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California's
Wild Islands

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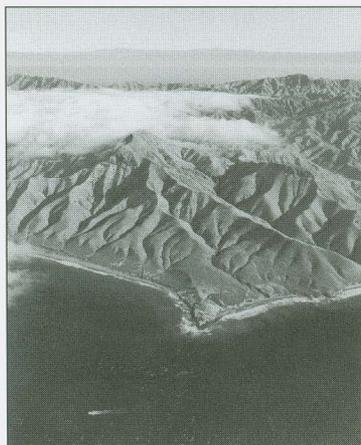
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Cover photo:

Clouds over
Sierra Blanca,
Santa Cruz Island,
looking north

Wm. B. Dewey
has photographed
California's Chan-
nel Islands from
the ground and
air since 1979.
"The island trips
have become a
pilgrimage to the
essence of the California landscape, to the wild
diversity that exists just 25 miles offshore," he says.
His photographs have been widely published and
exhibited. He lives in Santa Barbara.



Back Cover photo:

The border at last! (see page 34.)
Courtesy Jay Kent Bien



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DAN HOWARD

LOOKING AROUND

This being the last *Coast & Ocean* before the millennium, let's look at where we've been and where we might be going. The millennium, of course, is only a construct of the culture now dominant on the planet—by the Chinese lunar calendar it's 4697. Still, it's a kind of Geodetic Survey marker in time, a spot for looking at change.

My own backward glance calls up a studio in San Francisco's North Beach, where a few eco-activists held a press conference in the early 1970s in the name of some California species that were threatened with extinction. Among those represented by well-informed spokespersons were the California mountain lion, San Francisco garter snake, and San Joaquin kit fox, an irresistibly charming little creature that appeared in person at this event. Media coverage was light, as I recall, and its tone indulgent or tongue-in-cheek.

Now state and federal laws protect these and other creatures whose hold on existence has grown tenuous. The mountain lion population rebounded after 1972, when it became illegal to hunt them for sport, but has lately been declining. Loss of habitat is a major problem. The endangered kit fox is still dying from poisons applied for rodent control on agricultural lands, and is also prey to the red fox, an introduced species. The San Francisco garter snake is extremely rare, but if a site proposed for development is identified as its habitat, that site has a good chance of staying undeveloped. Government bureaucracies, including the Army Corps of Engineers, now spend millions of dollars in efforts to sustain the membership of endangered creatures in our planetary community. Developers appear before permitting agencies to assure that the saltmarsh harvest mouse (famous by virtue of being endangered) will not be injured by whatever construction is being proposed. They may merely be paying lip-service to get by some regulation, but the fact they have to do this is a sign of progress.

Back in the 1970s, eco-poets talked of bioregions, of living within the watershed, of bringing back lost salmon runs, of

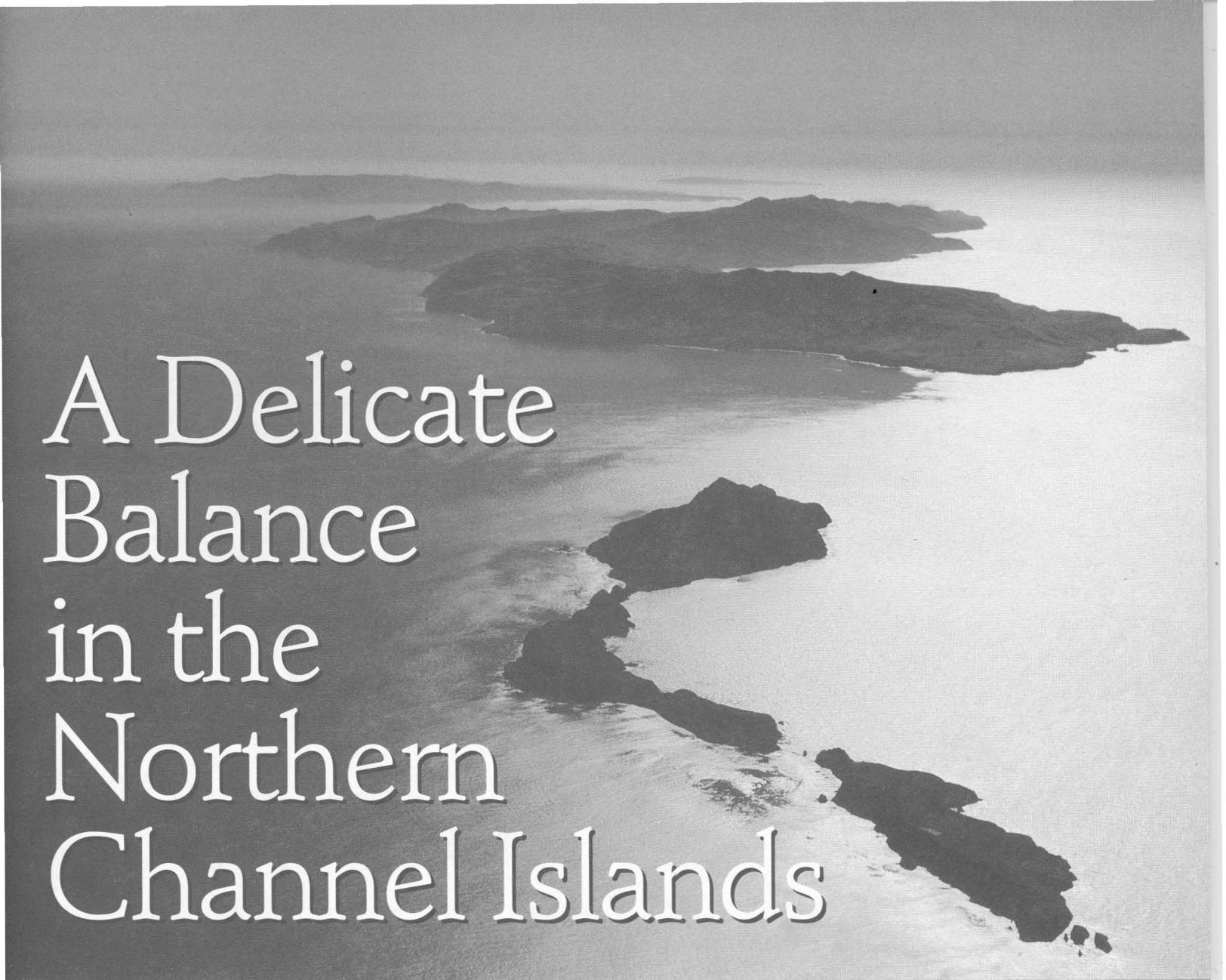
restoring buried streams to life. Now all that is either happening or being considered. Ecological restoration is a growing field, offering an expanding array of career opportunities. This is not insignificant.

In this issue, Anne Canright describes "a diversity of life struggling back to ascendancy" in the northern Channel Islands, nurtured by scientists and sanctuary managers. Sara Wan visits the Farrallon Islands and returns with sobering reflections on restoration limits. Gregg Elliott looks at the vast problem of oil pollution from unknown sources and what is—or isn't—being done about that. Kent Bien runs the entire California Coastal Trail route, while Nellie Hill takes a leisurely stroll in one of our treasured parks, the Point Reyes National Seashore. In all, the issue is a snapshot of what's happening on our coast, and there's a lot to take heart in.

On the other hand, just a couple of weeks ago, hiking with a friend on the Nature Conservancy's Ring Mountain above San Francisco Bay, I met a man from San Diego who asked if any of that land might be for sale. When we told him it was protected he replied that with the population growing as it was, in a hundred years such protections would be meaningless. "I hope you're wrong," I said. "These open spaces will be even more important than they are now. So will our parks and our forests." But I wondered: will future generations know and value their coast, parks, and forests, the mountain lion and saltmarsh harvest mouse?

In March, Californians will vote on the \$2.1 billion Safe Neighborhoods, Parks, Clean Water, Clean Air, and Coastal Protection Bond Act, which may well be the largest such measure in the nation. It will be the first proposition on the ballot in the new millennium. There has been no parks bond measure for more than ten years, and it's badly needed. If it passes, California—so often a trend-setter for the nation—will have made a solid investment in securing its natural wealth for the future. By putting this bond measure on the ballot, the legislature and Governor Gray Davis have launched California into the millennium on a promising course. We won't be the ones making decisions in 100 years, but what we do now will help to shape the future. —RG





A Delicate Balance in the Northern Channel Islands

WM. B. DEWEY

ANNE CANRIGHT

I have never been fond of scrub jays. They're not especially pretty to look at, and only another jay could love their raspy screech.

One day this past July, though, I developed a new respect for this bold bird. Into the bargain, I gained a greater understanding of the delicate ecological balance of islands and of the pivotal role humans can play in maintaining—or upsetting—that balance.

