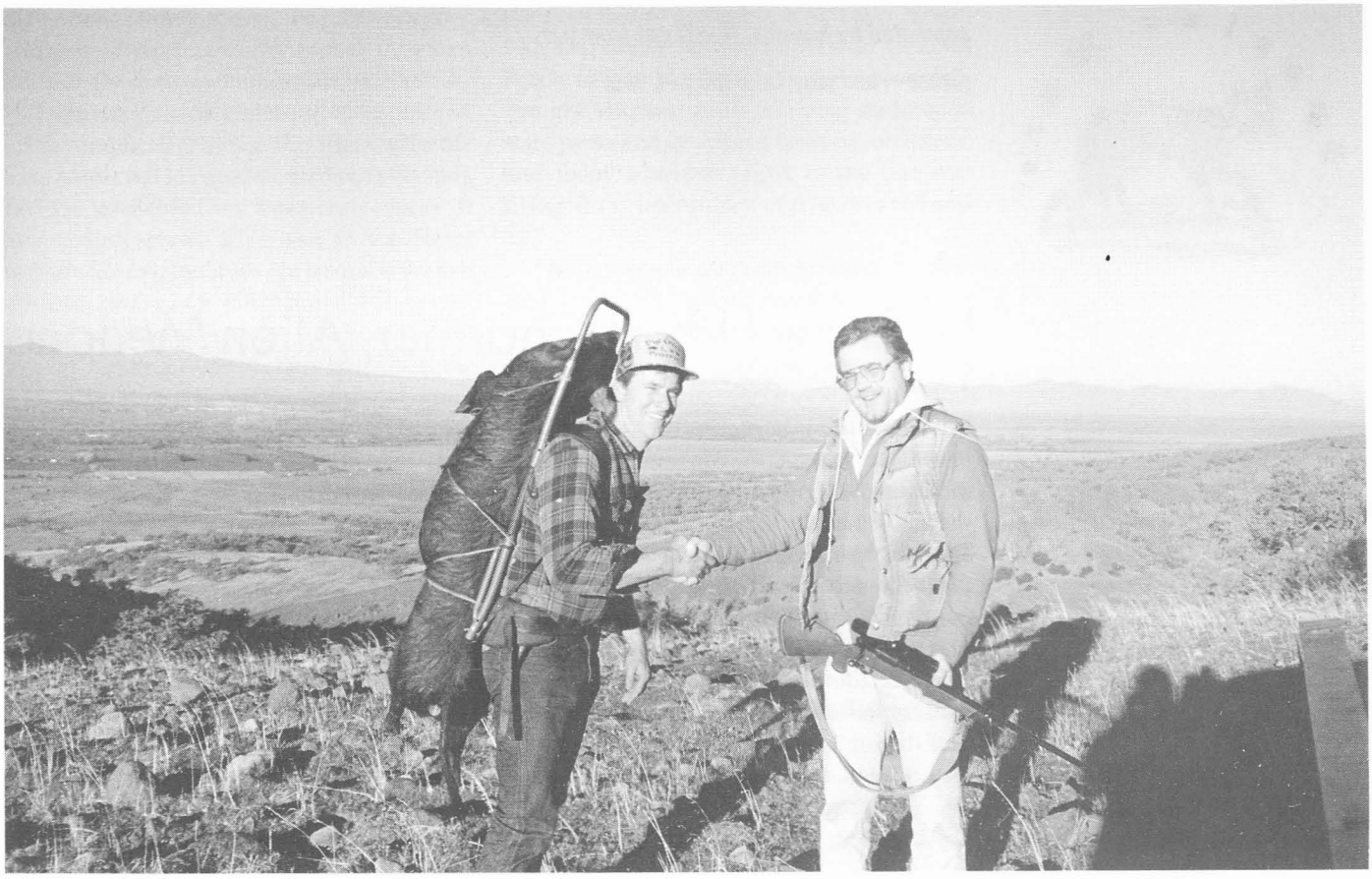
This year, Senator Henry Mello introduced SB 819, to provide new and stronger measures. Before it was drastically weakened in response to opposition from hunting interests, this bill would have empowered counties to establish special zones where pigs would have the dual status of pest and game animal. Landowners in these zones would register with the county and be permitted to kill pigs on their land under liberalized rules and either consume the meat or bury the carcass if it was not practical to give away the meat. Pigs killed for sport would have to be consumed by humans, but the bag limit would have been abolished.

Perhaps the most significant provision of the bill, however, provided that funds for managing the zones would come from Fish and Game through the sale of pig hunting tags, such as are required for deer. The deer hunter buys a tag on which he writes his name, the location where he shot the animal, and its sex. He puts one copy on the deer and mails the other to Fish and Game, thus providing information and funds needed for managing deer herds. Asked what he thought of imposing a similar tag requirement, Doug Updike of Fish and Game said in May that tags would bring in useful data on the range and population of pigs, but he was reluctant to see a $10 fee for them. "The Department is charging more and more fees and this will put us in a defensive position again," he explained. "A $10 tag is probably too high on top of a hunting license [currently $23.10]." To Terry Mansfield, on the other hand, a fee requirement would be essential if tags were to be required, to pay for administrative and other costs. Phyllis Faber, of the Native Plant Society, said it was "high time" to require tags for a fee: "Some hunters pay $150 to $750 to hunt pigs on private land, so what's a $10 tag to them?" she remarked. The California Rifle and Pistol Association's Gerald Upholt said hunters did not see that they would gain anything from the tag requirement now and said that any change in law that would allow pig carcasses to lie or be buried "galls a hunter's sense of sportsmanship and fair play." By June 1, both the local management option and the tag requirement had been removed from Senator Mello's bill. What remained were provisions that would help hunters gain access to more private land by removing the hazard of landowner liability, and a statement of legislative intent that Fish and Game draw up a management plan. The language, however, did not make this mandatory.

Question of Attitude?

With sport hunter demand far exceeding opportunities, the continued presence of wild pigs in California seems assured. In some cases, sports hunting has proven to be a cost-effective management method. On Lake Sonoma, at a U.S. Army Corps of Engineers recreation area, hunters are chosen by lottery for a pig eradication project. Fish and Game biologist Swanson said hunters have a 20 percent chance of being drawn, and winners have only a 10 percent chance of bagging a pig.

On the Gray Davis Dye Creek Preserve in Tehama County, pig hunting and cattle grazing have coexisted peacefully since 1964. The



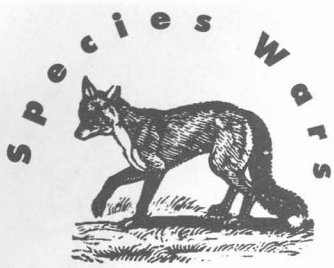
Courtesy Multiple Use Managers, Inc.

Nature Conservancy manages the preserve under a 25-year lease from the State Lands Commission and the Controller. It subleases its hunting rights to Multiple Use Managers (MUM), which organizes guided hunts between November and April, charging $550 for a two-day trip, including transportation, lodging, and meals. The Nature Conservancy gets a percentage of the income and uses it, along with income from cattle grazing, toward restoring native ecosystems. Since 1967, the annual pig hunt at Dye Creek has averaged about 200 head, according to Barrett.

"The goal is to show you can have public use, active hunting, and cattle grazing on the same land," said George Stroud, manager of the Dry Creek Preserve. Both MUM and The Nature Conservancy lead public field trips to the preserve, usually in spring and summer, when they do not conflict with hunting. Chuck Harrison, wildlife manager for Dye Creek Ranch, said that cattle and pigs do not compete for the same food, and that hunting keeps pigs out of waterfowl nesting areas. There is little fencing on the preserve.

Barrett believes that "hunting is the only economically feasible solution [to the wild pig problem] in most areas, though some may have to be fenced." The effectiveness of hunting as a management method depends on attitude among citizens in different areas, he said. "Most people in Santa Cruz County are anti-hunting. In Tehama County, the pig population is under control because the people there believe hunting pigs is a good way to control them." The real issue with pigs, according to Barrett, is "who will pay to solve the problem—the landowner, the hunter, or the state?"

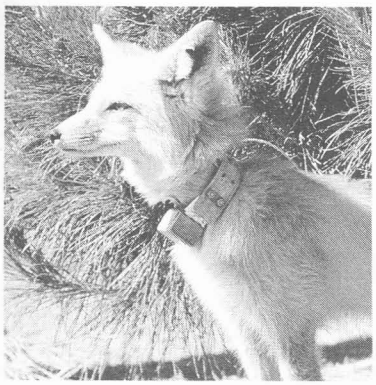
Meanwhile, in Mount Diablo State Park, chief ranger Todd looks around the mountain and sees that in 25 years urban development will have completely surrounded the park. "A lot of anti-hunting people talk about hunters killing animals, and they don't even think of how many they are killing by eliminating habitat," he reflects. "I have no problems with pigs as a game species, on lands where there isn't the mandate we have to preserve native species. But in 25 years, the only place these species will be relatively protected is in parklands. If you want future generations to view native species, you have to protect them, and we cannot do that unless we have a strong management program for species that have the biggest impact—1,000-pound cows and 300-pound pigs." ❐



The fox is bold and adapts to places densely populated by humans. It will eat from pet dishes—and may take the pet, too.

Red Fox: Urban Charmer, Alien Menace

Shortly before a new stretch of the Costa Mesa Freeway extension was to open in Orange County last April, construction workers discovered a family of red foxes ensconced in the embankment. Six photogenic pups, their attractive parents, and a one-year-old companion made the news, leading to an outpouring of citizen concern. Senator Marian Bergeson called Governor Pete Wilson, and word came down that the governor was willing to delay the scheduled opening, if necessary, until the family was properly relocated. When the Los Angeles County Zoo agreed to accept the foxes, the public was relieved. At the U.S. Fish and Wildlife Service and the State Department of Fish and Game, however, the incident struck an ironic note.



JEFF LEWIS

Collared young male fox, in a power line right-of-way in Anaheim.

The red fox has become a bane to wildlife managers, especially those trying to protect the endangered least terns, and the California and light-footed clapper rails along the coast. Biologists are engaging in desperate measures to prevent this appealing but ecologically destructive alien from driving these native birds to extinction by eating them and their eggs. They are fighting this fox with fences, traps, and rifles, and here, in the midst of it all, comes this fuss about the freeway foxes. Fish and Game staff were compelled to expend time and money to capture and deliver these pests to the zoo, knowing that zoos have no shortage of foxes, of course.

"It's very frustrating, especially to see this happening in Orange County where three brand new freeways are proposed that will mean death for foxes, coyotes, skunks, weasels," said Esther Burkett, of the Wildlife Management Division, Fish and Game."Why the big hullabaloo over a family of red foxes? Why aren't people out there protesting the building of more freeways?"

She knows the answer, which does not diminish the frustration. "Public polls have shown that the general public is more concerned about the welfare of individual animals than about populations of species," she said, "but Fish and Game can't manage for one animal—we're trying to manage ecosystems."

Red Menace in Wetlands

The red fox presents a special problem in coastal wetlands because its population has been rising rapidly as the least terns and clapper rails have diminished to the point of near extinction. No more than 500 California clapper rails are known to be alive now. Overhunting in the past, and the continuing destruction of wildlife habitat, have intensified the struggle among species. "If the Bay still had all the tidal marshes it had in 1900, there wouldn't be any problem because rail nests would be spread over a wide area," said Richard A. Coleman, manager of the San Francisco Bay National Wildlife Refuge. "Since most of those marshes have been converted to salt ponds, highways, and industrial parks, it's easy for the predators to find the birds in the tiny remnant left," he said. Consequently, in an effort to save the endangered birds, the refuge is now killing red foxes.

This makes some animal rights advocates uneasy and draws fierce protests from others. The answer is not killing foxes but restoring habitat, some say. "The red foxes have been here for 100–125 years," said Hal Baerg, president of the Animal Lovers Volunteer Association (ALVA). "Nature has done her balancing act. What do we do with Irish, Jewish, and black problems? Is there one? Or is it a matter of arranging society to accommodate these groups? It's the same with the foxes."

Such an argument may sound reasonable to many people. But "we can't afford to wait," Coleman recently told a reporter from the *San Francisco Chronicle*. "The foxes have pups to feed now, and the rails are nesting." A fox family of two adults and five pups would need

317 pounds of prey during the 12 weeks after whelping, according to one report. Coleman has seen the foxes swimming about, hunting.