I was sitting, binoculars at the ready, in a rocky, oak-studded canyon on Santa Cruz Island, one of the four northern Channel Islands off the coast

of Santa Barbara County. (The other three are San Miguel, Santa Rosa, and Anacapa.) I had just

seen a blue shape float over the golden grass and into an evergreen shrub and was scanning the vicinity for another sign of life. Suddenly, in a toyon very close by, a bird landed, then

inched along a branch, peering this way and that in search of prey. It looked like a more self-confident version of a mainland jay: bigger, prouder, and considerably bluer. It pounced and pincerred a good-sized insect in its beak. More head-

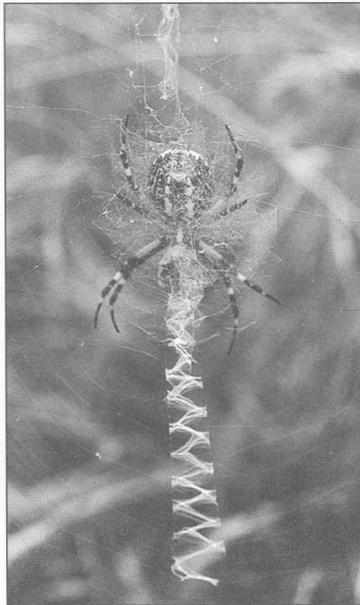




ANNE CANRIGHT



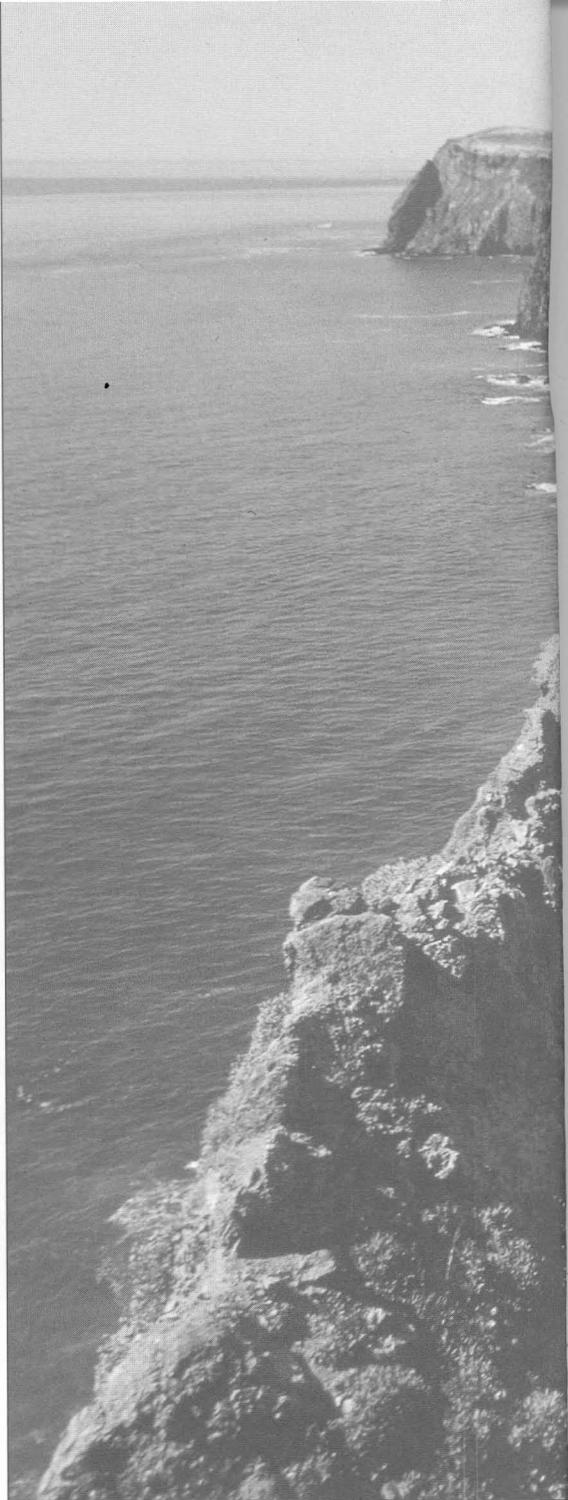
ANNE CANRIGHT



STEPHEN R. GLIESSMAN



TIM COONAN



Top: Island scrub jay habitat in Upper Scorpion Canyon on Santa Cruz Island

Center left: Gulls among giant coreopsis on East Anacapa Island with Middle and West Anacapa in the background

Center right: This island spider spins an interesting web pattern.

Bottom: Island fox

Right: Middle and West Anacapa Islands



WM. B. DEWEY

cocking, and another pounce, its eyes sparkling brightly. It couldn't have cared less that I was sitting not ten feet away.

The island scrub jay, *Aphelocoma insularis*, is a very special bird, and I felt privileged to watch it hunt from such close quarters. It is the only endemic species of bird on the California islands, found on Santa Cruz Island and nowhere else. A few other birds on the Channel Islands have evolved into one or more endemic races, or subspecies—among them the California quail, Allen's hummingbird, horned lark, and Bewick's wren—but *A. insularis* is the only one that is

considered a fully separate species.

At first glance you might think you've spotted a western scrub jay, *A. coerulescens*. On closer inspection, though, you'll mark the differences: the insular species is a third again larger than its mainland cousin, its beak is heavier, and it is a brighter blue. Its call has been described as sounding like a western jay with laryngitis (my bird was hunting quietly, so I cannot attest to this, alas), and its repertoire includes vocalizations not found among its mainland cousins. Unlike the western scrub jay, the island jay can be found feeding on the



Above: Students of the University of California at Santa Cruz Natural History Field Quarter study native plants in a hillside meadow.

Right: Several of the oaks on the island are unique species or hybrids of mainland species that occur in forms not seen on the mainland. This oak is probably mostly *Quercus xmacdonaldii*, a hybrid of scrub oak and valley oak.

Far right: An example of hybridization from the island. The smaller red endemic island sticky monkey flower on the right (*Mimulus flemengii*) shows introgression with the mainland form of the monkey flower (*Mimulus longiflorus*) on the left.



PHOTOS THIS PAGE: STEPHEN R. GLIESSMAN

ground. The island jay also lives longer, and it has a somewhat different social organization than the mainland bird.

Why these differences? The answer lies in the nature of islands, which are separated from the mainland by a formidable barrier: water—sometimes a lot of it. That barrier is not impenetrable, of course, but it does deter crossing by wildlife. In addition, water gives islands very definite edges. On the mainland, a plant or animal can extend its range beyond its preferred habitat when pressed, but on an island there's no such out—short of swimming or floating or flying back to the continent. An island's size and its distance from the

mainland combine, then, to determine just how many kinds of plants and animals can live there in equilibrium. The more distant and hard to reach an island is, the smaller the number of species that can gain a foothold; the smaller the island, the fewer species it can support.

Once a plant or animal reaches an island, the particular habitats available, the absence of predators, the limited gene pool, and the lack of interaction with mainland species virtually ensure that changes will occur. Adaptations that are valuable for survival in a more competitive mainland environment may become less important; new adaptations develop that are geared to

the specific conditions at hand.

As I mentioned, the island scrub jay is considerably larger than its mainland cousins. In fact, island-bound birds—along with rodents and insects—tend toward this “gigantism” as a rule. (The South Pacific island of Saint Helena, to cite a particularly creepy example, has earwigs three inches long!) The opposite tendency, toward dwarfism, is noted in larger animals, such as deer and fox.

With few predators waiting to eat them and little competition for food, small animals can afford to be larger. Larger size allows more efficient fat and water storage, which in turn improves survival prospects through lean times; it allows larger babies; and it literally allows animals to throw their weight around better when competing with members of their own species. Gigantism is the evolutionary result.

Dwarfism, in contrast, seems to occur because of a limited food supply. Unlike rodents, which become automatically less prolific when crowded, larger mammals lack intrinsic population control. When food is scarce, therefore, the young may be malnourished and stunted. If smaller individuals, now adapted to a less abundant resource base, achieve better reproductive success than big ones, the stunting can, over many generations, be perpetuated in dwarfism. Compactness may also allow

greater agility, enabling animals to exploit hard-to-get-at resources. And the absence of predation may be a factor as well: there’s simply no need to be so big if there’s nobody to fight off.

One of the most spectacular examples of dwarfism on the Channel Islands is the pygmy mammoth. Back in the Pleistocene, when sea level was several hundred feet lower than it is today, the northern islands were all one big land mass (known today as Santarosae) separated from the mainland by only a few miles. Around 40,000 to 20,000 years ago, a small group of Columbian mammoths (*Mammuthus columbi*), standing some 14 feet at the shoulder, apparently made their way across the Santa Barbara Channel. How? Simple: they swam, sticking their trunks up out of the water—natural snorkels. They may have ventured across the water for various reasons: limited food supplies on the mainland due to famine or drought may have forced them to find another source of sustenance; or perhaps an onshore wind simply brought the delectable smell of edible greenery wafting past their noses and they decided to check things out. In any event, once they reached Santarosae, they were there for good. And then the “downsizing” began. Ultimately a new species, *M. exilis* (the “exiled mammoth”), developed—measuring a dainty five or six feet from heel to shoulder.

The imperial mammoth (*Mammuthus columbi*) stood 14 feet tall at the shoulder and ranged from central Canada to Mexico during the middle Pleistocene era. The American mastodon (*Mammuthus americanum*) stood 11 feet tall and lived in boggy areas of North America, especially around the Great Lakes. The Pygmy mammoth (*Mammuthus exilis*) stood 6.5 feet tall at the shoulder and was found on the three northernmost Channel Islands. Dr. Tom Rockwell, a geologist from San Diego State University, discovered the first virtually complete pygmy mammoth skeleton in 1994 in an elevated marine terrace on Santa Rosa Island.