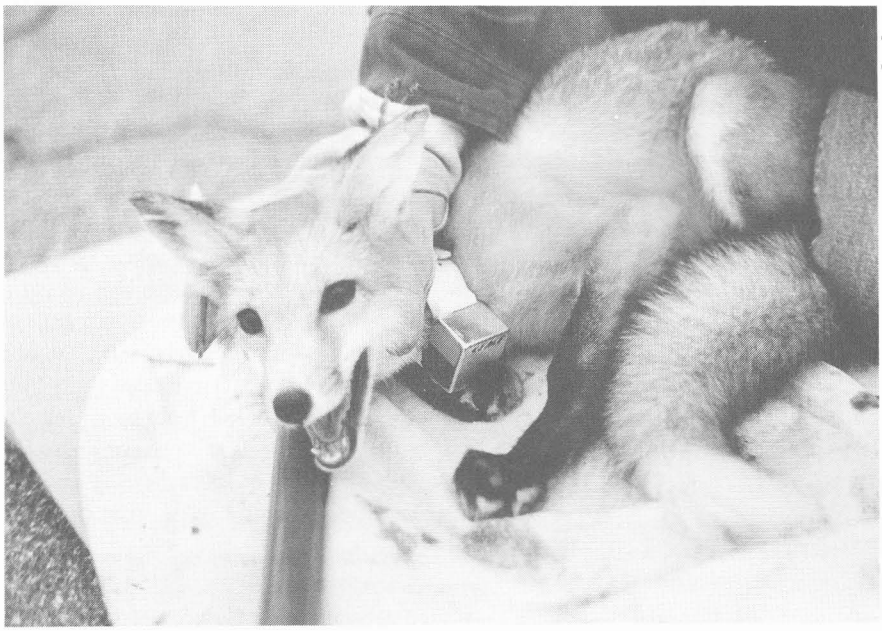
The struggle to control the troublesome red fox is complicated by the fact that California has a native red fox species, the Sierra Nevada Red fox, state-listed as a threatened species. It lives mainly above 5,000 feet in the Sierra Nevada Mountains, does not frequent the salt marshes, and, as far as is known, has not interbred with the alien fox, which was brought here by hunting clubs and fur farmers in the mid-1800s, probably from the Midwest. From the turn of the century to the 1940s, large fur farms operated in the Sacramento Valley, and in Orange, Los Angeles, and Santa Barbara counties. Some foxes escaped, others were released by farmers when business was bad. Because the native fox could be confused with the exotic, hunting any red fox is illegal.

Being highly efficient predators, and able to produce more than one litter of six pups in a year, these small foxes have spread along much of the coast. Thousands have been sighted in Orange, Los Angeles, Ventura, and Santa Barbara counties, and there are reports of sightings in San Diego County and on the Point Reyes National Seashore in Marin County. They prey on least terns, which nest on open beaches at Point Mugu Lagoon, and have destroyed snowy plover nests at Salinas River National Wildlife Refuge. Since they appeared in the San Francisco Bay Area around 1987, they have done major damage. This year, Coleman said, they destroyed 500 great blue heron, black crowned night heron, and egret nests in the refuge and wiped out the entire heron colony on Bair Island. They also took several ground nesting marsh hawks and burrowing owls. Last year they destroyed a Caspian tern colony of 200 nests. Arthur Feinstein of the Northern California chapter of the Audubon Society estimated that the rail population dropped from up to 6,000 in 1975, to about 400 last year. He said the decline was caused by loss of habitat, high selenium levels in the eggs, and predators, but most especially the red fox.

Unlike the endangered native birds, the fox is bold and adapts to places densely populated by humans. It will eat from pet dishes—and may take a pet, too—drink from garden hoses, and this spring entered a San Francisco home from a deck that opens to an overgrown cliff, leaving scat on a bed. "People feed these animals and leave dog food out and that increases the population," Coleman said. Larry Sitton, Fish and Game wildlife supervisor in Long Beach, said in May that foxes have been seen "on golf courses, at oil pumping stations, in state parks and ecological reserves, on levees, and today someone called to say one was living at the intersection of freeways 605 and 22."

"Many people don't understand or don't care" about the problem to other species that this predator poses, Sitton said. "The foxes are cute, easily attracted, and people enjoy seeing them." As happens with the feral pig—though for different reasons—people transport the red fox to other areas. A state agricultural inspector recently stopped a woman who was taking one in her car from coastal Southern California to the Sierra Nevada to set it free. She was unaware that she could have contaminated the native fox gene pool.

Under these untoward conditions—public ignorance, steady loss of habitat, political favoritism toward cute animals despite their alien origins—natural resource agencies have been undertaking fox control efforts along the coast. At the Seal Beach National Wildlife Refuge and in the Bolsa Chica Ecological Reserve, the United States Department of Agriculture Animal Damage Control Program has been trapping red foxes, using padded leg traps. If they cannot be placed in zoos or other appropriate facilities, the foxes are killed with sodium phenobarbital. Of 285 foxes captured at Seal Beach between 1986 and 1990, nineteen have been placed, and the rest were killed, according to Charles Houghton, of Fish and



JEFF LEWIS

At Mile Square Park in Fountain Valley, this young fox was captured, and given a radio collar and ear tag. An antibiotic spray used to prevent infection during ear tagging has made the insides of his ears yellow.

Wildlife Service in 1986, protesting fox removal. The Service, under court order, did a $300,000 environmental impact statement and was found to be in compliance with the National Environmental Policy Act.

The program under way in the 18,219-acre San Francisco Bay National Wildlife Refuge is meant to reduce damage being caused not only by the red fox, but also by rats, raccoons, feral cats, and skunks. It began May 3 with live trapping, but as of July 1, Richard Coleman said, the traps had yielded only 15 feral cats (taken to an animal shelter), two skunks (released), two or three raccoons, and five foxes, most of them young. The next step was to shoot the foxes, at night, after first attracting them by imitating the sound of a wounded animal and shining a spotlight on the responding fox. The last resort would be padded leg traps, which would be checked twice a day.

Before taking up deadly force against the foxes, the Fish and Wildlife Service explored alternatives. It wrote to 47 states asking if they would take foxes, but all declined. Commercial trapping was also considered, but rejected, Ken Smith of Fish and Game said, because the trappers would not sufficiently reduce the fox population, taking only those with the finest coats. Hunting the red fox is not only illegal, it also would not be practical in urban areas. Fencing is prohibitively expensive in most situations, though it has been used in combination with trapping in Seal Beach, and at Camp Pendleton. It is only useful for least terns, which nest on open beaches, however, not for rails, which nest in cordgrass.

The Fish and Wildlife Service explored alternatives. It wrote to 47 states asking if they would take foxes, but all declined.

To fence three-fourths to one square mile of coastal wetland would cost over $100,000, and the fence would have to be replaced every four years because of corrosion from moist salt air, said Sitton. It would have to be sunk into the ground to keep the fox from digging under it and electrified to keep the fox from climbing over it. A special wire would be required, at $1.50 a foot, to keep birds that prey on least terns from roosting on it, and even so, it would often be useless because moisture in the air can ground the electric current, enabling the fox to climb over, said Sitton.

No Solution Foreseen

Wildlife managers do not expect to solve the red fox problem. At best, they hope to manage it. The red fox population appears to be increasing not only on the coast, but also inland, into the Central Valley. "It will be much harder to control the fox here, where most of the land is privately owned, than in managed wildlife areas like Seal Beach," said Marti Kie, associate wildlife biologist with Fish and Game in Fresno.

One native predator who might help in some areas is the coyote. According to wildlife biologist Peter J. White, coyotes have excluded red foxes in North Dakota and Maine. However, "Coyotes require more range than the red fox, which can be an urban animal, like the raccoon," said Coleman. "Coyotes need space to retreat to. They left this area for a reason, and that reason has not changed. To bring coyotes in now would be unfair—like taking a four-pound trout and putting it in a 20-gallon aquarium." In addition, "People like to see coyotes removed because they fear them," said Fish and Game's Sitton. They also sometimes eat people's pets.

So Coleman is prepared to fight with all means available to eliminate the red fox from the refuge. If this predator remains, "every snowy plover nest will have to be found and barrier fences constructed around it before the fox eats the eggs. Every Caspian tern colony will have to be enclosed," he says. Those are desperate measures. But "What are we supposed to do?" he asks. "Let them go extinct?"❐

How far shall we go in fighting alien invaders to protect native species? How can we prevent people from continuing to introduce inappropriate animals to the coastal environment? How shall the natives be protected when aliens have a strong political constituency? Do ecosystems have rights? Are we fighting a lost cause? As the most invasive of all the predators, will *Homo sapiens californicus* agree to yield the space other species need to survive?

In the fall issue, *Coast & Ocean* will look at what wildlife managers are doing to control some other invasive mammals, as well as reptiles, fish, mollusks, and birds. And we will consider some broader issues that emerge.

Mending Young Lives Along a Wild River

You do not see the Pelican Bay State Prison from Highway 101, although it is just west of it. A screen of trees and bushes protects travelers along Del Norte County's beautiful coast from the sight of this huge maximum security complex, built in 1989 for $217.5 million to incarcerate 2,280 men and already crammed with more than a thousand over capacity. At night, however, the high security mast lights are visible for many miles.

The boys from the Bar-O Ranch see the eerie white glow as they ride into Crescent City for basketball games, and they recognize its meaning. Many of the men doing time in that prison began getting into trouble with the law early in life, like the Bar-O boys. Perhaps, had they had the luck to land at a place like the Bar-O, their lives could have taken another direction. For while Pelican Bay Prison is the end of the line, this county juvenile probation camp offers a new beginning.

Several miles up the wild Smith River, along winding two-lane Rte. 199, the camp is not visible from the highway either, but that's all it has in common with the prison. There are no fences, gates or guards here. A small handcarved sign in the trees indicates the driveway leading down toward the riverbank where low wooden buildings, not unlike those at a typical summer camp, are nestled among the fir, oak, alder and madrone. At night, the lights are no brighter than necessary to find your way.

Unlike most detention facilities, the Bar-O is not a place of confinement but an intense place of learning. It offers work, study, sports, and a lot of personal attention, all part of a unique crash course designed to enable boys who got off to a bad start to grow into free and responsible human beings.

These boys, aged 13 to 18, are sent here for 7 to 10 months by juvenile authorities in this county and others, and, until this past July 1, by the California Youth Authority. They have fallen afoul the law mostly through property crimes and drug law violations. "Almost all lack self-esteem and 99 percent are substance abusers — everything from alcohol to silver paint," said assistant camp director Tom Greener. "Most of the substance abuse comes as a result of being stepped on. It is a way to cope."

The Bar-O Ranch offers a more effective way. It seems to work, as evidenced by the fact that more than a few keep in touch with staff after they have been released, and some come back to visit. There is no systematic followup, but all indications are that recidivism is far lower than in many other juvenile institutions.

"No other program in California can affect some of these boys as this one can, actually altering life scripts," said Dan Hutton of the Napa County juvenile probation department, who has supervised wards of the courts in three counties. "I've seen boys make a major turnaround here." The major reason, he said, is the dedication of the staff. "They really care about these boys and the boys know it. For many of them it's the first time someone has cared."

The aim of Bar-O director Al Smith and his staff of 20 is to provide opportunities for each boy to develop a sense of personal worth, to become a member of a community, seeing how

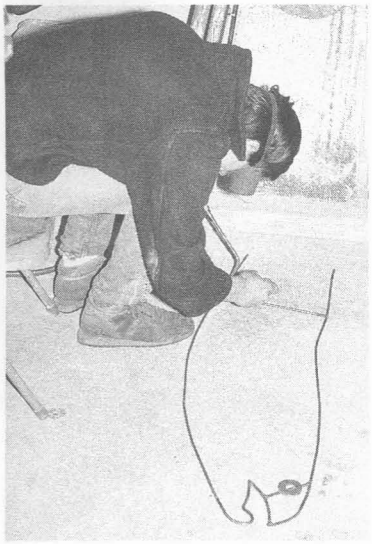
Steelhead smolts raised at the hatchery are transferred to a Fish and Game tank truck.

All photos by Linda Smith

the behavior of each member affects others; to understand something of his place in nature, and, in Greener's words, "to become a giver."

Everything in camp is done with those goals in mind. Greener, who earlier taught biology in high school, says the Bar-O has "given me a chance to do all the things I wanted to do as a teacher. The high school kids I taught, they've burned out on the system, they don't want to be there. Here we have one-on-one contact. It's ideal for learning. You take your own enthusiasm to the boys and it's infectious."

Boys who had never played basketball became part of a team that won second place in the county last year, third place this year. One group of boys built picnic tables that turned out so well the National Park Service decided to use them at the Point Reyes National Seashore. Another built canoes and then took them out on white water. "So what if none of us had done it before?" said Greener, reflecting the can-do atmosphere of the camp. "Now we have!"



One boy, who was observed to have "incredible metalworking abilities," said Greener, was asked to make a three-dimensional steelhead to be mounted on a bicycle frame and used as a fun ride at the dedication celebration of the Smith River National Recreation Area in May. It was wildly successful, and the boy now intends to get into underwater welding.

A major component of the camp's program revolves around its fish hatchery, which raises steelhead and salmon for release into the river, and is the site of an aquaculture class, which is accredited as a regional occupation program. The Bar-O acquired the hatchery, on U.S. Forest Service land, in 1989, with a grant from the Department of Fish and Game and the help of Assemblyman Dan Hauser. It had been a commercial operation since 1941, raising gourmet trout. Now its purpose is to help sustain the native salmon and steelhead runs on the river, otherwise help the Forest Service, and offer education opportunities to the community and the boys. Trout continue to be raised, for the camp. Al Smith said Pelican Bay Prison declined an offer of some, because "we could not guarantee all would be of the same size, and that could cause fights."

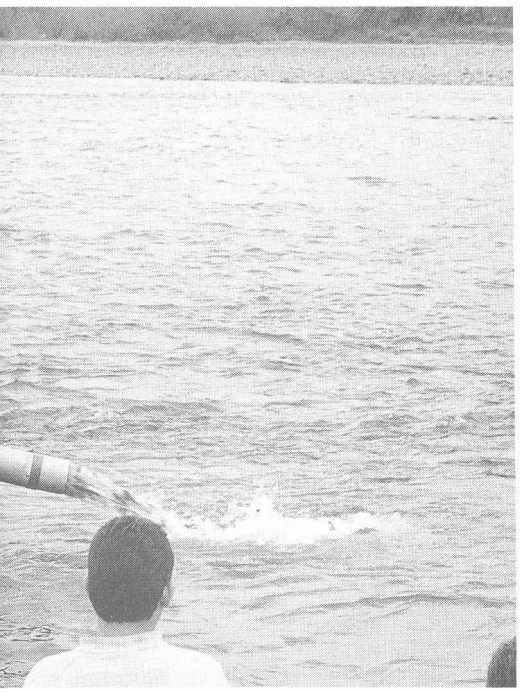
The main interest, however, is the salmon and steelhead. Fish and Game supplies eggs when it has a surplus and collects the smolts for release. The boys work at the hatchery under David Prince, a veteran hatchery manager, who knows and loves the wilderness. In addition, some boys also work on stream surveys and spawning counts, with a Forest Service biologist. "Our hope is to provide a learning experience for the boys while meeting the needs of the Smith River watershed," Smith said.

On April 4, the steelhead smolt were ready to go. A crew left camp in a truck at midmorning to meet a Fish and Game tank truck.

There had been some discussion among biologists at two different resource agencies about the release site. If the smolt were dropped into the stream near the hatchery, they might be more likely to return there to spawn. But the journey to the sea would be difficult. If they were dropped near the river mouth, they might return to try to spawn in the river mouth, a poorly suited place, rather than upstream. Camp staff had stayed out of the discussion. Restoration is still a young science. "It will be 15 years before we really know much," was Prince's opinion. Right now they were glad just to participate. Another year they could, perhaps, help with the much needed research.

As they waited for Fish and Game, staff and boys talked about differences between wild steelhead and hatchery fish. (It wasn't the first time the subject came up. The camp has a T-shirt, with the picture of a returning steelhead, and the words: "Bar-O Fish Hatchery. Where education meets the environment and wild fish never get the blues."). Prince told of the amazing thing he had observed last Christmas night, when a bear had appeared at the hatchery and had lifted a standpipe to let water—and fish—flow into a pond, where a second bear stood waiting. He pointed out the osprey nest and wondered whether its builders would return this spring to raise a family.

Thousands of young fish flickered in cement raceways. When the tank truck arrived, boys formed a team, scooping the jumping smolts in nets and passing them, in relays, to



Finally, the release near the mouth of the Smith River.

the tank. They worked carefully: after all, they had raised these fish. Then some piled into another truck, with camp staff, to follow the tank truck. Soon some of them also would be released. As they stood watching the fish go free—it was at the mouth of the river, finally, that it happened—they must have been wondering not only about the fishes' future but also their own. It would be as long as five years before the steelhead would return — a small percentage, at most — and as they were not tagged, nobody would know how many completed the cycle.

Later, boys talked individually with a visitor. One boy, from Fresno, had spent two months at a Youth Authority facility,"locked in a room except for two hours a day for recreation" before coming to the Bar-O. "The only activity was when someone had a birthday. People came from outside to give a party," he said. "If you're in a wing that's been good, you could come. If you're in one that messed up, they stomp all over you." Here, instead of trying to be "good" so he would be rewarded with a piece of cake, he is working to earn the right to wear a blue shirt. All boys start with white T-shirts, get a blue one when they have been found to have made significant progress in working on themselves and issues at home, and have begun to accept themselves as members of this community. Those who become responsible community members and role models to others get to wear green.

Chuck, a 17 year old Native American, was wearing green. Earlier, the visitor had observed him being especially careful in handling the smolt. He had been here nine months and was about ready to go home. "I had been in a little trouble and then some big trouble," he said. "My next step was the Youth Authority, and there's nothing there to help you. I thought this was going to be a prison. But this is the place where we grew up. I look at myself now totally different. Here everybody is trying to change themselves and that makes it easier. These guys (the staff) are like my parents. In a way I'll miss my table head—he's the one who opened my eyes. I'll miss this place a lot. Before, I didn't know what I'd be doing—work at Denny's all my life or something. Since I've been here I got into nature a lot. Now my life has a direction."

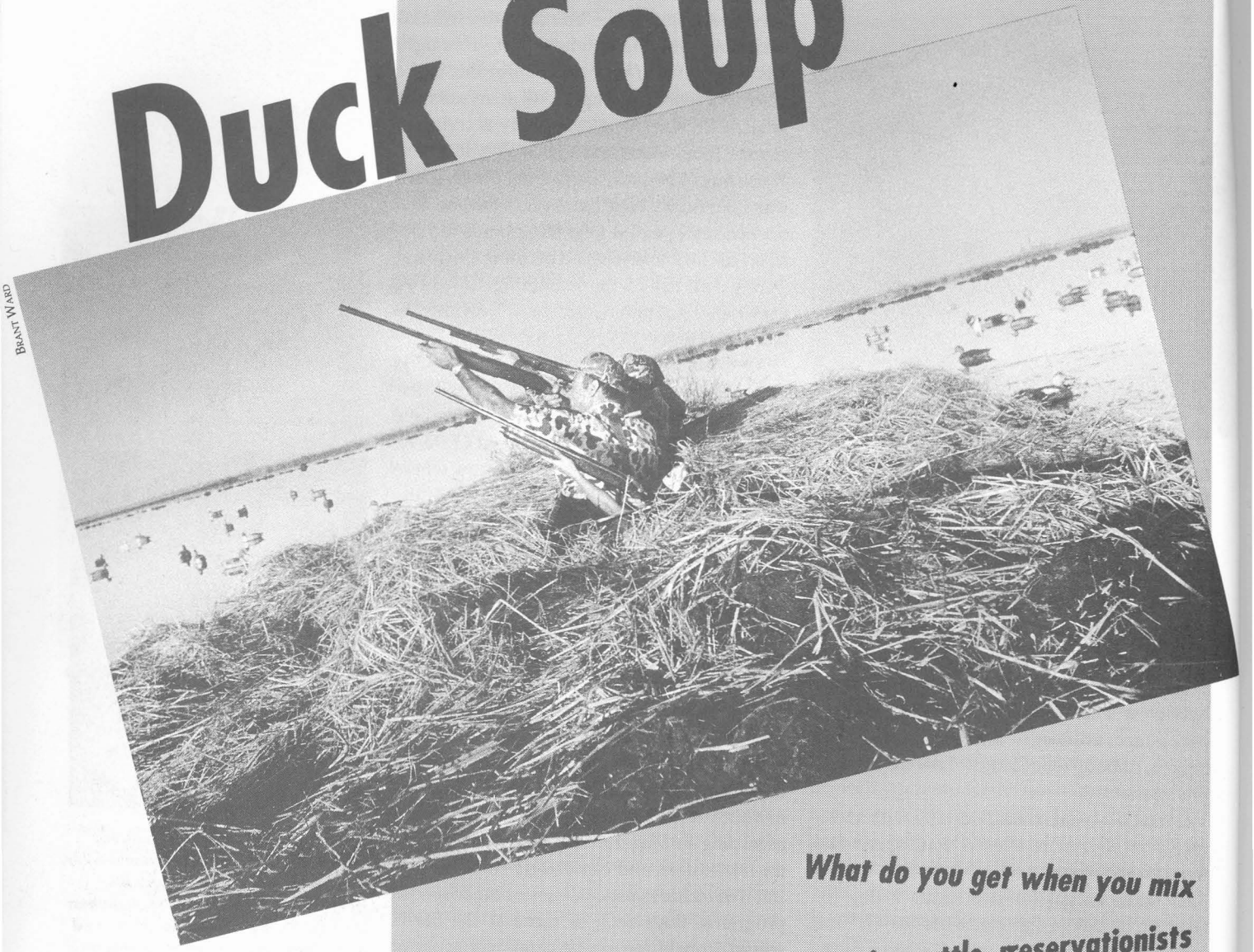
Unfortunately, the future of the Bar-O is hazy. It is cheaper for counties to send their court wards to group homes, which receive federal and state Aid To Dependent Children funds, and to Youth Authority facilities, where the state picks up the bulk of the cost. At the Bar-O, the entire cost must be met by the county, and most counties are financially strapped. The camp can take 42 boys, and a few years ago it was always full. Now it only has 32 and "to keep that many is a struggle." Smith said. The Youth Authority's Clyde McDowell, deputy director of institutions and camps, said that "with financial conditions as they are, we don't intend to renew the contract." At the end of June, the YA picked up three boys and took them away. The annual average per capita cost in Youth Authority facilities is $32,000 a year, according to Meg Tanaka, business manager for institutions and camps branch of the YA. But that includes psychiatric and other special programs. Boys such as those at the Bar-O would probably go to a YA camp within one of its locked facilities, where costs are $17,700, she said. That is still higher than at the Bar-O's $17,000, and all the YA facilities are overcrowded. However, absorbing just the few boys at the Bar-O would mean the YA would not have to put out any money for them, McDowell explained: "We figure, if we just take them in, it will cost us nothing, just food and clothing. There are so few [at Bar O] that we'll just absorb them as part of a mass." ❐

-R.G.

Postscript: Chuck has been doing well on parole, and has been invited to study with a Native American medicine man. Three young ospreys have been seen in the nest by the steelhead raceway.

Another boy, whom staff noticed observing birds, gained stature in his own eyes and status among his peers when he was lent an Audubon bird guide, a pair of binoculars, and some bird lists. Before long, this boy — who had never been in the wilderness before — was helping to build boxes to be mounted on tall trees and, hopefully, become wood duck nests. Whether he would become a birder or ornithologist was not really important. He now had new experiences to build on.

Duck Soup



BRANT WARD

What do you get when you mix duck hunters, grazing cattle, preservationists and the state of California? A model for land-use conflict resolution.

By Reed Holderman

Conflicts over land use are common in California, as elsewhere, with developers confronting farmers and slow-growth advocates, loggers pitted against conservationists, off-road-vehicle users against dune preservationists, duck hunters against cattle grazers. As the state's population grows, and habitats shrink, such conflicts intensify. In any effort to resolve them, the challenge is to acknowledge differences and work toward mutually beneficial solutions. While this is easier said than done, reasonable people can arrive at agreements that prevent or end long and acrimonious battles—as long as all sides gain something.

A case in point is the story of Rush Ranch, in which duck hunting interests fought long and hard with a nonprofit foundation that wanted to preserve the ranch for agriculture, public access, and wildlife habitat. Their differences jeopardized the shared goal of acquiring the property, clouded its future use, and drew the attention of the state Legislature. In the end, however, both sides got what they wanted, ushering in a new era of cooperation between waterfowl and grazing interests within 100,000-acre Suisun Marsh and throughout California.

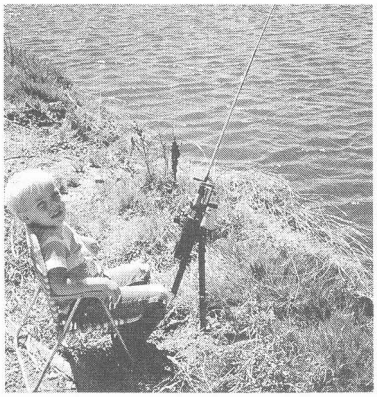
Rush Ranch is a magnificent 2,070-acre expanse of grassland, rolling hills, and marsh on Suisun Bay, two miles south of State Highway 12 along Grizzly Island Road. From Suisun Hill, which rises gently from the property, you can see the entire Suisun Marsh and the distant Sierra Nevada. The ranch comprises 1,190 acres of salt marsh, Spring Branch Creek, an 80-acre freshwater pond, extensive uplands and foothills (800 acres), and some ranch buildings. To the north, beyond the winding tidal sloughs and grasslands, new subdivisions are spreading along the edges of the cities of Fairfield and Suisun, where the current population of 80,000 is expected to double by the year 2020. Most new residents commute to the San Francisco Bay Area or to Sacramento.

As typically happens when open spaces become targets for residential development, local resistance has led to court action. In 1986, a suit by a group of citizens called the Orderly Growth Committee challenging three major annexations by the city of Fairfield ended in a settlement that created the Solano County Farmlands and Open Space Foundation and a special taxing district that would provide funding to the Foundation to acquire open space and farmlands in and around Fairfield. The Foundation board was to be drawn from all four parties in the lawsuit: the city, environmentalists, home builders, and the agricultural community. They agreed to work together to acquire open space and farmlands in Solano County that supported wildlife habitat, recreation, and a viable agriculture.

Named as executive director of the new nonprofit organization was Neil Havlik, formerly range management specialist for the East Bay Regional Park District. The task, in his words, was "to use development as the engine to preserve open space. The community desires a puncture-proof greenbelt."