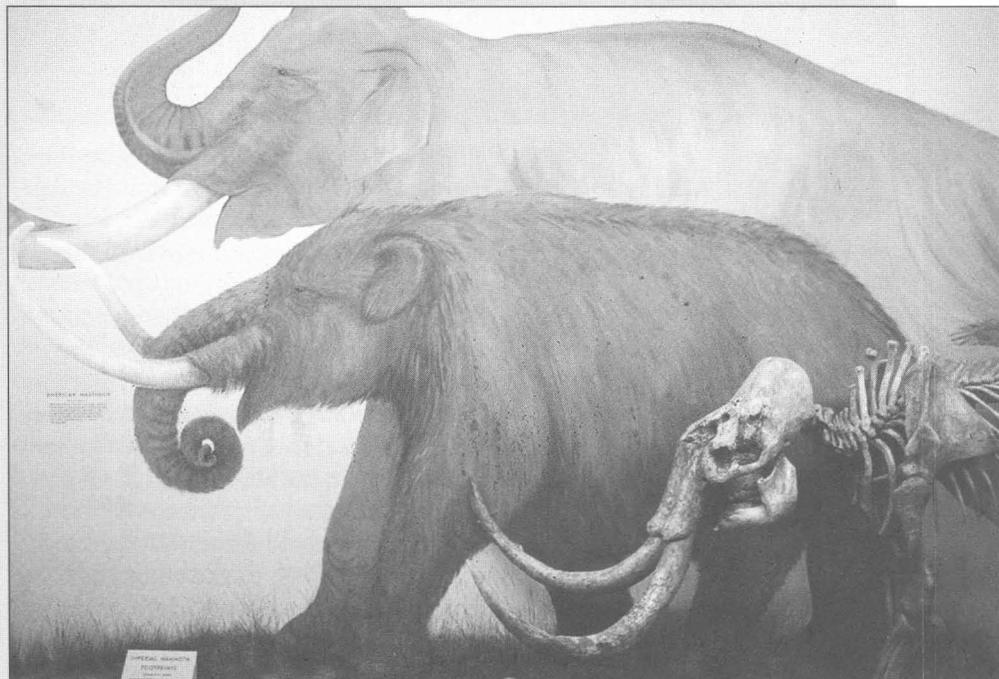


PHOTO COURTESY SANTA BARBARA MUSEUM OF NATURAL HISTORY

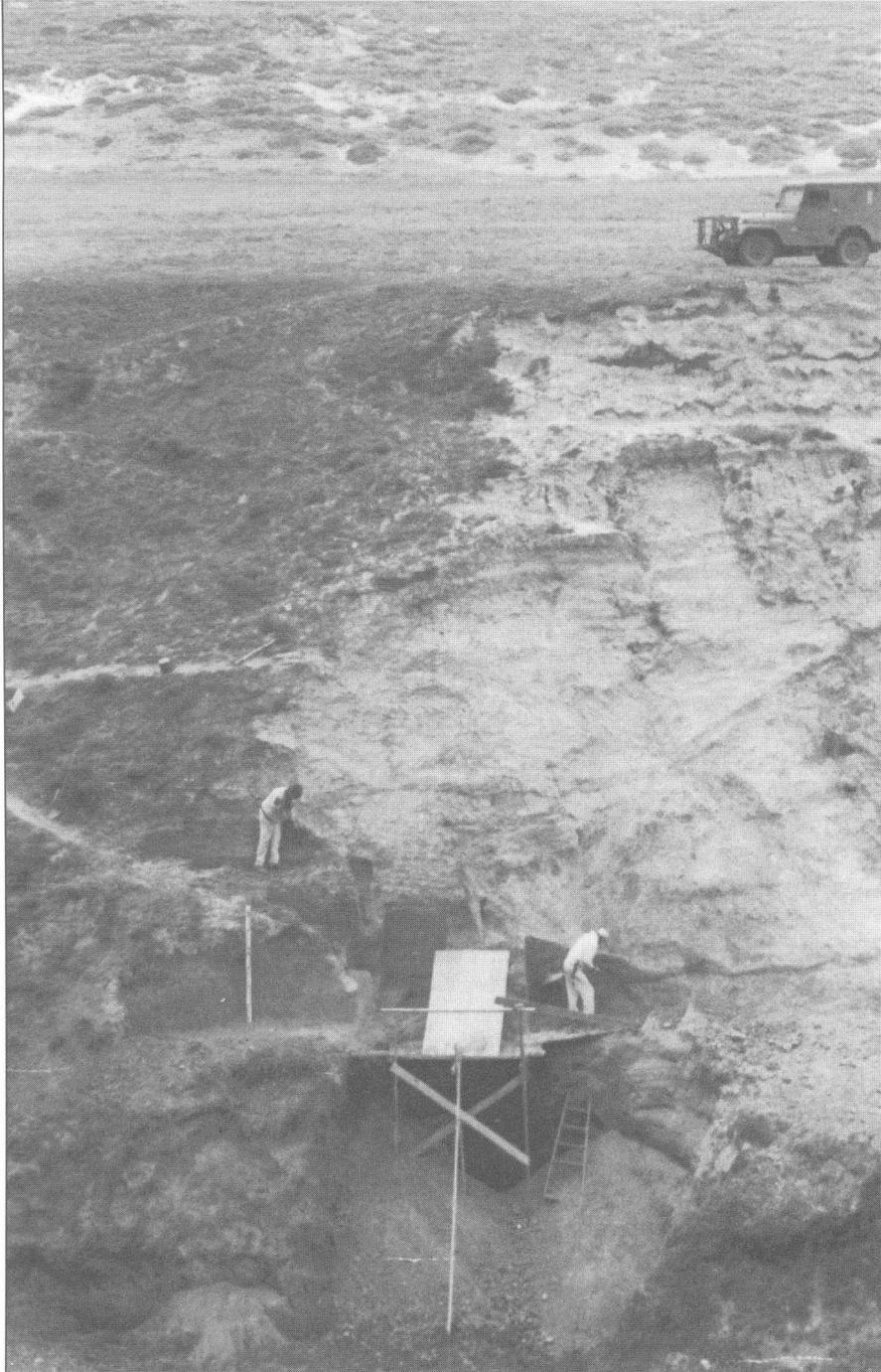


PHOTO COURTESY SANTA BARBARA MUSEUM OF NATURAL HISTORY

In 1993, a bone fragment from the skeleton of a woman found at this 1960 excavation in Arlington Canyon on Santa Rosa Island, previously thought to be 11,600 years old, was redated using advanced techniques of bone chemistry analysis and radiocarbon dating. It turns out she is an astounding 13,000 years old—one of the oldest known humans in western North America, and the oldest in California. She may well have witnessed the pygmy mammoths lumbering about their business.

eral buckwheats also grow considerably larger than their mainland relatives.

THE ISOLATION AND LIMITED SIZE of islands allow species to evolve into unique forms. They also dramatically increase the chances of extinction. On islands throughout the world, scores of species have been lost—far more than on continents. The Mascarene Islands in the west Indian Ocean, for instance, have lost at least fourteen bird species (among them the dodo) within the past 300 years—as many as the combined losses on the mainlands of Asia, Africa, and North America over the same period of time. Hawaii has lost more bird species than have been lost from all the continents on Earth. And the list goes on.

The reasons for this vulnerability are many and complex. Right up there among the culprits, though, are human activities: hunting and collecting, habitat disturbance, habitat destruction, and introduction of alien species, all of which have affected the natural history of the Channel Islands. Hunting, for example, may well have led to the extinction of the exiled mammoth and a flightless goose known today only from the fossil record, and it certainly contributed to the bald eagle's extirpation from the islands.

Over the past century, however, the main processes upsetting the balance of life on the Channel Islands are habitat disturbance and destruction. Grazing, plowing, farming, and military maneuvers including bombing have combined to set into motion a cascade of effects that threaten the survival of many unique island species.

The first human inhabitants were of course Native Americans, who may have reached the Channel Islands some 13,000 years ago (some scientists place their arrival as early as 40,000 years ago) and certainly had permanent settlements on all of the larger islands by 5000 B.C. They affect-

The other dwarf species of note on the Channel Islands is the island fox. Though only about the size of a house cat, it is the largest native land mammal on the islands.

"Giant" species on the islands include lizards and various rodents, such as the deer mouse and spotted skunk. Plants can also evolve to large sizes, thanks to relatively mild temperatures, moisture available from marine air, the absence of native grazing animals, and fewer plant competitors than on the mainland. Especially striking is the giant coreopsis, a thick-stemmed, woody plant that can grow to six feet in height. Found on all the islands, it blooms in late winter and early spring in an explosion of bright yellow daisylike flowers. Sev-



WM. B. DEWEY

ed island vegetation through food-gathering activities, including setting fires and introducing desirable edibles, and they may well have cut down trees or shrubs for shelter, for fuel, or to make baskets. The bulk of their diet, however, came from the sea—a vast and relatively limitless resource, given their small numbers (an estimated 3,000 at the time of first European contact).

Although European explorers made brief visits to the islands in 1542 (Cabrillo) and 1601 (Vizcaíno), it wasn't until 1769, with the arrival in Alta California of the Franciscans and, shortly thereafter, Russian, English, and American fur traders, that the ecological balance on the islands tilted. And when it did, it tilted dramatically. During the next 50-odd years, the Native American populations on the islands were decimated by European diseases, introduced, it is thought, largely by otter hunters, who at the same time brought about the local elimination of the sea otter, northern fur seal, and northern elephant seal. In 1812 a tremendous earthquake, with an epicenter near Santa Cruz Island, apparently convinced the remaining islanders to accompany the mission fathers back to the mainland. By the 1820s all the native inhabitants had been removed from the Channel Islands—the sole exception being a woman who lived alone on San Nicolas Island for

18 years and whose remarkable story was immortalized in Scott O'Dell's book *Island of the Blue Dolphins*.

During this same period, goats, pigs, and sheep were introduced to most of the islands. These animals soon reverted to a wild (feral) state; reproducing rapidly, they probably extirpated many plant species, and they certainly altered almost all native plant communities.

The first European settlers moved to the islands in the 1830s to farm and to raise sheep and cattle. Each island had a slightly different history from this point on, but plants and animals totally alien to the insular ecosystem were introduced to all.

The two largest northern Channel Islands, Santa Cruz and Santa Rosa, were granted to prominent local families by the Mexican government in the mid-1800s, and they remained in private hands until quite recently. The Santa Cruz Island ranch produced sheep, cattle, honey, olives, and some of the finest early California wines (until Prohibition). The ranch on Santa Rosa became one of the major wool producers of southern California. Anacapa, San Miguel, and Santa Barbara Islands were also heavily grazed or cultivated. The Coast Guard established a presence on Anacapa and San Miguel Islands early in this century, and during World War II the



STEPHEN R. GLESSMAN

Top: Cowboys drove cattle from Lobo Canyon to the main ranch at Becher's Bay on Santa Rosa Island, 1994.

Above: This island endemic succulent (*Dudleya greenii*) occurs on Santa Cruz, Santa Rosa, and San Miguel Islands, but not on the mainland.



STEPHEN R. GLIESSMAN

A student from the University of California at Santa Cruz holds fennel, an invasive alien plant, which she has uprooted to help natives recover.

islands played an important role in southern California's coastal defenses. Between 1948 and 1970 the U.S. Navy used San Miguel as a bombing range, though in 1963 the Navy and the Department of the Interior signed an agreement to jointly protect "the natural values and historic and scientific objects" on that island.