With that goal in mind, Havlik took a keen interest in a "For Sale" sign he saw in September 1987 on the Rush Ranch. He perceived "an opportunity for us to demonstrate what open space can be like" by acquiring the property and managing it in such a manner that wildlife preservation, grazing, and public access could coexist on the land without conflict, and to mutual advantage. Although the property was for sale, the land was not targeted for development at the time, so its future could be shaped with proper care and deliberation.

Suisun Marsh Natural History Association



R. Robert Smith

Suisun Marsh is a favorite spot for bird watchers, wildflower enthusiasts, and patient fishermen.

The more established elements of the resource community had other ideas. During the past 28 years, the California Waterfowl Association (CWA), the Suisun Resource Conservation District (SRCD), and the DFG—the waterfowl interests in the marsh—have bought degraded wetlands and marshes and restored them as prime duck habitat. Most of the Suisun Marsh wetlands are now either publicly owned and managed for hunting and fishing or privately owned and operated as duck clubs. These resource interests have superseded ranchers as a political and economic power in the marsh as agriculture has gone into decline with increased soil salinity and public acquisitions. The Foundation saw Rush Ranch as an opportunity to demonstrate that ranching and waterfowl could be compatible, and approached Fish and Game and the SRCD for help with the purchase. Havlik also approached the State Coastal Conservancy.

Who's Who Here

California Department of Fish and Game (DFG): Charged with managing statewide fish and game resources, it manages several reserves in the Suisun Marsh and must determine that all marsh activities are consistent with wetland protection.

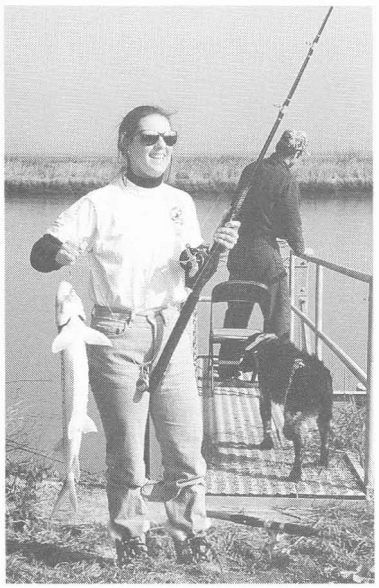
Suisun Resource Conservation District (SRCD): Five-member elected board that regulates all water management activities in the wetland areas of Suisun Marsh. All board members are property owners and most support duck hunting. Regulatory activities outside the wetlands are governed by Solano County and the San Francisco Bay Conservation and Development Commission (BCDC).

California Waterfowl Association (CWA): A nonprofit lobbying organization for waterfowl habitat and hunters.

The Solano County Farmlands and Open Space Foundation: A nonprofit organization formed in 1986 to acquire open space and farmlands that support wildlife, recreation and a viable agriculture; funded by a special district tax.

The State Coastal Conservancy: An independent state agency that undertakes projects and works to resolve coastal and bay land use conflicts.

R. Robert Smith



Sturgeon are a major sport fish in the Suisun Marsh. This one is undersized and was returned to the water.

The waterfowl interests were wary. They were not sure what the Foundation really was. One minute you have farmers, developers, environmentalists, and a local government fighting each other, the next minute you see them all working together to buy farmlands and open space. While out-of-court settlements have been known to make for strange bedfellows, this one seemed particularly insidious to the waterfowl community. Was the Foundation actually home builders disguised as environmentalists? Ranchers who wanted to convert prime duck nesting habitat back to rangelands? Or were they opponents of hunting, using the open space and public access arguments to drive duck hunting from the marsh? Who could say? Uncertainties about the Foundation and its goals created great anxiety among the DFG, SRCD, and CWA. Despite these concerns, the waterfowl interests, at least initially, worked with the Foundation to drum up support and money to acquire Rush Ranch.

A Widening Rift

The State Coastal Conservancy was the first stop. The Foundation's project fit with the Conservancy's mandate to protect bay wetlands and farmlands, and to provide public access. We first made sure that the Foundation was really serious about resource protection and that Fish and Game did not want to buy the ranch. The Wildlife Conservation Board (WCB), which is the acquisition arm of DFG, said it was not interested, having already spent lots of money in Suisun Marsh. WCB's new priority was buying up the Sacramento Delta. This response gave us the green light for proceeding with the purchase of Rush Ranch. However, we were unaware that a big rift was opening between the Foundation and waterfowl proponents.

This rift was not immediately apparent. All our attention was on putting the deal together and buying the land. The Foundation wanted to protect and restore wildlife habitat and diversity, and so did the DFG, SRCD, and CWA. Since neither knew exactly what the other meant by this, or how it would be implemented, both groups put all potential differences aside to accomplish the purchase. All of us appeared together before numerous boards and commissions, urging local and state support for the acquisition of Rush Ranch, and we got that.

But as our talks progressed, issues we had put aside had to be dealt with. The first conflict occurred over cattle grazing. The Foundation wanted to show that a properly managed rotational grazing program could enhance waterfowl and wildlife habitat by keeping grass and brush heights at desirable levels. But the resource conservation district and Fish and Game were opposed to any kind of grazing, despite its history in the area and the protec-

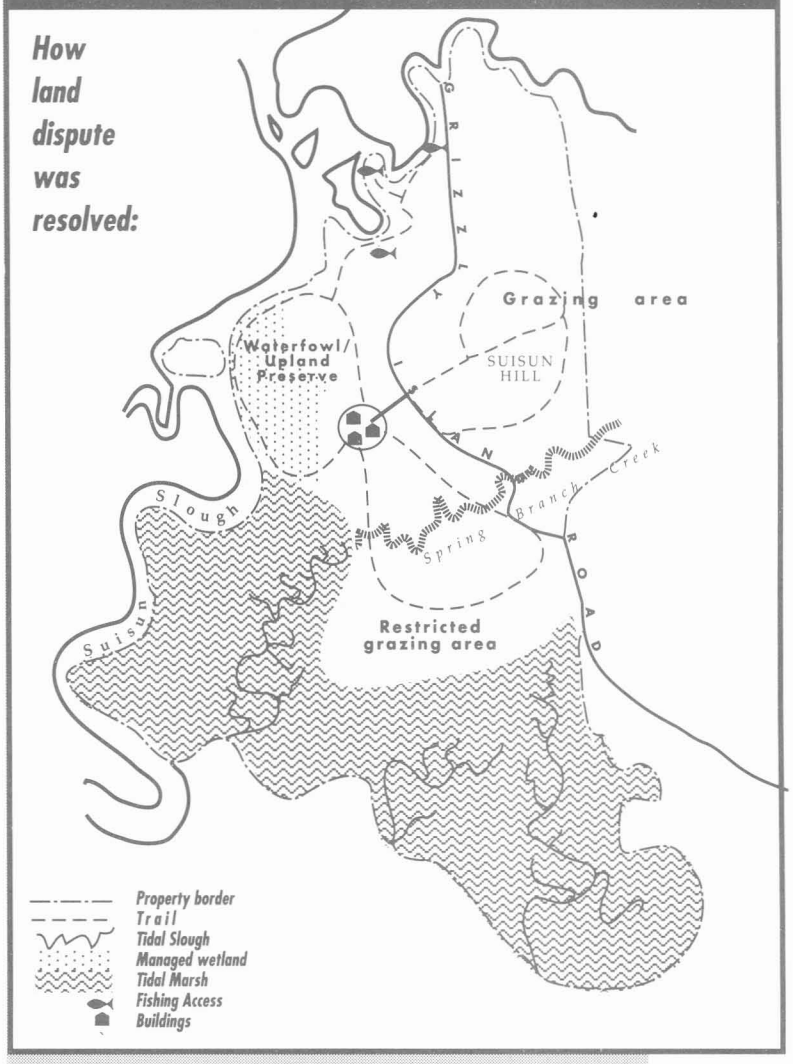
tion it enjoyed in Solano County and San Francisco Bay Conservation and Development Commission (BCDC) plans for Suisun Marsh. "Our number one interest was in developing the property for wildlife and waterfowl habitat," the SRDC's Michael Lewis explained.

The second conflict was over hunting and public access. It came to a head on a hot spring morning two weeks before the Conservancy was to meet and consider the Foundation's request for $1,507,500 for the purchase. Anne Macquarie and I, who had been working on the project together, met with Dennis Becker of Fish and Game, Michael Lewis of the SRCD, and with Havlik in the driveway to the ranch. We announced at this meeting that we were recommending that the Conservancy authorize acquisition funding, plus $50,000 to prepare a management plan for the property, to the Foundation on condition that no hunting be allowed and that the ranch be opened to public use. We explained that it would be dangerous to allow hunting in a place where the public would be walking trails, observing wildlife, or eating lunch. The ranch was, after all, on the outskirts of one of the fastest growing cities in the San Francisco Bay Area.

We were not prepared, however, for Becker and Lewis's response. They told us, in effect, that if hunting was not permitted, the SRCD and Fish and Game would oppose the Foundation's funding request before the Conservancy. The SRCD's worry was that a no-hunting precedent might be set here that could have wider impact, Lewis later explained. Instead of barring hunters, Becker and Lewis proposed that we eliminate or restrict public access to the property. This was something neither the Conservancy nor the Foundation could agree to.

On April 21, 1988, the Conservancy met in Fairfield City Hall, five miles from Rush Ranch, and heard testimony for and against public access, cattle grazing, waterfowl habitat, and the appropriateness of the Foundation owning and managing the ranch. Dennis Becker spoke on behalf of the waterfowl interests in the marsh and said that they were "willing to conditionally support the acquisition of Rush Ranch" if Fish and Game were designated as the lead agency for preparing the management plan; if "interest in the property shall come under the possession and control of the Department," not the Conservancy, "if the Foundation fails to meet its contractual obligations"; and if, after the "management agreement has

Rush Ranch Solution



CHARLES HAVLIK

Left to right: Neil Havlik, Rush Ranch Ranger-Naturalist Tom Klimowski, and Mike Lewis, Manager of the Suisun R.C.D.

Photos: Mona Reeder, Fairfield Daily Republic

Rush Ranch officially opened to the public on Saturday, June 22. The celebration included fiddle players, a wagon tour of the property, and a few of the natural inhabitants of the area, such as this red-tailed hawk.

expired, the land and its improvements shall become the sole property of the state of California to be administered by the Department [of Fish and Game]." The Department had made it clear it would "insist upon these terms and conditions." I took this to mean that if the Conservancy disagreed, DFG and SRCD would prefer to see the present owner overgraze the ranch and degrade its resources rather than have it in Foundation ownership. At least, that's how it seemed.

What carried the day, however, was a spontaneous statement by a surprise witness, Ralph Ingalls, an elderly gentleman, who stood up toward the end of the meeting. None of us knew who he was or where he came from, but his words were powerful and sincere: "I've been using the marsh since 1941 and have seen it deteriorate tremendously over those years—not necessarily Rush Ranch. I recommend highly the purchase to stop the spread of houses. Secondly, when I first hunted and brought home waterfowl, my wife would cook them, and we would eat them. I don't believe in hunting if I cannot eat the food. Now my wife says, please don't go to Grizzly Island to hunt. Birds are too salty, not worth it. As a citizen from Saint Helena, I certainly highly recommend setting aside [the Rush Ranch]. Hunters don't need to use that area. The 14,000 acres on Grizzly Island Reserve [managed by DFG] still has open spots that could be developed [for hunting]."

The unsolicited testimony put the hunting issue into perspective for Conservancy board members, and they immediately voted 4 to 1 to acquire Rush Ranch.

The elderly duck hunter did not sway the waterfowl folks, who next went to Sacramento determined to pressure the Conservancy to reconsider. At subsequent meetings, a reconsideration proposal was laid before the Conservancy twice and rejected both times. As a result, the Rush Ranch controversy came to the attention of several legislators, who urged the Conservancy to resolve the matter quickly, lest the Legislature intervene directly.

Insurmountable Differences?

What had begun as a promising project to protect valuable natural resources and open major new public access had exploded into a major controversy. Meanwhile, more trouble came from another, unexpected direction. The deal with the owner, Robert Dittmer, was on the verge of collapse. Two days before the Conservancy meeting, Dittmer declared he did not want to sell the property. He was behind on his mortgage payments (having

missed two) and, according to him, had never officially taken possession of the property because that would not occur until he made his last payment to the former owner. If he accepted our money, Dittmer argued, he would be liable for anything that had occurred on the ranch, and he was unwilling to assume that responsibility for the amount we were offering. This news left Havlik in shock. He had poured his heart and soul into the acquisition, the Foundation's first. After we left Dittmer's house in Cordelia, I told Havlik we would get the property sooner or later, but at that moment I really did not know how.

As would happen again and again, however, we pulled through. After the Conservancy approved the purchase, an arrangement between Dittmer and the Foundation was worked out and the land was acquired. Now we had to face the formidable task of achieving peace with the waterfowl folks. Havlik called the first meeting of the Rush Ranch Management Committee, which consisted of representatives from DFG, SRCD, CWA, Solano County, the San Francisco Bay Conservation and Development Commission, and the Conservancy. The job was to come up with a management plan on which all would agree. And, despite all the mistrust and animosity, Havlik somehow managed to move the discussion forward.