Federal efforts to preserve these unique islands began in 1938, when President Franklin D. Roosevelt proclaimed Santa Barbara and Anacapa Islands as Channel Islands National Monument. Supervised visitation to San Miguel Island has been allowed since 1976. Two years later a conservation partnership between the Nature Conservancy (TNC) and the private Santa Cruz Island Company provided for continued protection, research, and educational

use of most of that island. Finally in 1980, Congress designated the four northern islands, Santa Barbara Island, and the waters for one nautical mile around each as the nation's 40th national park, and later that year Channel Islands National Marine Sanctuary was established, extending protection to six miles out from the islands' shores.

Although Santa Rosa and Santa Cruz Islands were included in the national park in 1980, they remained in private hands for a number of years thereafter, and agreements still exist with the former owners allowing continued use. On Santa Rosa, for example, the Vail and Vickers Company ran a cattle stocking operation until 1998, and continues to sponsor elk and deer hunting under a lease that expires in 2011. The Nature Conservancy still owns 90 percent of Santa Cruz Island; the other 10 percent came under National Park Service ownership and management only in February 1997—completing public acquisition of the five islands included in the park. (The western nine-tenths of Santa Cruz Island is specifically exempt from purchase by the federal government and will remain in the hands of TNC.)

WHEN YOU LAND ON Santa Cruz Island, you can't help but notice the grass, which was California golden when I was there. Most of that grass is not native to the island, but was introduced, perhaps arriving as seeds on livestock and clothes and in supplies brought from the mainland. An annual, it thrives in disturbed areas created by cultivation, construction, and ranching activities. It is also opportunistic and easily outcompetes native perennial bunchgrasses.

Just behind the old Scorpion ranch house I saw a small group of sheep in a pen—the last remnants of a 30,000-strong feral population, scheduled to be deported from the island in an ongoing effort to restore native balance. Cattle also lived on the island until the mid-1980s. By trampling the roots of the native grasses and compacting the soil, these grazers encouraged the nonnative grasses, which rely for propagation not on roots but on seed dispersal.

Ironically, domestic livestock aren't all bad, at least where control of noxious weeds is concerned. When the Nature Conservancy eradicated sheep from its 90 percent of Santa Cruz Island in 1985, an outbreak of sweet fennel irrupted on the former grazing lands. Fennel is so invasive that today it covers some 10 percent of the island's surface. Moreover, it seems to be aided and abetted by another, even more aggressive exotic: feral pigs. By keeping the earth turned over, the pigs—natural rototillers—prevent native plants from becoming established, yet provide ideal conditions for invasive weeds like fennel, star thistle, and Mediterranean grasses. If balance is to be restored, both the fennel and the pigs will have to go. UC Santa Cruz environmental studies professor Stephen R. Gliessman is presently trying to determine how best to clear out the weedy invader and at the same time jump-start the recovery of native vegetation. As for the pigs, the task of hunting them down will be tricky, given their nocturnal habits and the rugged terrain on much of the island.

The other Channel Islands have similarly complex problems, but bit by bit solutions are being found. All of the islands, National Park Service biologist Tim Coonan says, are recovering from historic grazing, with native shrub communities beginning to beat out some of the annual alien grasses. San Miguel Island is a case in point, although there a separate chain of events is at work, endangering the future of the endemic San Miguel fox (see p. 12).

On tiny Santa Barbara Island, feral cats and rabbits, as well as grazing animals, have caused significant destruction to endemic species of plants and birds. The Santa Barbara song sparrow is now extinct, owing to cat predation coupled with a devastating fire in 1959. Yet there is good news too: after the last rabbits were removed in 1979, an endemic live-forever that was thought to be extinct made a recovery and now grows in a variety of habitats.

Anacapa Island's major success story lies in the recent reestablishment of seabird rookeries. In the 1960s and early 1970s the brown pelican population on West Anacapa suffered a colossal collapse owing to DDT contamination: in 1969, only 12 of 1,125 nests contained intact eggs, and no more than four chicks successfully fledged. DDT caused thinning of eggshells, and since pelicans actually stand on their eggs to keep them warm with their highly vascularized feet, the eggs were crushed. DDT was banned in 1972, and since 1980 up to 6,000 nests a year have been built on West Anacapa, making that island once again the largest pelican rookery in California. Other important rookeries on West and Middle Anacapa include Cassin's auklets and Xantus' murrelets. And East Anacapa is covered with western gulls—like the scrub jay, a bird I've never been especially fond of, though seeing the comical adolescents with their clown spots and hearing their plaintive peeps in concert with the raucous laughter of their elders did bring a smile to my face.

I WENT OUT TO THE ISLANDS to see what I could see. I, like millions of Californians and visitors to our coast, had driven past them many a time and wondered about them. As I rode the boat out to East Santa Cruz Island one foggy morning, and to East Anacapa the next foggy morning, I thought of the occasional views I've had from the mainland, of islands so crystal clear across the blue water that you feel you can reach out and run your finger along their ridgetops. I thought of their isolation, and of their bounded fragility. On a continent, plants and animals have opportunities that island species don't. On an island, however, life forms can evolve into something unique and special—a plus when circumstances are in balance, but easily thrown off kilter when the natural barriers of water and distance are breached. I saw evidence of the negative impact of

humankind in both places: the golden grasses of grazed hillsides on Santa Cruz, tangled clumps of ice plant on Anacapa. But I also got a sense of hope for the future, in the laughter of gulls and the flashing dance of dolphins, in the huddled defiance of the soon-to-be-banished sheep and the floating glide of pelicans. On Anacapa, the shriveled giant coreopsis plants will revive in the spring, and on clear, windswept days we'll be able to see the golden glow from shore and be thankful for the diversity of life struggling back into ascendancy in these island sanctuaries. ■

Anne Canright is a contributing editor to Coast & Ocean. She lives in Monterey County.

Giant coreopsis clings to the edge of a cliff.



STEPHEN R. GLIEMMAN

Endangered Species Chess

ANNE CANRIGHT



IT'S A CLASSIC situation of the fox in the henhouse, only in this case the fox is a golden eagle, the henhouse is an island, and the hen is . . . well, a fox. A tiny little fox, only two-thirds the size of its mainland relative, the gray fox—"more kittenlike than fox-in-the-henhouse-like," says Brian Walton of the Santa Cruz Predatory Bird Group. Walton is working with the National Park Service on San Miguel Island, the most remote of the northern Channel Islands, to sweep the henhouse free of golden eagles.



POINT REYES BIRD OBSERVATORY

Golden eagle

These birds are not native to the Channel Islands. Of course, it's no problem for them to fly the 25 or so miles between the Ventura County mainland and Santa Cruz Island, and then do short hops to neighboring Santa Rosa and San Miguel Islands, all of which have their own unique subspecies of fox. In the past, such forays were kept in check by the presence of bald eagles; by the mid-1900s, however, these larger, fish- and bird-eating raptors had been all but eliminated from the California islands, victims of pesticides that weakened shells, chick predation by feral cats, and years of sport hunting and egg collecting. (At least 125 bald eagle eggs in collections around the country can be traced to nests on the Channel Islands.) The coast was clear, and sometime in the early 1990s, apparently, a small group of young goldens soared out over the water and found a tidy food source.

The birds probably fueled up at first not with foxes, but with wild pig carcasses on Santa Cruz Island. But what golden eagle would turn up its beak at a little canid frisking in the grasslands? Easy pickings.

The island fox, *Urocyon littoralis*, lives on the six largest Channel Islands (Santa Cruz, Santa Rosa, and San Miguel in the north;

San Clemente, Santa Catalina, and San Nicolas in the south). Descended from the mainland gray fox (*U. cinereoargenteus*), it probably reached the northern islands by rafting across the water, perhaps as recently as 20,000 years ago; in the south, Native Americans likely brought the island foxes as pets. Once established on the islands, it evolved into the dwarf species—approximately as big as a housecat—we know today. It also changed its lifestyle, abandoning its preference for woodlands and moving into all habitat types, from chaparral to coastal sage scrub to grassland to dune communities, and becoming more of a generalist in food habits. An island fox dines on insects and fruit in season, supplemented by birds, eggs, carrion, mice, and the occasional amphibian or reptile. Island foxes will even climb trees to find food.

Island foxes live eight to ten years and can breed after their first year, though most breeding is done by older adults. They mate for life. Breeding commences in January, and a litter of two to five pups is born in late April. The pups remain in the dens until early summer, when they emerge to forage with their parents. The family stays together until the pups' first winter.

THE SIGNS OF something not-quite-right going on were spotted in 1995. Two years before, Channel Islands National Park launched a long-term ecological monitoring program for terrestrial ecosystems, conducting annual censuses of vegetation, reptiles, amphibians, deer mice and foxes (the only two significant mammals), and birds on the five islands within the park.

Monitoring of the foxes is accomplished via capture-mark-recapture methods. "Foxes are live-trapped in box traps, marked, and released," explains Tim Coonan, a biologist with the National Park Service. "Traps are set out in large grids for five nights in a row during the summer, after pups have left the den. The ratio of marked to unmarked foxes is used to estimate the total number."

In 1994, some 450 adult foxes were counted on San Miguel. The next year, the

population on the west side of the island had crashed, among both adults and pups. At that point, says Coonan, "we didn't know if it was just some sort of normal fluctuation." But when the same thing happened on the east side of the island in 1996, "we knew something was wrong." Biologists at the park now estimate that there are fewer than 30 adult foxes on San Miguel, with comparable declines of as much as 90 percent on the other two northern Channel Islands.

Once the severity of the population drop hit home, biologists got to work trying to figure out what was happening. Earlier investigations by the Arcata-based nonprofit Institute for Wildlife Studies had shown that predation by golden eagles was a primary cause of an island fox decline on the west end of Santa Catalina Island. In November 1998, park biologists put radio-collars on eight foxes—seven youngsters and one adult. Within four months, six of those foxes had died, four of them apparently at the talons of golden eagles. One of the victims, says Coonan, "really worried me; she was one of the oldest and most savvy foxes." Because there are no native predators on the island, however, she had no built-in defenses.

This spring, Channel Islands National Park convened an island fox recovery team to develop a plan. The team recommended a two-pronged approach: removing the eagles from the islands and capturing the foxes on San Miguel and Santa Rosa Islands, both to safeguard them from further attacks and to institute a captive breeding program to increase their numbers.