A year and a half later, in August 1989, a draft management plan was released without much fanfare. It included an opportunity-and-constraints analysis and recommended wetland, riparian, and grassland restoration projects; a waterfowl brood pond and nesting preserve; public access and an environmental education program; a rotational cattle grazing program designed to enhance wildlife and waterfowl habitat; and a monitoring and management program to ensure that everything was working the way it was supposed to. On the crucial points of hunting, cattle grazing, and public access, however, the participants were farther apart than they had been at the beginning, recalled Jim Buchholz, the lead consultant from Wetland Research Associates. The waterfowl interests were unhappy with the draft plan, and the SRCD threatened to veto it unless it was changed.

Given this impasse, the Foundation decided to lease part of the ranch for cattle grazing. Havlik recalls, "I made this decision, after consulting my board and legal counsel, because I was concerned about potential fires, the Foundation's ability to undertake effective property management, and the remarks made by the SRCD."

Jumping the Gun

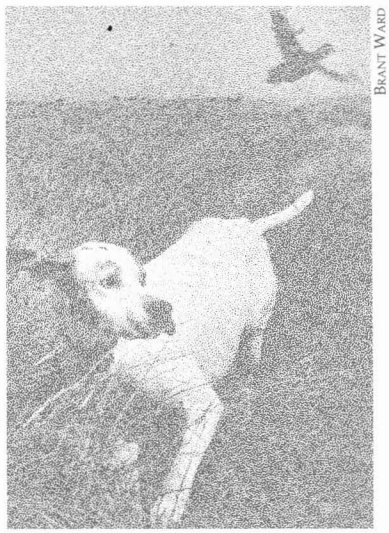
The waterfowl folks were livid. Nothing was supposed to happen on the ranch until the management plan had been agreed to by all parties. From their perspective, the Foundation had suddenly sabotaged the plan and the process. Telephone calls poured into the Conservancy from the SRCD, DFG, CWA, BCDC, and others, all asking the same questions: Why did the Foundation do it? What was the Conservancy going to do about it?

The cattle created problems for everyone, especially for us. The next day, we demanded that the Foundation terminate its grazing lease and pull the cows off the ranch. We considered the matter a violation of both the spirit and the letter of our contract. Havlik disagreed, but called a special meeting of the Foundation board of directors to discuss the situation. He told the board that the Foundation had been patient with the process, which had taken two years already, and that grazing was an approved and historic use in Suisun Marsh, fully consistent with other uses. He also said the ranch was becoming a fire hazard and cattle grazing would help to reduce this problem while generating a little income.

When it was my turn to speak, I told the Foundation board that the prospect for a compromise with the waterfowl interests was very good. We had a good working relationship with them, and I was convinced we could work things out. But that was not the point. The Conservancy had a contract with the Foundation, and the Foundation had violated this contract, which states that until a management plan was approved, nothing except maintenance work was to be done. To set things straight, the cattle had to go immediately.

The Foundation board had had it with the management plan and agreed with everything Havlik had said. There was bad blood between them and the waterfowl folks, and their patience was growing thin. Despite all that, however, the board voted to pull the cows off and take the loss on the lease, but on condition that the Conservancy wrap up the management plan by February 1, 1990. If it failed to do that, the Foundation would lease the property again and defend its position in court if necessary.

Unfortunately, putting cattle on the ranch reinforced DFG, SRCD, and CWA's mistrust of



BRANT WARD

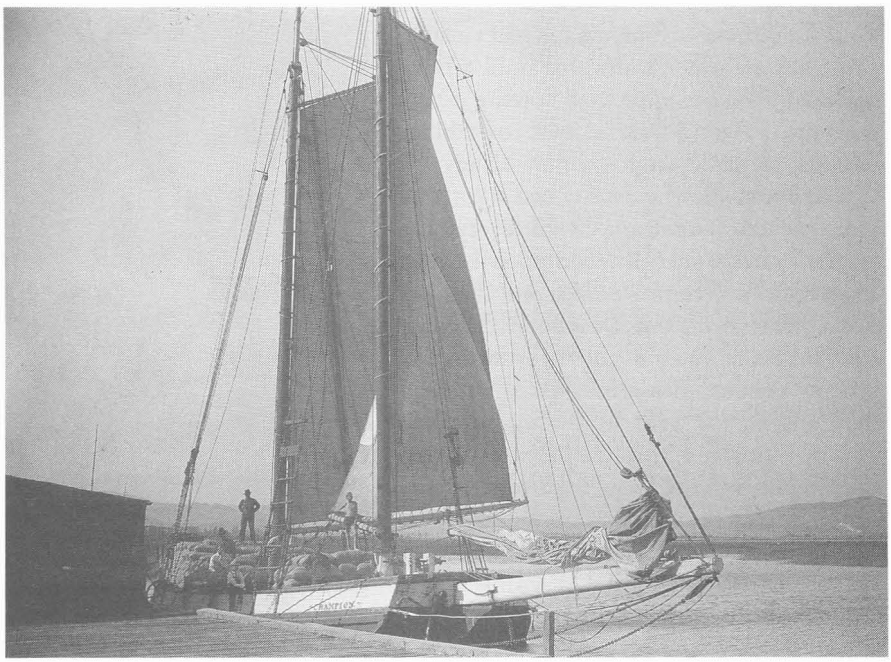
"When I first hunted and brought home waterfowl, my wife would cook them, and we would eat them. I don't believe in hunting if I cannot eat the food. Now my wife says, please don't go to Grizzly Island to hunt. Birds are too salty, not worth it."

the Foundation and put on hold any talk of a compromise on the management plan. Although the cows were removed quickly, the fact that Havlik had acted precipitously affected the groups profoundly. Who could guarantee that he would not do something like that again? Why negotiate with a man who could run off and do his own thing again, making everyone else look bad? For a couple of months there were no more talks. Meanwhile, the Foundation's clock kept ticking. A deal within four months, or else.

Given this situation, the Conservancy called a meeting between Dan Chapin, vice president of governmental affairs for the California Waterfowl Association and a consultant to the Suisun Resource Conservation District, and Bob Berman, a land use consultant, who had been a key force in the creation of the Foundation and was its president. Neil Havlik and I were sure that if we could get these two men together, we could come up with a solution that others might accept.

Soon after the Gold Rush of 1849, scow schooners began trading in the hundreds of miles of waterways connecting the San Francisco Bay and the Central Valley. The schooner Champion (below), loaded with local grain, prepares to leave Suisun embarcadero, on the Rush property, in this 1914 photo. A topographical map from 1873 shows the Rush ranch. Note "Grisly Island": was the name change a matter of spelling or attitude?

COURTESY BANCROFT LIBRARY



COURTESY SOLANO COUNTY HISTORICAL ASSOCIATION

A Dark and Stormy Morning

We met on a stormy Monday morning on October 23, 1989, a few days after the 7.1 Loma Prieta earthquake that rocked the San Francisco Bay Area. There was a surreal quality about the drive from Oakland to Fairfield. It was dark and rainy, several freeway ramps were closed, and many cars had been abandoned along the freeway. If all this was any clue to how things would turn out, the prospect for compromise was dim. Yet several hours later, Dan Chapin and Bob Berman agreed to take back to their respective organizations a proposal that included restricted grazing, setting aside waterfowl nesting areas, creating public access, protecting critical wildlife areas, and excluding hunting. Finally on the right track, we just had to sustain the momentum.

One month later, on November 20, all the major parties met again to discuss the previously agreed-on compromise. Those present included representatives from the Suisun Resource Conservation District, Fish and Game, the California Waterfowl Association, the San Francisco Bay Conservation and Development Commission, Solano County, the Conservancy, and the Foundation. Everyone was there who had to be to make a deal.

This was the meeting in which, at last, agreement was accomplished on all the major issues dividing the Foundation and the waterfowl interests. After much haggling, the SRCD, DFG, and CWA agreed to support the management plan if the Foundation and the Conservancy would agree to limit grazing west of Grizzly Island Road to South Pasture after the waterfowl nesting season and to implement a more elaborate monitoring program to evaluate the result of this activity annually. The monitoring program would also be used to establish stock rates and time periods to assure adequate grass for nest building.

The issue of hunting was more difficult and was discussed at great length. Then suddenly it was settled. I reiterated our reasons for deciding that hunting was inappropriate on the property, and then someone let slip that if hunting were done from a boat, shooting from the tidal channels onto the ranch, there was very little either the Conservancy or the Foundation could or would do because this area was restricted for wildlife and they have no control over waterways activities. This understanding seemed to appease the waterfowlers. Everyone had known all along that the only hunting at the ranch was either in the tidal channels or in the freshwater pond, which was to be used for duck rearing and was off-limits to hunters. Hunting by boat, however, provided an acceptable solution to all parties since neither the Foundation nor the Conservancy had the regulatory authority or enforcement powers to control it.

On March 13, the previous agreements on the management plan were ratified by the Rush Ranch Management Committee. Less than a month later, the SRCD approved the plan without discussion. Shortly thereafter,

BCDC did the same, largely on the recommendation of the SRCD and Fish and Game. The final approval came on June 22, 1990, when the Conservancy approved the Rush Ranch Management Plan and authorized $444,170 to implement its recommendations. The Foundation, for its part, agreed to contribute over $500,000 to the project, most of that for long-term operation and maintenance. These approvals concluded a long and grueling battle over the future of Rush Ranch, and ushered in a new era of cooperation and guarded trust.

The Final Plan

- ***Eliminate grazing and public access in tidal areas and create a 200-foot buffer around the marsh perimeter.***
- ***Raise and repair existing levees to an elevation of 8.5 feet.***
- ***Exclude cattle from springs and creeks by building fences.***
- ***Conduct pilot planting programs to determine the survivability of native trees and shrubs.***
- ***Implement a rotational grazing program (85 to 125 head) east of Grizzly Island Road and in South Pasture, west of Grizzly Island Road, except during waterfowl nesting season.***
- ***Conduct a five-year monitoring program with annual reports and annual field assessments to study the effects of grazing on native plants and wildlife, and especially on waterfowl nesting.***
- ***Construct three loop trails that originate at ranch headquarters, using existing trails and roads.***
- ***Create fishing access and parking along Hill Slough.***
- ***Prohibit hunting on Rush Ranch.***
- ***Protect existing Native American sites from public access and grazing impacts.*** ❐

Lessons Learned

Perhaps the most important lesson learned from this project was that you can work out seemingly unsolvable differences, given enough time, pressure, and relevant information. It is inconceivable that a speedy agreement could have been reached at Rush Ranch, no matter how careful you were in checking out the situation in advance. Each party came to the project with strongly held views on substantive matters. Only after we had learned about the ranch and its resources could we begin to see what would work and what wouldn't in managing it. Without such information, we would still be arguing over many of the issues that the opportunity and constraint analysis settled.

Time played a crucial role. After fighting over differing uses for almost two years, people of opposing points of view learned to respect other positions. Dennis Becker and Michael Lewis did not have to convince me that waterfowl hunting was an appropriate use in the marsh anymore. But was it appropriate at Rush Ranch, given the other activities planned and the absence of even a moderate waterfowl and upland game population? Time gave us each a chance to think about such issues instead of rushing back into policy positions. Constant exposure to each other also taught us that the other person could be right, and that we should try to include each other's point of view.

Not everything was settled. The question of optimal use of the property by people, wildlife, waterfowl, and cattle remains open. Since the location and intensity of uses will be largely determined by the annual monitoring studies, and we have had only one year's worth of data (base year before improvements), the jury is still out on the optimal number of cattle allowed; how many ducks will nest and rear their young at the ranch and where; whether the upland and creek revegetation projects will take and establish new habitat for upland species; whether the Foundation can manage the property as envisioned in the management plan; and whether public access will affect other uses even if it is sensitively integrated into the natural landscape. Early indications suggest that these activities can be mutually reinforcing and beneficial, if properly managed. In addition, our relationship with the Foundation during the last four years suggests that it is capable of carrying out this management, and if it is not, the Department of Fish and Game or the Suisun Resource Conservation District will let us know.

What advice can we give to others involved in similar efforts? Don't give up. Several times, Neil Havlik confided in me that he wondered if this project was worth all the suffering. While the light at the end of the tunnel was pretty dim at times, neither Neil nor I ever gave up hope that things would be settled. The process was emotional, depressing at times, and beset with delays and setbacks. But a solution was eventually found. It just took a tremendous effort on everyone's part.