In May, two foxes were taken into captivity in a pilot program, the aim being to determine what diet will work over the long run and to test out the holding pens. The foxes are baited with cat food and then must be transitioned to a slightly less rich diet consisting of dry dog food and vegetables, supplemented by frozen quail and hard-boiled eggs. The vegetables are spiced up with garlic powder to add interest—even foxes will turn up their noses at food that is too bland. Also, Coonan points out, "we want them to retain the ability to catch prey, so we deliver live mice in small boxes." The foxes are curious animals and, intrigued by the fidgeting little container, they soon manage to get at the live prey.

In early August the construction of eleven



TIM COONAN

20x30-foot completely enclosed holding pens commenced on San Miguel, and as quickly as possible all the remaining foxes on the island will be captured. As of late September, 11 foxes were being held. "We know of at least four other foxes in the wild," Coonan states, "and suspect there may be as many as ten. For a total population of about 20." The pens will be scattered, with one family group billeted in each. Within five years, Coonan hopes to begin returning the foxes to the wild. "I think it will take two years to remove the eagles currently present on the northern Channel Islands, and an additional three years to build the San Miguel Island fox population up, since we're dealing with so few. We'd like 100–150 foxes on the island."

Capture of the golden eagles is critical to the long-term success of the island fox recovery plan. The numbers and locations of the eagles are not precisely known. In early August Walton said that there might be "as many as six; I think there may be as few as one." By late September, however, Coonan could state firmly that the situation was more dire: "Surveys this summer and fall reveal as many as ten golden eagles on Santa Cruz Island alone . . . more than we originally thought." The birds will be baited with dead cows, in a location away from the foxes, says Walton—"probably on Santa Cruz or Santa Rosa, where access is easy." They will then be moved to good golden eagle habitat on the mainland, possibly near

Marking a captured island fox



The northern Channel Islands, showing the boundaries of the National Marine Sanctuary. Both the Sanctuary and the National Park have good web sites. See www.channel.islands.national-park.com; www.areaparks.com/channelisland; or www.cinms.nos.noaa.gov

Reno or Sacramento, or even somewhere in the desert, depending on the season. The eagles will be radiotagged to determine whether they return to the islands. "The chance of successful relocation is high," says Coonan, "because the eagles on the Channel Islands are likely immature 'floaters' less tied to the area than adult breeders would be. Also, as eagle habitat, the Channel Islands probably lack a prey base sufficient to support breeding golden eagles."

Another long-term goal is to release bald eagles in the islands, although, Walton points out, bureaucracy is a major stumbling block in that effort. "They want to do a big study to see" about the viability of such a reintroduction. In all these efforts, he says, paperwork is a frustrating component, with the need to obtain contracts and permits causing delays even in approved actions like the golden eagle removal.

Coonan, for his part, cited funding frustrations. He has already had to divert monies from other terrestrial monitoring projects—but, as he pointed out, "I couldn't not": the island foxes are in danger of extinction, and action is needed now. He has secured emergency Park Service funding for the next three years, at almost \$500,000, which will cover the fox sanctuary and captive breeding on San Miguel Island, and eagle relocation. However, the situation on Santa Rosa and Santa Cruz Islands is equally pressing. Santa Rosa, which is 85 percent grassland and provides much less cover than on Santa Cruz, is the "highest priority for new funding." In addition, the monitoring required for the initial five-year restoration period

remains unfunded. At present, Coonan estimates a \$1.2 million funding gap.

In light of the serious population declines during the last few years, many biologists think that the island fox should be listed as endangered under the U.S. Endangered Species Act (it has been on the state list since 1971). Coonan says that the U.S. Fish and Wildlife Service is studying the problem, and in his view, listing can come none too soon. "The fact that it's not listed hurts, both within the agency and without," insofar as funding is concerned.

Because of the emergency nature and large scope of the actions required, the project cannot be covered solely with federal funds. To help close the gap, the National Park Foundation, the official fund-raiser for the National Park Service, in coordination with the Friends of Channel Island National Park, has established a "Save the Island Fox" program. Information about this program is available at (888) GOPARKS.

The notoriety that comes from an endangered listing will, Coonan suspects, make a big difference in helping the little gray fox escape extinction.

IRONICALLY, ON NAVY-administered San Clemente Island—one of the four southern Channel Islands—in Los Angeles County, a very different situation exists. Here the fox in the henhouse is a fox (like its northern relatives, a unique subspecies found only on one particular island), and the hen is the endangered San Clemente Island loggerhead shrike, one of the rarest birds in North America, with only 13 remaining in the wild. This spring, in an effort to save the bird, Navy biologists trapped and killed 15 foxes that had taken up residence in the birds' habitat. The bird protection program called for removing and euthanizing up to 50 more foxes this year, but in late May the Navy reversed that decision, opting to trap and hold foxes for a few weeks instead. Jan Larson, the Navy's regional director of natural resources, said that by midsummer shrike fledglings, both in the wild and in captivity, are learning to fly, so merely keeping the foxes out of the way for a short time should ensure the young birds' survival. If the foxes had to be held captive for months on end, other foxes could easily move in, making reintroduction more difficult.

Next spring more fox killing might be necessary, though Larson is pinning his hopes on new technology. Currently, a shock-collar system is used to keep the foxes away from shrike nests. When a collared fox crosses a wire encircling the nesting area, a single shock is applied. It has not proved as strong a deterrent as was anticipated, however, so now a new antenna is being tested that would trigger continuous shocks. Experts hope this will prove more successful in diverting the predators from the shrikes.

The San Clemente situation is different from that in the Northern Channel Islands largely in that there are no eagles there, and the populations have been more stable over time—though a new population estimate puts the number of San Clemente foxes at 650 to 750, well below the 1,000 believed to have existed on the island a mere five years ago. Nevertheless, because the northern situation is so dire, some fox defenders plan to petition for the protection of all island fox subspecies under the U.S. Endangered Species Act—the same law that on San

Clemente is being used to justify killing foxes to save the shrike.

IN A SENSE, WE'RE MAKING UP the rules and moves of the game as we go along. This is true in all areas of conservation and resource management, of course, but the capacity for a sudden-death finish is far greater on islands, isolated as they are, than on the mainland. Just as in chess, when pieces are under threat or are taken, the value of the remaining pieces is reassessed and strategy revised accordingly. The overall game is the same on the northern islands and on San Clemente Island: to save endangered endemic species. The tactics that biologists and resource managers apply, however, will necessarily be different for the two areas, suited to the immediate balance of power among the players. Island fox or golden eagle? No contest—I'm rooting for the fox. Island fox or loggerhead shrike? In that game, let's hope we can effect a draw. They've both earned the right to long life in their island home. ■

View toward Saucos Beach, Santa Cruz Island



STEPHEN R. GLIESSMAN

Not As Remote As They Seem

SARA WAN



Early one cold and dreary morning in July, we made our way to Sausalito Harbor to board the 42-foot cabin cruiser *Kumbaya* for a run to the Farallon Islands. The purpose of the trip was to deliver supplies to a handful of biologists from the Point Reyes Bird Observatory (PRBO), the only humans on the rocky islands, some 25 miles off San Francisco.

The boat left the dock and headed beyond the Golden Gate under an overcast sky. The famous bridge, brilliant red on post cards, loomed muddy brown before us. It seemed a "star gate" through which we would pass from man's world of concrete and commerce to an island realm of nature.

The feeling that we were moving into a different world was enhanced as the fog closed the curtain on the cluttered San Francisco shoreline, and we entered a mist-shrouded abyss of huge swells churned by 25-knot winds.

The Farallones would not be visible for some time. We imagined them as they once were, rich in pelagic life, with thousands of northern fur seals, returned from unknown points of the ocean, lounging on the rocks. Overhead would be a spectacular skydiving display by thousands of murre, puffins, auklets, and storm petrels. The birds would plunge again and again into the bountiful sea, then fly back to rookeries on every ledge with beaks full of shiny silvery fish.

When at last the island pierced the fog,



TOP: U.S. FISH AND WILDLIFE SERVICE; BOTTOM: POINT REYES BIRD OBSERVATORY



U.S. FISH AND WILDLIFE SERVICE

our illusions were shattered. There was no symphony of barking seals, no avian spectacle. The first object we saw was a tall cargo crane that held the "Billy Pugh," a rubber doughnut rigged with ropes which lifts humans and supplies from the sea to the land—the only way onto the island. You step into a Boston whaler, then onto the Billy Pugh. As we held on to the ropes and swung over crashing surf to the cliff we wondered how any place so difficult to reach could be affected by man. Since 1968 these islands have been protected by the U.S. Fish and Wildlife Service (USFWS) as the Farallon Islands National Wildlife Refuge, and biologists from PRBO, under cooperative agreement with the USFWS, monitor and safeguard the wildlife. Kyra Mills and two student interns were in temporary residence, conducting studies.

Exploitation of the Farallones began in 1579 when they were discovered by Sir Frances Drake. And as we stepped ashore,

we were quickly confronted with man's lasting and continuing influence.

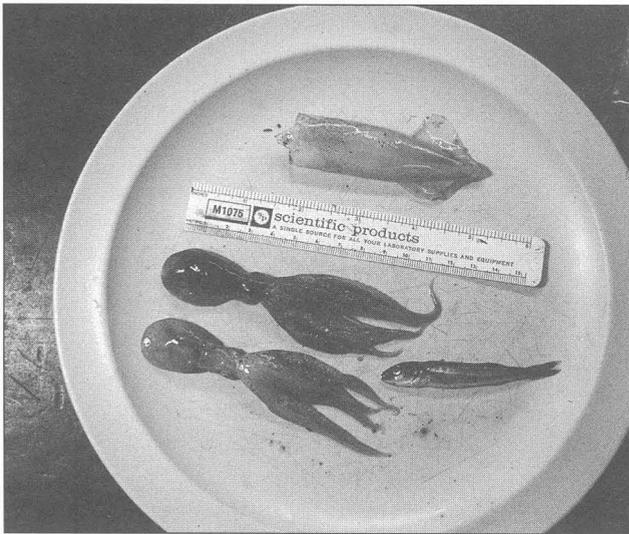
Walking along a concrete path toward the two buildings—built in the 1870s and left behind by the Coast Guard—we saw many dead or dying gulls. Mills, the island's resident biologist, said that they had contracted botulism from unknown sources, either from garbage dumps on the mainland, or from water-borne pathogens.