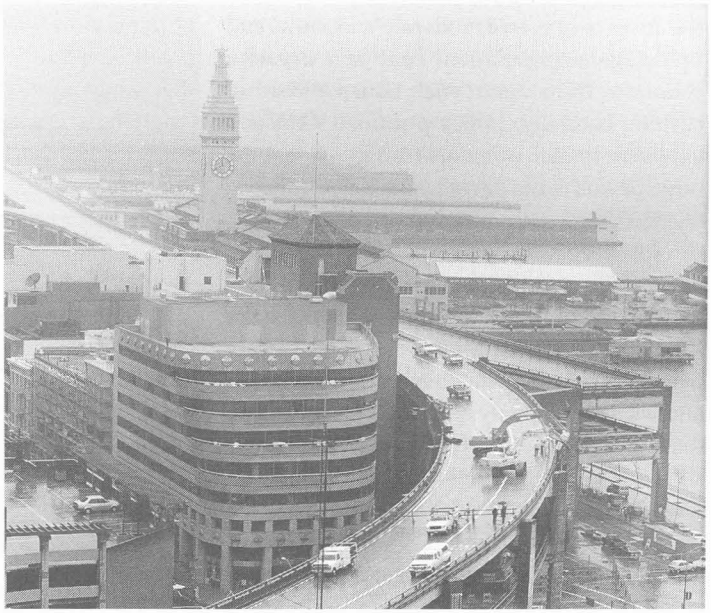
Postscript

Rush Ranch was opened to the public on June 22, 1991. ❐

Reed Holderman is manager of the Coastal Conservancy's Public Access and Nonprofit Programs.

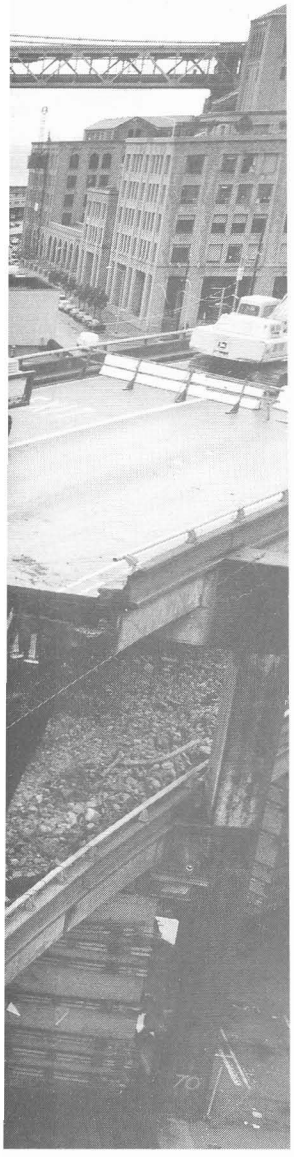
The earth shook, the people spoke, the freeway came tumbling down—and th

The first blow is struck on February 28 (right). The section of freeway that already appears to be cut off was, in fact, cut off—by a previous generation of freeway activists. In 1963, a citizens' "Freeway Revolt" stopped construction on the Embarcadero and a whole complex of freeways that were to loop around the city and join up with the Golden Gate Bridge *and* another proposed bridge to Marin County. The interrupted roadway pictured here was to continue the Embarcadero Freeway along the waterfront to Route 101 and eventually to that now-forgotten bridge-to-be.

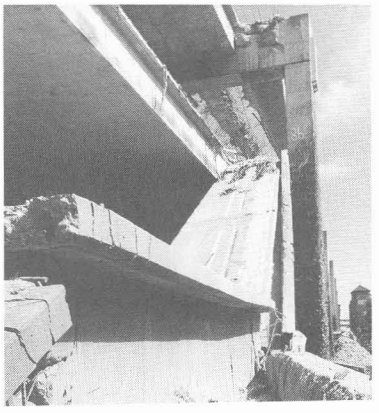


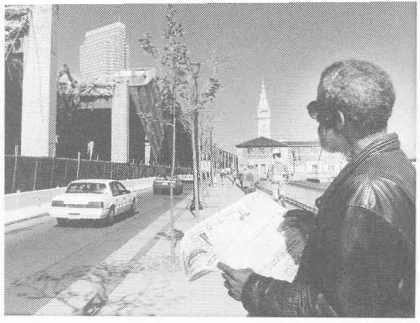
rue face of San Francisco's waterfront emerges.

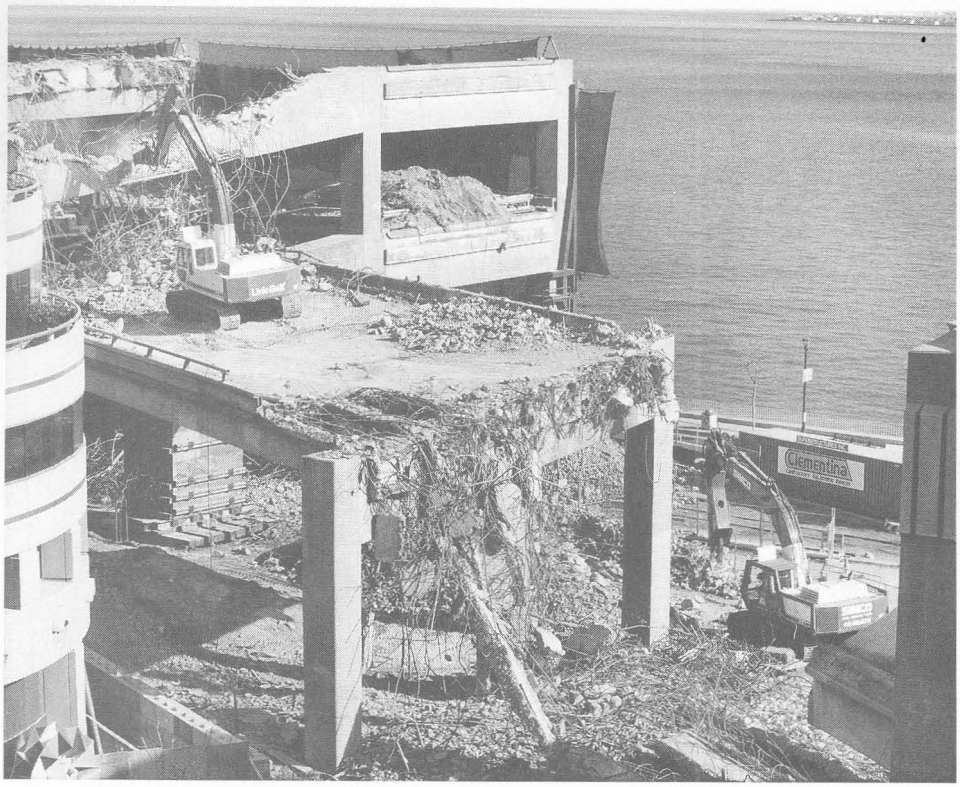
THE END OF THE EMBARCADERO



Photographer Steve Hellon of CalTrans has followed the demolition of the Embarcadero freeway, and has compiled a portfolio documenting the most radical change to the San Francisco waterfront since . . . the construction of the Embarcadero?



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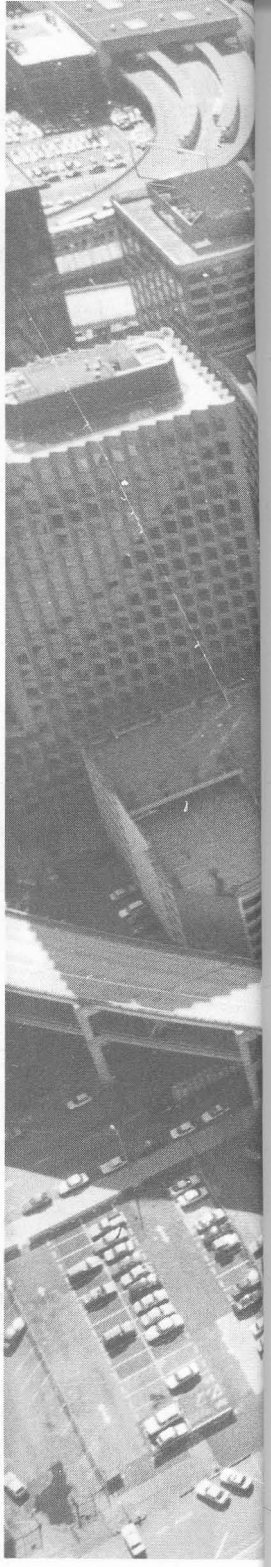

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Book Reviews

Waterfront Revitalization

Watershed, *by the Royal Commission on the Future of the Toronto Waterfront. Toronto, Ontario: 1990. Free, 207 pp*

"The Greater Toronto Region is, both literally and figuratively, at a watershed," the Royal Commission on the Future of the Toronto Waterfront states in *Watershed*, a creative analysis of the potential future of this waterfront. Arguing that "a good quality of life and economic development cannot be sustained in an ecologically deteriorating environment," this analysis is based on an "ecosystem" approach.

The commission realized that the waterfront could not be viewed as "simply a narrow band along the shore: it is linked by Lake Ontario to the other Great Lakes, by rivers and creeks to the watershed, and by water mains, storm and sanitary sewers, and roads to homes and businesses throughout the metropolitan area."

The Royal Commission was established in 1988 to analyze the waterfront's future and make recommendations. This elegant volume is its second interim report. The ecosystem approach is not new in planning studies. However, integrated comprehensive analyses, and, more importantly, implementation plans are all too few and far between. Indeed, the efforts of the Royal Commission may be among the first large-scale "bioregional" planning studies to be completed in the 1990s, providing important information to planners throughout North America. The environmental assessments completed by the commission to date have demonstrated many links among the Toronto bayfront areas, Lake Ontario, the Don River Watershed, and the Great Lakes region, leading the commission to establish the Greater Toronto Bioregion as the area to analyze.

The first chapters of *Watershed* describe the methodology and principles used by the commission in planning for the future of the Toronto waterfront and larger region. The bulk of the report is devoted to several dozen recommendations, focusing on both the Toronto waterfront and the regional watershed. These broad recommendations encompass planning, organization, and implementation. While some address long-term goals, many of the recommendations address specific actions that could be undertaken in the short term. Perhaps the most significant recommendations—which need to be addressed immediately if the commission's efforts are to achieve some positive result—focus on intergovernmental relations. Government in the Greater Toronto Bioregion is shared by five regional agencies, 30 municipalities, and numerous federal and provincial ministries, departments, boards, agencies, and commissions.

To those of us outside the Toronto region, the work of the Royal Commission gives hope that comprehensive plans can be undertaken. It remains to be seen if the social, political, and economic will exists in the region to ensure that they are implemented.

Reports and working papers published by the Royal Commission on the Future of the Toronto Waterfront are available free of charge. Contact the Commission at 207 Queen's Quay West, 5th floor, P.O. Box 4111, Station A, Toronto, Ontario M5W 2V4.

Reviewed by Marc Beyeler, manager of the Coastal Conservancy's urban waterfront program.

Waterfront Revitalization for Small Cities, *by J. W. Good and R. F. Goodwin. Oregon State University Extension Service, Corvallis, Ore.: 1990. $16.00, 124 pp*

This handsomely produced volume is a useful tool for those revitalizing small city waterfronts. It is a how-to guide aimed at movers and shakers in government, business, and the community, focused on developing and implementing a waterfront plan in a small city (with a population of under 50,000).

A lot of information is presented, in a well-designed, illustrated format that includes annotated outlines and checklists. The reader is told in advance, in some detail, what's about to be discussed. To the question, "Why revitalize?" seven brief case studies provide some answers. Also included is a model planning process that discusses Getting Started, Surveying the Waterfront,

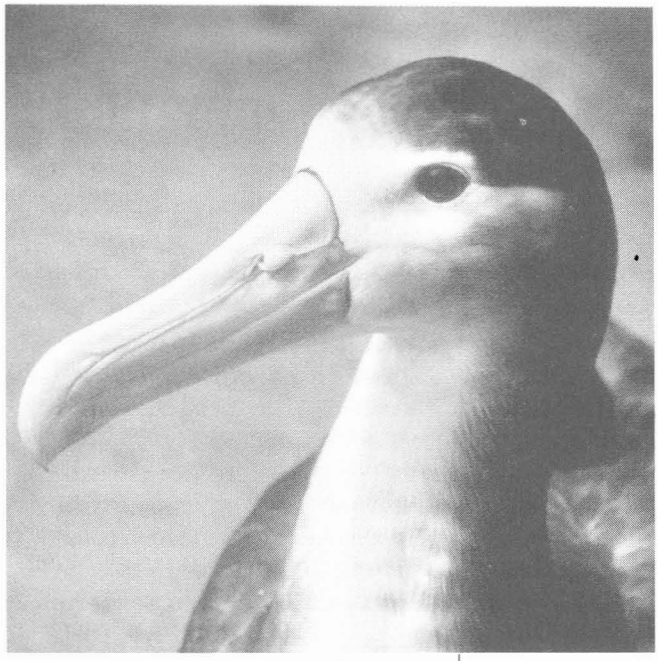
Developing the Waterfront Plan, Implementing the Waterfront Plan, and Revisiting the Plan (later modifications). The Tools and Techniques section includes land use controls and incentives, acquisition methods, financing approaches, choosing and using consultants, and the development permit process. Also included are citizen involvement techniques.

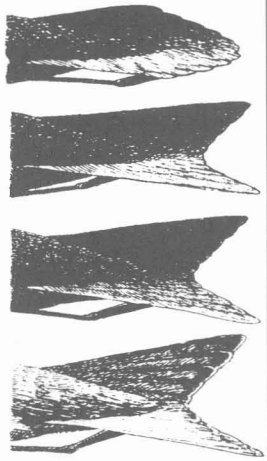
A few issues that often crop up are discussed, especially "gentrification," and what constitutes "good" and "bad" public access. The book suggests useful design guidelines, such as "Housing over water—either on pilings or in floating structures—should be discouraged; state and federal resource and coastal management agencies generally will object to such projects" or "Locate parking lots near the ends of the downtown waterfront, perhaps in conjunction with an 'anchor' activity, such as a marina or yacht club; or use a landscaped parking lot as a land use buffer between industrial and commercial sections of the waterfront."