Mills and her team were checking on young auklets and pigeon guillemots in pipes and boxes that had been strategically placed to serve as artificial nesting sites—an effort to aid in monitoring the species. The interns lifted nestlings gently from the pipes, weighed them, and returned them. This was part of a daily routine to monitor the chicks' development. I asked about the current status of the various species I had expected to see here. Some were out fishing, but it was apparent that population numbers had dropped drastically.

Top left: Looking southeast toward the South Farallons

Bottom left: Eggers lowered themselves over cliffs on ropes, then filled their flour-sack shirts with up to 20 dozen murre eggs at a time. (19th century)

Above: An elephant seal turns its back on the old Coast Guard buildings.



U.S. FISH AND WILDLIFE SERVICE

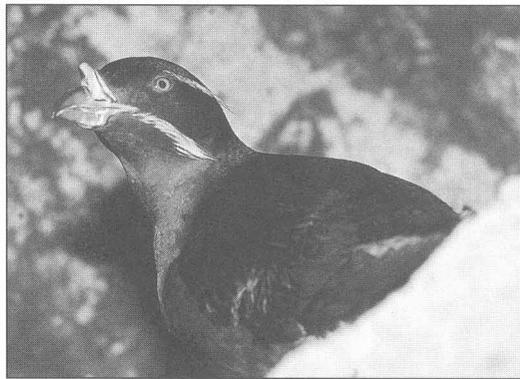


LARRY WAN

Top left: A plate of gourmet treats for a rhinoceros auklet (below left)—small fish, squid, and octopus.

Top right: Weighing a rhinoceros auklet

Below right: Western gulls with their well-camouflaged chick



POINT REYES BIRD OBSERVATORY



LARRY WAN

Before the mid-1800s, when Russian fur traders brought Aleuts as slaves to hunt fur seals, these islands are believed to have harbored some 50,000 northern fur seals, at least one million murres, 7,000 puffins, thousands of double-crested cormorants, and various other seabirds for which we do not have estimates. The fur seals were destroyed. Puffin, cormorant, and murre populations were reduced to one-tenth of mid-1800s' populations.

Where, I asked, were the ash storm petrels? I had never seen one and particularly wanted to. I was told that the adults were out, but there was one chick inside a crevice in the wall of a supply shed. So we walked over and tried to view it. What had happened to the ashys? Apparently their numbers continue to decline. Why? Mills responded that western gulls had expanded into ash nesting habitat: crevices on steep slopes. But what was causing the gull population to expand into this area? Were human activities a cause? She said that scientists did not really think so, that the gulls had been moving up into the hills ever since the Coast Guard left the islands. However, as I contin-

ued to ask questions of Mills and, later, of Willaim J. Sydeman, director of marine studies at the Point Reyes Bird Observatory, I discovered that man was indeed the underlying cause.

To understand just what was going on, we must go back in time. Before the fur traders' arrival, said Sydeman, "the whole marine terrace and parts of the hillsides were covered with fur seals. They made the habitat unavailable to gulls." After the seals had been destroyed, murres took over the hills, keeping the gulls off. During the Gold Rush murres were hunted and their eggs were collected and sold, until few murres remained on the Farallones. The gulls then seized their opportunity. When the Coast Guard took up residence, they smashed gull eggs to keep gull numbers down and off the hillsides.

Now the Coast Guard is gone, and "the murre population has risen to about 70,000—still a far cry from one million," said Joelle Buffa, refuge manager at the Don Edwards San Francisco Bay National Wildlife Refuge.

Human activities continue to ravage murre populations. "The most significant problem facing seabirds in California waters, in my view, is oil pollution," said Sydeman. "At least 20,000 murres were killed by oil in the last three or four years." Additionally, each year thousands of murres are killed in California by entanglement in gill nets. As a result of the continuing depression of the murre population, gulls have moved into former murre nesting grounds in the hills and are preying on petrels. "They prey on both adults and chicks, but it's the predation on adults that keeps the petrel population down," said Sydeman. In addition, mice (introduced to the island) sometimes prey on the chicks. (Ashy storm petrels are only eight inches long, and their newly hatched young are barely bigger than a golf ball.) Scientists from PRBO and USFWS have made major and heroic efforts to encourage the various species to recolonize the Farallones, but human impacts, both local and global, continue to keep these species in jeopardy.

An overall decrease in fish stocks keeps down the populations of all seabirds. Global

climate change and altering sea conditions impact fish stocks. Overfishing diminishes the food supply. Many birds feed on small "bait" fish, including anchovies and sardines, which are increasingly being harvested for salmon aquaculture and other uses. Pollution and oil spills poison the waters; low-flying aircraft and boats come too close to the islands during the nesting season, and flush birds off their nests, making it easier for predators to take chicks. In short, while the work of the USFWS and PRBO is essential, full recovery and restoration cannot be expected. Restoration efforts can lead to a sustainable and viable future, but the past will never return. Whatever the future holds, wildlife will undoubtedly be less abundant and less diverse.

If I learned nothing else that morning, it was that no place on this planet is immune to the impacts of those who view natural resources as assets to be liquidated for short-term greed. Consumption of the interest is appropriate; consumption of the principal, when avoidable, is an act of greed that mortgages the future.

Rough seas cut our visit short, as the captain signaled that we needed to head back. Suddenly we succumbed to a sinking feeling. Images of protesting western gulls began to haunt us. To us their cries were like mournful wails of refugees forced to raise their offspring on top of bombed-out rubble.

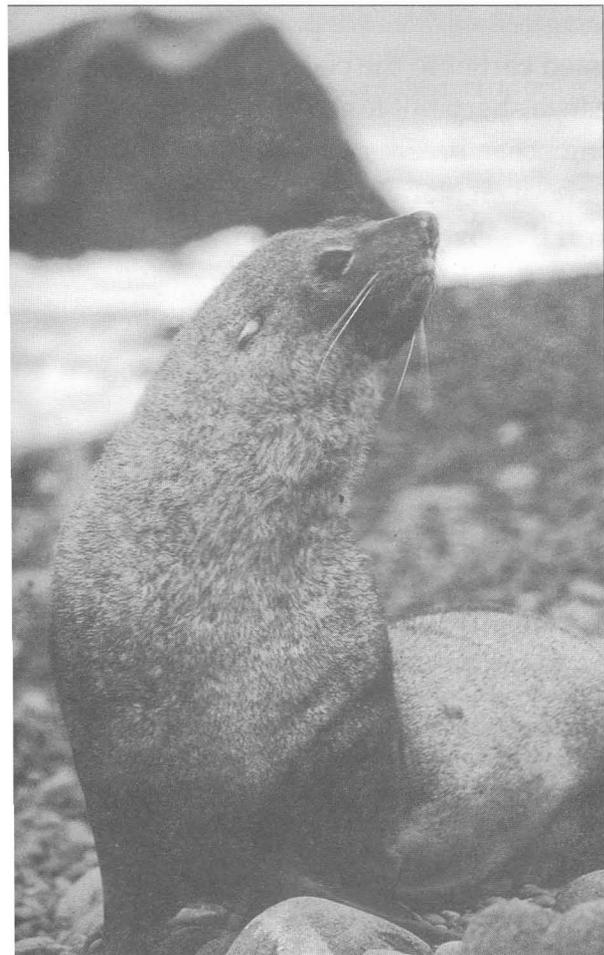
The wind had increased, and the afternoon seas grew rougher, but the sun had broken through the clouds, and soon we could see the San Francisco skyline. Somehow the distance seemed shorter than it had this morning—we had been reminded that the environment is never beyond the reach of human impact. ■

Sara Wan is a long-time coastal advocate who currently chairs the Coastal Commission and is a member of the Coastal Conservancy. She has master's degrees in biology and electrical engineering, and is an avid birder and wildlife observer.



U.S. FISH AND WILDLIFE SERVICE

**Above: The Billy Pugh in action
Below: Since 1996, six fur seal
pups have been born on the
islands.**



POINT REYES BIRD OBSERVATORY

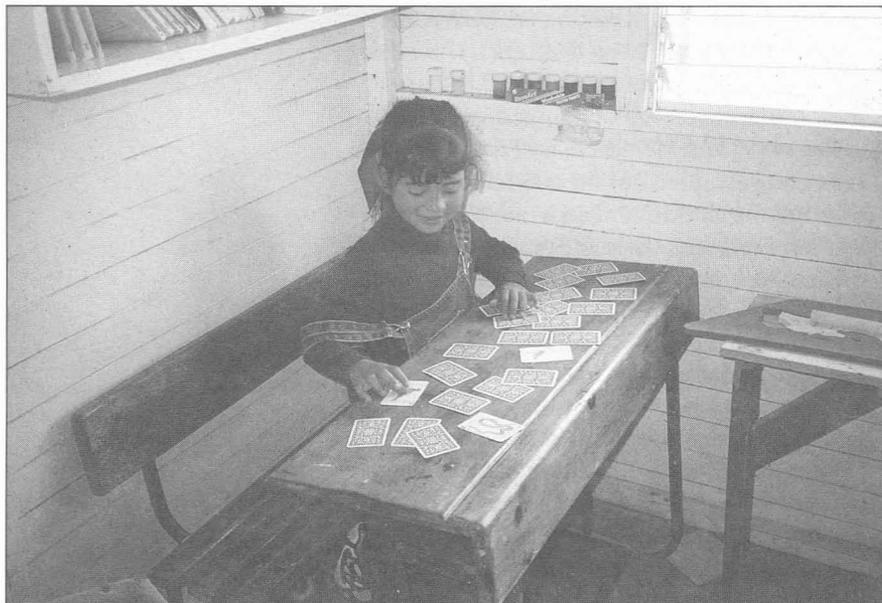
Using Research and Education to Save a Bird from Extinction

C. JOSH DONLAN AND BRADFORD S. KEITT



Photographs by
Bradford S. Keitt

José's eyes lit up when he saw the young bird. He appeared surprised that something so small and delicate could live underground. The other children on the field trip gathered around to look at the black-vented shearwater chick as we pointed out characteristics we had discussed earlier in the classroom: webbed feet for swimming in the ocean, a sharp bill for catching fish, and large wings for flying in strong ocean breezes. The children were third-graders from the only school on Natividad Island, a wind-swept desert island 10 miles off the Vizcaíno Peninsula, about halfway down Baja California. This island is home to about 400 fishermen and their families, and the breeding ground for over



150,000 black-vented shearwaters, more than 95 percent of this species' entire population.