Other helpful hints include: involve waterfront property owners and development interests from the beginning; ensure that needed public improvements go in with, or ahead of, private development; and, if necessary to reduce development risk, secure some public sector financial participation in the sharing of risks and rewards.

Altogether the book is a welcome addition to the growing literature on urban waterfront development. To order, write to Publications Orders, Agricultural Communications, Oregon State University, Administrative Services A422, Corvallis, OR 97331-2119. Specify volume number EM 8414 and enclose $2.40 for shipping and handling.

Reviewed by Peter Grenell, executive officer of the State Coastal Conservancy.





Typical rump-tail patterns for (top to botom) Least, Ashy, Black and Fork-tailed Pacific storm-petrels. (Left) Adolescent albatross.

Guide to Ocean Birds

Ocean Birds of the Nearshore Pacific: A Guide for the Sea-Going Naturalist, *by Rich Stallcup. Point Reyes Bird Observatory, Stinson Beach: 1990. $19.95, 214 pp*

My experience with pelagic birding has been largely restricted to observing small dark floating objects on the ocean surface fleeing ahead of the boat as we approach or flying rapidly in silhouette along the horizon. Telescoping from the Cliff House esplanade or the wind-swept observation area at the Point Reyes Lighthouse has provided me with yet another glimpse out into the world of offshore birds. Sometimes large migrations are tantalizingly suggested by floating rafts of dark shapes that rise and fall from view on the ocean swells or by the rapid, rolling flight of birds in the misted distance. Repeated frustration with attempts to positively identify these birds from the standard field guide illustrations and description—along with the legendary rough waters outside the Golden Gate—has discouraged me from pursuing a wider acquaintance with pelagic birds.

New hope and encouragement have appeared in the form of this modest volume by outstanding birder Rich Stallcup. I have followed his "Focus" articles in the *Point Reyes Bird Observatory Newsletter* for some years and have found them very valuable in learning subtle but readily observable characteristics for separating members of confusing groups of birds such as cormorants, loons, and terns. Rich Stallcup has the twin gifts of an excellent eye for differences and the ability to translate his vision for the less-experienced birder with clear and often clever and memorable descriptive turns of phrase. Here he is discussing the flight behavior of the Wilson's storm-petrel: "Flight is direct, with low, fluttering, butterfly-like strokes, and it does not involve bouncing side-to-side (like Leach's) or up and down (like Band-rumped). Fluttering flight is occasionally interrupted by steep upswoops, sometimes in combination with shrug preening, and during these behaviors the unique tail shape can often be seen. When foraging, Wilson's just seem to dangle like little marionettes, on open wings, pattering the surface with their long legs much extended. This pattering behavior is frequent in Wilson's, occasional for Band-rumped, and seldom for Leach's."

Stallcup's deep fascination with birds and years of observational experience are evident on every page in his rich descriptions of characteristics and behavior. He is also familiar with records of sightings and distribution of species, and gives the reader a good idea of what

is likely to be seen, where, and when. Users of *Ocean Birds* will clearly gain in ability to identify these birds from limited sightings—so often all we get.

The book concludes with a discussion of other marine creatures that may be sighted on pelagic trips. Marine mammals and sea turtles are illustrated with boat-view photographs that emphasize identification characteristics most likely to be seen by a pelagic tripper. The whale comparison chart on page 174 is a useful feature. A similar graphic summary of the bird groups, comparing silhouettes of flight and foraging postures, would be a useful addition to the book but doubtless is difficult to produce.

Ocean Birds is illustrated with clear black and white photographs and with drawings by Tim Manolis and Keith Hansen, well chosen to reinforce the identification characteristics discussed in the text. There is a bibliography for further reference and an index for quick access to suspected species.

Reading around in this book has reawakened my suppressed interest in pelagic birding and given me a new confidence that I can come to know and better appreciate these wanderers of the open sea. The discussion in the introduction of how, when, and where to take a pelagic trip provides the means, methods, and the message to go for it.

I strongly recommend *Ocean Birds* to people interested in birds and sea life, who view from the shore, from whale-watching trips, or fishing trips to the "outside." It is a most useful companion to the present field guides for beginners and experienced birders alike.

To order, write to the Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970.

Reviewed by Allan Ridley, who teaches ornithology at the Urban School of San Francisco.

Walks of a Lifetime

A Walker's Yearbook: 52 Walks in the San Francisco Bay Area, *by Margot Patterson Doss. Don't Call It Frisco Press, San Francisco: 1991. $9.95, 275 pp*

It is quite safe to say that no other person has ever walked around and commented upon as many Bay area places as has Margot Patterson Doss, a transplant from Baltimore who has become more of a native than descendants of Gold Rush families.

While individuals may have researched and written about specific places more thoroughly and at greater length than Doss, no one has rummaged around, picked up, and displayed for all to see, more intriguing oddments than has she. In the process, she has become not only a commentator upon but a major figure in this place, known to and heeded by the leaders of the Bay area community. In her own right, she is now a major player in the never-ending conflict between those who would destroy in the name of progress and those who would preserve and expand those places set aside for the enjoyment of all. Needless to say, she is on the side of the angels.

The most visible part of her campaign to save her adopted land has been her "—At Your Feet" Sunday column of the *San Francisco Chronicle,* which has carried this feature for decades, and the books that have resulted from this offbeat journalistic endeavor. In these columns-become-books, she transports her readers to sites in the Bay area, and then stride by stride, shows them the treasures of each site—the sounds, the sights, the scents, the history, all the facets that make that particular place unique and worth visiting.

The occasion for this note on one of our area's most influential citizens is the reprinting of this volume, one of the most select of her collected works.

Whether it be at Point Reyes to watch the migrating whales in December, along San Francisco's Edgewood Avenue with its "pagan pink glory" of plum blossoms in February, in the heat of Jack London State Park in July, or in the "blue and cold" morning air of the East Bay's Hidden Canyon in October, a Doss walk as experienced here is almost as pleasurable on the printed page as it is on the site itself.

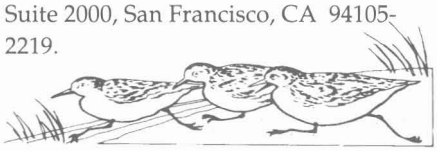
(Further note for Doss fans: The third revised edition of *San Francisco At Your Feet* has just been released by Grove Weidenfeld Press.)

Reviewed by Stanleigh Arnold, former Sunday and feature editor of the San Francisco Chronicle.

On June 30, exactly 30 years since the first "Bay Area At Your Feet" appeared in the Sunday San Francisco Chronicle, *Margot Doss retired, to begin her 11th book.*

Guides to Marine Education

The California Coastal Commission has published two directories to coastal and marine educational resources. One is for the San Francisco Bay Area, the other for San Luis Obispo, Santa Barbara, and Ventura counties. The directories list information on educational programs (there are close to 100 in the Bay area), including available speakers, training, intern and volunteer opportunities, periodicals, curricula, reference books, teaching aides, videos, and on-site resources. For a copy, write to the Coastal Commission at 45 Fremont St., Suite 2000, San Francisco, CA 94105-2219.



Conference Log

Continued from page7
International Symposium on Coastal Ocean Space Utilization (COSU II). Held in Long Beach April 2–4, the conference was truly international in scope, with many participants from the Far East.

Many of the speeches focused on multipurpose projects that combined commercial, industrial, recreational, and environmental components. Among these were presentations on tidal and wave energy, innovative ways of unloading cargo, floating structures, land reclamation, new breakwater technologies, mining (sand, gravel, shell, and placer), waste incineration, and ocean-oriented theme parks. Japanese scholars discussed the proposed "Odaiba" Sea Purification and City Resort in Tokyo Bay. Using a system of buried filtering pipes, this project would transform a shallow, polluted area semi-enclosed by an artificial island and two old breakwaters into zones for tidepool play, marine sport, touch-and-play-with-the-sea, and nature sanctuary for the thousands of workers and residents of a proposed adjacent urban center.

Other speakers described coastline changes, shipping safety, data collection, and various countries' ocean programs. The importance of the ocean for fishing and mariculture was recognized, but scant mention was made of how to manage or improve the fish population. Oil and gas drilling were not discussed, except by marine policy consultant Eugenia Laychak, whose paper offered charts of impacts and mitigations for oil and gas development and minerals mining that should prove useful to regulatory agencies. A few papers addressed legal and institutional issues, such as the application of the Comprehensive Environmental Responsibility Compensation and Liability Act, to ocean pollution. This "Superfund" law gives authority to designated federal and state agencies to seek compensation for injury and loss of resources from the release of hazardous substances.

The conference was sponsored by the National Oceanic and Atmospheric Administration, National Science Foundation, Coastal Development Institute of Technology (Japan), University of Southern California Sea Grant Program, Paul Hall Endowment, University of Southern California, Max and Victoria Dreyfus Foundation, Worldport Los Angeles, and the Port of Long Beach. Proceedings are available for $50 from International Maritime Inc., 839 South Beach St., Suite 217, San Pedro, CA 90731. Call president Don Walsh at (213) 514-8304 for more information about this or the next COSU symposium.

Rick Hyman

Rick Hyman is a coastal program analyst for the California Coastal Commission.

Upcoming Conferences

Estuarine Research—The 11th biennial International Conference of the Estuarine Research Federation, November 10–14, San Francisco. Among themes: comparative cycling of natural and contaminant materials in estuaries. Invited symposia include National Science Foundation Land-Margin Ecosystem Research Program; Estuarine Fronts; Comparison of Large River-Delta Estuaries; and Information Exchange Between Estuarine Scientists, Managers, and Policy Makers. Information: Jerome Williams, P.O. Box 544, Crownsville, MD 21032-0544.

Morro Bay Harbor Festival—(October 5–6) and **State of the Estuary Conference** (October 4–12) —"Bounty of the Bay" is the theme of the tenth harbor festival, celebrating the diversity of Morro Bay marine and coastal life. Contact Morro Bay Harbor Festival, P.O. Box 1869, Morro Bay, CA 93443. "Understanding the Past; Celebrating the Present; Designing the Future," is the aim of the nine-day conference on the state of this bay, which Governor Pete Wilson in May nominated as an estuary of national significance to be included in the National Estuary Program. Contact: State of the Bay Conference, P.O. Box 1375, Morro Bay, CA 93443.

Urban Waterfronts '91—Ninth Annual Conference on Urban Waterfront Planning, Development, and Culture, October 10–12, Washington, D.C. Organized by the Waterfront Center. Among topics: Waterfront resorts, making cities liveable, art on the waterfront, marina management issues, industrial waterfront installations, respecting nature, waterfront regulations. Contact: Susan Kirk or Ginny Murphy, The Waterfront Center, 1536 44th St. NW, Washington, DC 20007. (202) 337-0356. FAX (202) 625-1654.

Historic Preservation—The 45th National Preservation Conference, October 16–20. San Francisco. Focus on the future of historic preservation; with trade show and tours of Bay area monuments and public buildings. Sponsored by National Trust for Historic Preservation, National Park Service, and Advisory Council on Historic Preservation. Information: Connie Keys, National Trust for Historic Preservation, 1785 Massachusetts Ave. NW, Washington, DC 20036. (202) 673-4092.

Ecotech Conference--Developing new strategies and new managerial models to address environmental issues; focusing on new paradigms for business. Nov.14-17, Monterey Conference Center. Contact:, Ecotech Conference, 600 Townsend Street, Penthouse, San Francisco, CA 94103. Tel. (415)703-9900. Or call Mike Whitacre, (619)259-5110.

From Other Shores

JAPAN

Japanese Wetland Protection Movement Through A Californian's Eyes

by Serge Dedina

Isahaya Bay, in the Ariake Sea along the southern Japanese island of Kyushu, is the largest remaining tidal flat in Japan, teeming with over 250 species of shellfish, 272 species of birds, and 174 species of fish. On Sundays local families gather oysters and clams. Master fishermen catch *mutsugoro* (mudskipper), a local delicacy, with such extraordinary skill it would put most fly fishermen to shame. The beautiful European spoonbill, an endangered bird species, stops here on its way south to Australia, where it escapes the cold winters of Siberia.

♣ If the current rate of coastal destruction continues, all of the natural coastline of Japan will be eliminated by the year 2050. ♣

Local environmentalist Hirofumi Yamashita and fishermen from around the Ariake Sea have been fighting for over 20 years to preserve Isahaya Bay. They have achieved a minor victory. Instead of filling the bay's entire 25,000 acres as it had originally planned, the government agreed to fill only half. A breakwater is now under construction to accommodate a "Disaster Prevention Landfill Project," which will eliminate 10,000 acres of mud flats and wetlands.

Isahaya is only one example of what is occurring throughout Japan. If the current rate of coastal destruction continues, all of the natural coastline in Japan will be eliminated by the year 2050. The government has turned to large-scale public works projects to stimulate an economy that faces stiff competition from the rapidly expanding export economies of South Korea, Malaysia, and Singapore. The coastline's shallow bays, tidal flats, and wetlands are seen as excellent locations for industrial parks, boat harbors, garbage dumps, and flood control projects. Little heed is paid to the fact that they also provide critical habitat for local wildlife and the millions of migratory birds that stop over in Japan on their way to Australia and Southeast Asia during the winter, and to Siberia in the summer.

(Upper) Wetlands of Isahaya Bay. (Lower) Woman gathering crayfish in area to be filled in. Photos: Serge Dedina

I was invited to Japan by the Friends of the Earth-Japan to speak at the "International Wetlands Symposium" in Isahaya on effective grassroots strategies for saving wetlands. The gathering brought together activists from throughout Japan who are attempting to preserve wetlands in their communities. They included biologists, bird watchers, academics, homemakers, photographers, factory workers, retired loggers, and a Buddhist priest. Waki Yoshishige, a dockworker from the industrial city of Fukuoka in northwestern Kyushu, said that the wetland near his house, targeted for development as a commercial center, was one of the few places where his daughters could view wildlife.

Japan is scheduled to host the 1993 Convention on Wetlands of International Importance (Ramsar Convention), which it has signed along with 44 other countries, including the United States. To focus attention on the plight of Japanese wetlands for this occasion, the Japan Wetlands Action Network (JAWAN) was

formed at the symposium. The purpose of JAWAN is to work for national legislation (similar to the California Coastal Act) to preserve the coastal zone, with emphasis on wetlands. JAWAN will also pressure the central government to protect the 24 wetlands (including Fujimae and Isahaya) recognized by the International Waterfowl and Wetlands Research Bureau (IWRB) as sites of international importance in Japan. Nine of these sites have been targeted for development by the national 1987 Resort Law, which provides government subsidies for recreational development, such as marinas and hotels.

Despite their excellent organization and broad level of public support, Japanese grassroots environmental groups face tremendous obstacles. Japan's political system caters to the needs of business and development interests and provides little room for public input in the planning process. For example, the Nagasaki prefecture continues to promote the plan to eliminate Isahaya, despite opposition by local governments from around the Ariake Sea whose economies depend on the fishing industry, and protest demonstrations involving 10,000 fishermen. Groups opposed to the project argue that the elimination of Isahaya Bay, which fishermen refer to as the "womb of the Ariake," will cause serious damage to the health of the region's fisheries.

In the industrial city of Nagoya, local bird-watcher Tsuji Atsuo has organized a broad campaign to preserve the Fujimae tidal flat, which contains higher concentrations of shorebirds than any other wetland in Japan. The city, which currently recycles only 1 percent of its garbage, plans to use Fujimae as a dump. The Nagoya Council for the Conservation of Tidal Flats has collected over 100,000 signatures on a petition for preserving Fujimae, and has brought together more than 2,000 people in demonstrations against the garbage dump. The Japanese Environment Agency (equivalent to the U.S. EPA) has asked Yamazaki Tadahiyo, director of the city's waste management department, to find an alternative cleanup site and to develop a citywide recycling plan.

Mutsugoro Reserve, the area of Isahaya Bay to be filled in. ***Photo: Serge Dedina***

Atsuo arranged a meeting between Tadahiyo, me, and Michael Lau, the manager of the World Wide Fund for Nature (WWF) Mai Po Marsh reserve in Hong Kong, in hopes of persuading Nagoya officials that the wetland dump plan was ill-conceived. Why would the city have recently constructed a $1 million bird watching center on the northern shore of the Fujimae tidal flat if it had no value?

Lau and I argued that if coastal reserves could exist in the midst of heavily populated Hong Kong and between San Diego and Tijuana (the Tijuana River National Estuarine Research Reserve along the U.S.-Mexico border), then the city of Nagoya could preserve Fujimae. Lau stressed the importance of Japanese wetlands in maintaining the health of birds that travel between Hong Kong and Japan. I pointed out that under bilateral treaties Japan had signed with the Soviet Union, China, and Australia, it was obligated to preserve habitats of international significance for migratory birds.

Tadahiyo and the other officials smiled and nodded their heads. Tadahiyo informed us that Nagoya has few options. Land is expensive and garbage is piling up. Recycling sounded good in theory, but filling Fujimae Bay with garbage was the solution.

Atsuo was neither surprised nor disappointed. More than 3 million people would witness the meeting that evening on Nagoya television. They would learn —or be reminded—that after areas such as Fujimae disappear, the natural coastline of Japan will be gone forever. The Southwest Wetlands Interpretive Association will keep in touch with the Japanese wetland activists and monitor projects of mutual interest, including a Japanese proposal to build a major resort on Magdalena Bay in Baja California, Mexico.

For more information on JAWAN, write to Maggie Suzuki, 769-29 Kagawa-ken, Okawa-gun Hiketa-cho, Kureha 279-1, JAPAN. ❐

Serge Dedina is a life-long resident of Imperial Beach and a member of the board of the Southwest Wetlands Interpretive Center.

Letters to the Editor

Chiding Paul Siri...

Editor:

Paul Siri's article "Should the Law of the Sea Govern U.S. Fisheries" [Winter/Spring issue], if considered within an appropriate geographic region such as the High Seas, might make its case. Unfortunately his choice of the Exclusive Economic Zone (EEZ) and misinterpretation of pertinent facts confuses the issue. First of all, Siri fails to distinguish clearly between the four conventions (1958) of the first Law of the Sea conference (1956) and the Law of the Sea Convention of 1982. It is the latter, not the former, which awaits ratification; furthermore, since the 1982 convention was signed by 119 states it no longer is a "draft" document as Siri suggests. It is now common international law for most states, including the United States.

But it is not Siri's confusion over appropriate documentation to which I object. His principal concern over possible intrusion of international law and regulations is misdirected. The general trend in ocean affairs today is not international intrusion; rather it is the progressive extension of state sovereignty into marginal sea areas. The United States in no way "subjugates some of its authority over fisheries to international agreements." Instead, these agreements, namely the '82 convention, codify the rights of coastal states to exploit, conserve, and manage fisheries within the EEZ in an "exclusive" manner. The United States' sole obligation under international law is to practice conservation and permit foreign access to a declared surplus of specified commercial stocks. Since it is the responsibility of coastal states to define this surplus, access by foreign states is effectively controlled by the coastal state, not any international agreement. Incidentally, the United States has concluded only ten bilateral agreements that permit access to the EEZ; more than half have lapsed.

One last point. Recent changes in federal policy permitting sale of exclusive rights to specified catches within the EEZ underscore the trend I mentioned earlier. So, I fail to see how the facts of the current situation with respect to the EEZ suggest that the United States must take care not to become enmeshed in any international agreement. We should be concerned instead with the shift from an international law that supports an "open sea" to one that increasingly encloses the oceans, placing primary control in the hands of coastal states, each with its own management agenda.

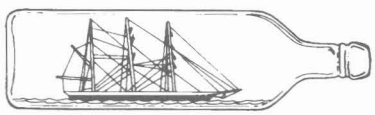
Robert Picker

Robert Picker is professor of geography at San Francisco State University.

Paul Siri replies:

I agree with Professor Picker that the trend in ocean affairs is toward extending sovereignty into marginal areas. His focus is on the framework of agreements, not the biological implications. The basic message I attempted to convey was that agreements governing living resources should be based primarily on the maintenance of stocks. Picker ignores concerns I was advancing, namely that fish stocks are vulnerable commodities, and that legal agreements are rarely (out of necessity, since scientists often disagree) biologically specific to favor the sustenance of species.

Law is usually crafted with little attention to the necessary qualifications of uncertainties inherent in biological systems. This places varied pressures on fishery managers who are usually already overwhelmed with parochial political problems and struggling with a serious game of "catch up" in their investigations.



I regret any difficulty the reader may have encountered with the background documentation in my article. My source on the status of the Law of the Sea was the Office of the Assistant Secretary of Ocean Affairs–Marine Law and Policy, which has been dealing with it since the first drafts. Picker's exceptions to my attempt to merge descriptions of various geographical and legal authorities are unwarranted. Fishery managers work on vastly different scales—from larval fish to oceanic processes. They attempt to work their science with both precision and qualification that allows differing interpretation under specific environmental conditions. The exclusive nature of managing fisheries within the EEZ is a difficult problem. Most of our living resources evolve on the continental shelves (hence mostly in the EEZ), but species move independently of our legal/geographical descriptors. When countries differ on abundance estimates and management strategies, biological issues sometimes conflict with legal vision.

So what's a few clams among friends?

Editor:

In your Winter/Spring 1991 issue, I stated *incorrectly* that "200,000 sea otters from California to Alaska consume over three *billion* lbs. of shellfish each day." The correct, conservative figure is "three *million*." Please accept my apology for this mistake, which appears to exaggerate the food resource issue 1,000 times.

Thank you for a fair, balanced article concerning marine mammal management and our finite seafood resources. Please continue your investigation.

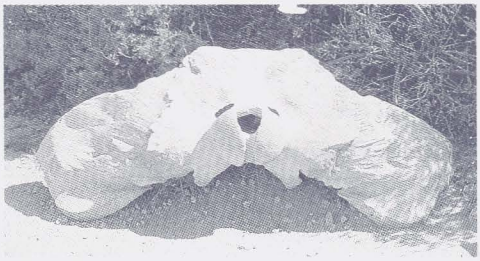
Jon Holcomb

Jon Holcomb is a commercial sea urchin diver in Fort Bragg.

Mystery Photo

Richard Frear

If you can't identify this type of vessel, you haven't read the issue carefully enough. This one was rescued from an Alviso mudflat in 1959, and things have been looking up since. Keep your eyes peeled when on San Francisco Bay this summer, you'll be able to provide us an answer in time for the next issue, thereby winning a free subscription to your favorite magazine, *Coast & Ocean.*

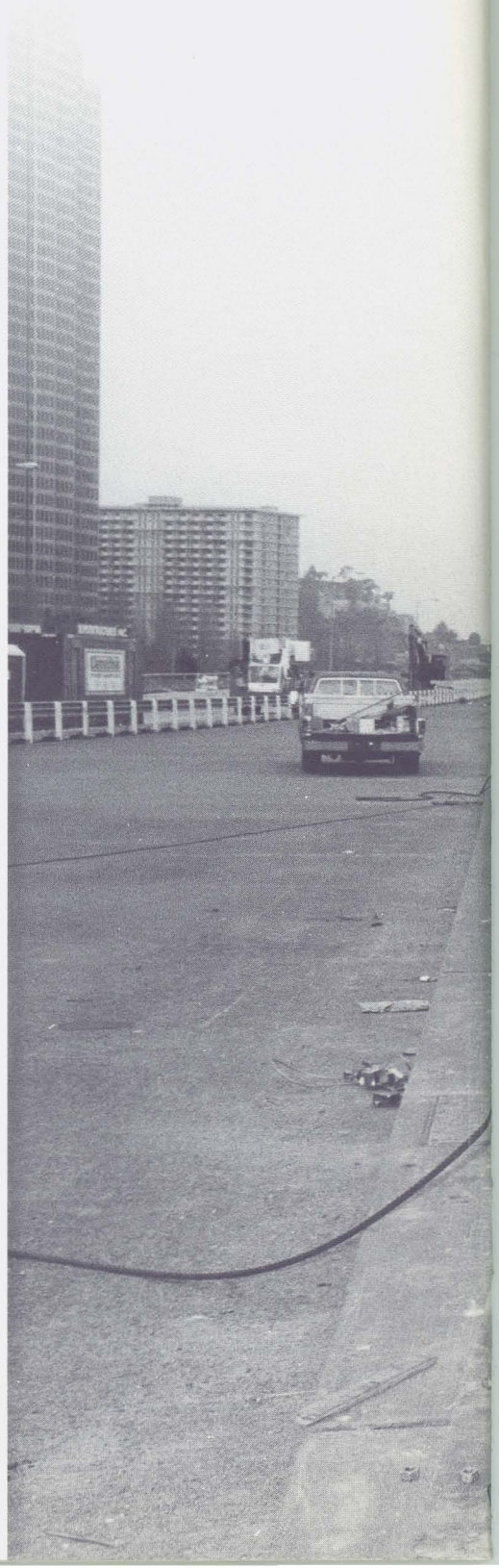


Regina McGrath

Last issue's mystery solved:

Lots of readers correctly identified our photo as a whale vertebra, but the *crème de la crème* knew that it can be found at Año Nuevo State Park: Andy Bell, Sheila Bowman, Arlene Gemmil, Gary Stern and Penny Wisener. Extra credit to Bob DeWenter and his students at Westminster High, who correctly identified it as the base of the occipital bone.

The vertebra comes from a Blue whale, washed up at Pescadero beach 11 years ago. Readers advise us that there is something very similar at Pt. Lobos State Park, and in the parking lot at The Tides restaurant in Bodega Bay.

The Romberg Tiburon Centers
San Francisco State University
1600 Holloway Avenue
San Francisco, CA 94132

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