On the short stroll from the classroom to the bird colony, the children were able to see firsthand the burrows the birds construct to breed. They had also seen many dead birds around the seabird colony, killed by feral cats. The live chick we showed came from an artificial burrow with a removable lid being used in a study. The study, as well as this field trip, are part of a binational effort to save this and other declining island species from extinction. The children were learning about native creatures with which they share the island, and the threats these creatures face. For the black-vented shearwaters, the main threat is feral cats.

Natividad Island is 3.6 miles long and only 1.5 miles wide at its broadest point.

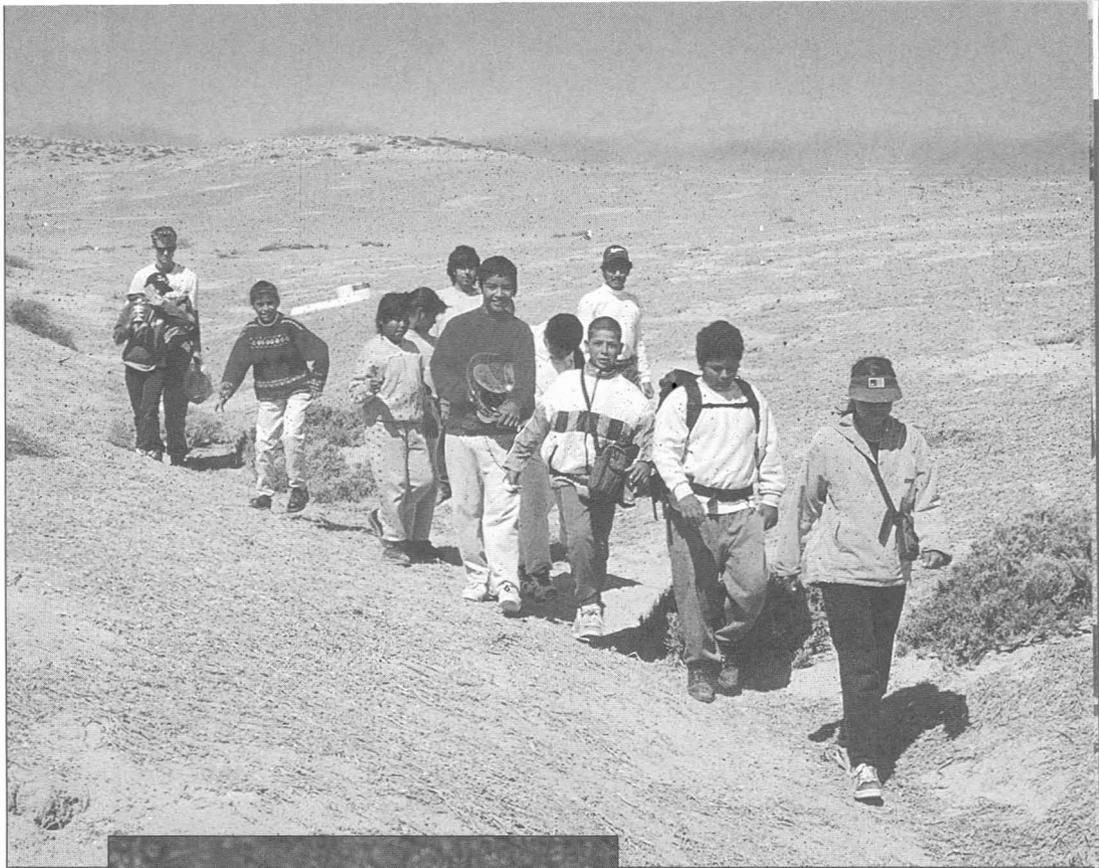
Significant rain falls only every three to five years, brought by hurricanes that drift up from the south or by storms from the north. Persistent winds sweep the island year round, driven by the desert heat on the adjacent peninsula. While the winds make the water around Natividad productive through the process of upwelling, the high wind-driven seas make fishing difficult. The islanders make their living diving for abalone, lobster, and turban snails, working in groups of three in *pangas*, small, blue-and-yellow boats made of fiberglass.

Their catch is processed at the island fishing cooperative's canning plant and then sold to Japan. All the islanders are associated with the cooperative, which has exclusive fishing rights to the island, recognized by the federal government.

It is not uncommon for fishermen to bring domestic cats to Natividad Island as a way to control the native mice that are attracted to their houses. Unfortunately, when the cats prove to be poor mouse hunters, fishermen usually abandon them. When we arrived three years ago, a distinct population of wild cats roamed the island. Historical notes by other scientists and naturalists report feral cats here as far back as the early 1900s.

Feral cats are a leading cause of bird and mammal extinctions on islands all over the world. On Natividad Island we witnessed nightly killings over the past three years, and it was quite clear that cats were the single greatest threat to the survival and persistence of black-vented shearwaters. They were killing hundreds of birds a week as well as preying on other species native to the island.

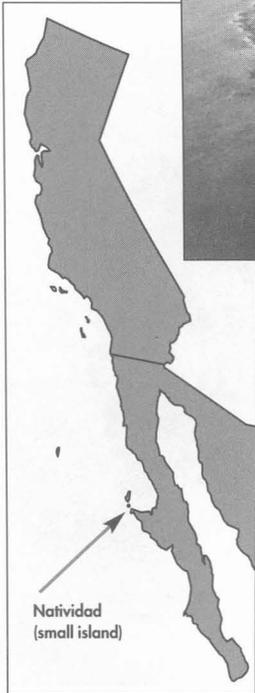
Introduced mammals threaten many native species, especially those called "endemics": plants or animals native to and restricted to one particular geographical location. Over 75 percent of all recorded animal extinctions have been island endemics, the majority as a direct result of introduced species. Predators, such as feral



Top: School trip to the bird colony
 Left: Black-vented shearwater
 Opposite: Learning about local species by playing a game invented by the authors

cats and rats, prey on native fauna and extirpate nesting seabird colonies. Introduced herbivores, such as European rabbits, sheep, goats, and donkeys, can devastate island plant communities and threaten many endemic plants with extinction. Feral pigs are an island catastrophe, devouring bird eggs one hour and native plants the next.

Only habitat destruction is a greater threat to global biodiversity than introduced animals and plants. As we study these feral cats and how they threaten native island species, island endemics all over the world continue to flicker out of existence while common weeds flicker in. Even on such a remote, arid island as Natividad, annual non-native grasses, the crystalline iceplant from South Africa, and many European weeds are becoming major problems. These invasive aliens will be even harder to control than non-native



mammals, and their ecological effects are even less understood.

Despite all these problems, islands offer excellent conservation prospects. Islands everywhere—from the Galápagos to Hawaii, from California’s Channel Islands to Natividad—are alive with plant and animal species found nowhere else on earth. Sea turtles, seals, sea lions, and countless species of seabirds find critical nesting habitat on islands. Because they are often remote and inaccessible, islands do not face the development pressures so common in continental areas. Thus, in many instances, island conservation efforts can proceed without economic conflicts. And, last but not least, on islands we can preserve not only entire ecosystems but also the ecological and evolutionary processes that have been occurring on islands for tens of thousands to millions of years.

While the islands of northwest Mexico likely do not conjure up the same images as Darwin’s Galápagos or the tropical paradises of the South Pacific, they are every bit as important to global biodiversity. The region’s approximately 230 islands are home to more than 200 endemic animals and plants. An exploding human population in this region has brought increased development of fisheries; the presence of more humans means the presence of more introduced species—and the threat of more extinctions. Of 19 recorded animal extinctions on islands in northwest Mexico, 18 can be attributed to introduced mammals. Among them are three endemics driven to extinction by feral cats: the Guadalupe Island storm petrel, the Todos Santos Island packrat, and the Todos Santos rufous-crowned sparrow.

While we are too late for these 18 animals, many other endemic animal and plant species in this region might still be saved. Since 1994 we have been working to do just that. The regional conservation effort we are involved in includes conservation biologists, ecologists, and environmental educators from both Mexico and the United States. We have developed relationships with Mexican government agencies such as the National Institute of Ecology (INE) and

Top: Looking northward at Natividad, with air strip in foreground
Bottom: A solar-powered lighthouse guides fishermen.



the Office of National Protected Areas of the Ministry of Fisheries, Natural Resources, and Environment (SEMARNAP). These relationships are prerequisite for effective and lasting conservation work. A collaboration of Mexican government agencies and a Mexican nonprofit conservation organization has resulted in the removal of introduced mammals from a number of islands on both sides of Baja California. In the past two years, this effort has focused on the Pacific islands of the peninsula. Feral goats and European rabbits were successfully removed from the San Benitos Islands, saving an endemic desert succulent from extinction. Feral cat populations have been removed from five Pacific Baja California islands, where many nesting seabird species have been decimated by years of cat predation. On Natividad Island we have succeeded in removing feral goats and sheep, which belonged to an island resident but were allowed to roam free because he could not afford fencing and feed. After this man learned about the damage caused by sheep and goats, he cooperated with our request that the animals be removed to his father's farm on the mainland.

A successful and permanent conservation program for these islands must include the community. Therefore, we work extensively with the members of local fishing cooperatives, which are usually at the heart of the island communities. On Natividad, everyone is connected to the cooperative in one way or another, since fishing is the island's only source of income. As educators and biologists, we were welcomed by the residents of Natividad, who provided housing as well as transportation to and from the island during our study. But our breakthrough came the year after the third-graders' field trip, when we returned to Natividad for our third and final year of research. Marcelo Castillo, president of the fishing cooperative and the highest official on the island, approached us to ask about the many dead birds he had seen. Castillo is in charge of vigilance, the goal of which is to keep people from poaching the resources around the island. When he heard that feral cats were devastating bird populations, Castillo asked us to help remove the cats. We were ecstatic at this request—it was a sure sign that our education efforts were working—and provided assistance and expertise for



the removal effort. Led by a Mexican conservation organization, the effort had removed 95 percent of the cats from the island by July 1997. (The cats are hunted or trapped, then given away or, if a home can't be found, euthanized.) In the coming months we will work with the fishing cooperative to remove the rest.

While our scientific studies and restoration efforts contribute to the immediate preservation of biodiversity, we are counting on education for the long run. We hope that one day José's granddaughter will quiver with excitement as she looks at a nesting black-vented shearwater. And even more, we hope she will proudly guard this bird's habitat, and this island ecosystem, from the assault of non-native species. ■

Josh Donlan and Bradford Keitt are biologists for the Mexican organization Grupo de Ecología y Conservación de Islas. Donlan is a graduate student at University of California Santa Cruz, and Keitt holds a master's degree in marine sciences from UCSC.

Peeking at a shearwater mother and chick through an infra-red camera lens

Oil spills of unknown origin cause up to 90 percent of marine oil pollution. Why do public funds for spill cleanup go unspent?

Shunning the Tarbaby

GREGG ELLIOTT

OIL SLITHERED INTO WATER, and the wine-dark sea turned black. Waves chopped the slick into thousands of sticky puddles that scattered across the ocean surface. Borne by wind and currents toward shore, they hit rafts of seabirds, soaked the pelts of sea lions and otters. Tarballs and oiled carcasses eventually made landfall, littering beaches and wetlands between Bodega Bay and Carmel from November to March. Authorities and volunteers combed the shore, rescued wildlife, and sought clues, but no one ever discovered the source of the 1997–98 “Point Reyes Mystery Tarballs”.

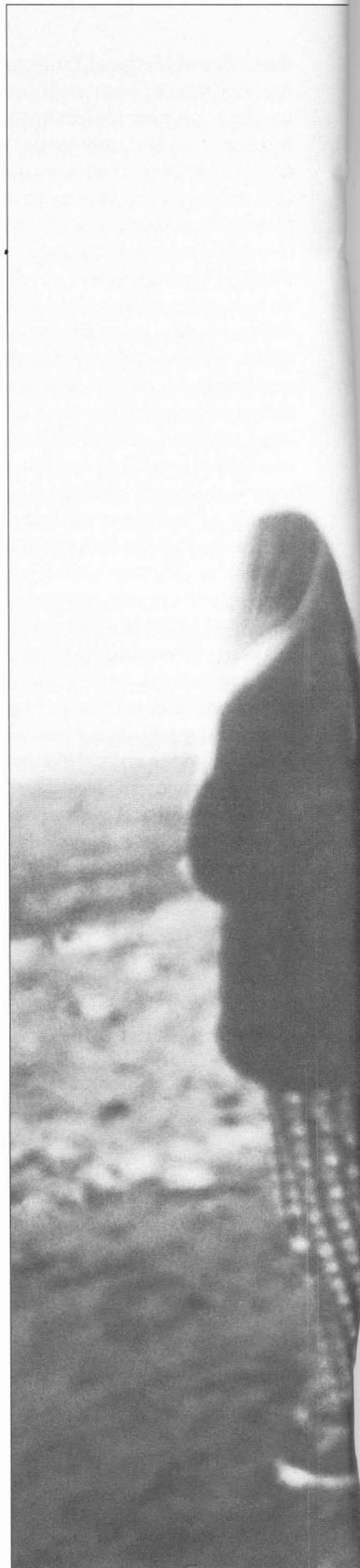
Each year in California, hundreds of small to mid-sized oil spills of unknown origin speckle the edges of our marine environment. Those deemed significant enough for the crews in white suits to be called out are known as “orphan spills.” Spills too small to merit a response from the Office of Oil Spill Prevention and Response (OSPR, pronounced *osper*) or local authorities—those evidenced only by a sheen on the water or a few oiled birds washed onto shore—are referred to as “chronic.” (They are part of nonpoint source pollution.) Together, orphans and chronic spills account for up to 90 percent of the oil pollution in marine waters. Because no polluter is identified, public funds must be used to pay for cleanup and, at least theoretically, to mitigate the environmental damage.

According to OSPR records, 21 orphan spills have blemished the California coast since February 1992, costing the state \$1,562,876 for response and cleanup, some of which may eventually be reimbursed by the federal government. However, more comprehensive records of the State’s Office of Emergency Services reveal that in the 18 months since January 1997, authorities have responded to 28 oil spills of unknown origin in Monterey and Marin Counties alone. Clearly this is a problem that calls for greater attention.

Chronic Is Catastrophic

THE DAMAGE TO WILDLIFE accumulates over time, and therefore often goes unmeasured and unnoticed. In the case of the Mystery Tarballs, 1,500 dead seabirds were found, but the actual losses may be ten times that number, says William J. Sydeman, director of the Point Reyes Bird Observatory’s Marine Program. The greatest casualties, on paper, occur among common murrelets, since they are strong swimmers and often make it to shore after they’ve been oiled, while many smaller or less buoyant birds sink without a trace. If Sydeman’s estimate is correct, some 15,000 seabirds may have been killed by the Mystery Tarballs event alone.

Oil’s lethal action does not end after it



POINT REYES BIRD OBSERVATORY



washes ashore, points out Sarah Allen, ecologist with the Point Reyes National Seashore. Windblown sand often covers tarballs before they are discovered or removed. On hot days they melt, then repeatedly gum the feathers of shorebirds that feed or rest on the beach.

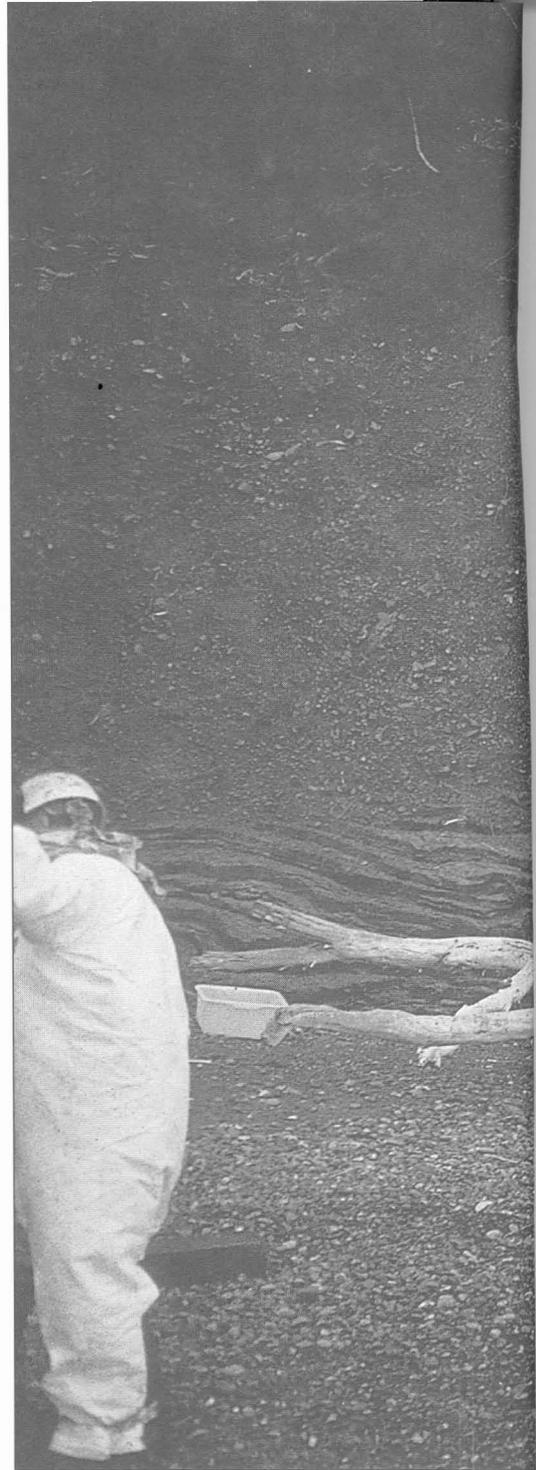
"The effects of chronic oil pollution are as severe as, or more severe than catastrophic events whose effects we actually track," says Sydeman. Ed Ueber, manager of the Gulf of the Farallones National Marine Sanctuary, estimates that a ton of tar per mile lies just under the surface of many Bay Area beaches. The Sanctuary's volunteer Beach Watch program reported in 1997 that 33 out of 57 beaches showed evidence of chronic oiling, not including the Mystery Tarballs incidents.

Are Orphans Neglected?

IN THE AFTERMATH of the 1989 *Exxon Valdez* disaster in Alaska's Prince William Sound and the 1990 *American Trader* accident in Orange County, the federal Oil Pollution Act of 1990 (OPA 90) and the California Lempert-Keene-Seastrand Oil Prevention and Response Act (SB 2040) were passed to prevent spills and improve emergency response. The federal legislation established a \$1 billion Oil Spill Liability Trust Fund

Right: No, it's not Halloween. These workers are cleaning up the *Cape Mohican* oil spill, October 29, 1996, at Kirby Cove beach, Golden Gate National Recreation Area.

Below: This oiled murre has a chance at survival.



(Federal Fund), managed by the U.S. Coast Guard, to be used for oil spill response and to reimburse states for oil spill removal and damages that are uncompensated by a responsible party. The state legislation created OSPR within the California Department of Fish and Game, and gave this new agency jurisdiction over all vessel- and marine-related spills in California waters. OSPR subsequently forged a "unified command" partnership with the Coast Guard for marine spill response.

By almost any measure, OSPR has been extraordinarily effective. It has





ED UEBER

succeeded in extracting over \$68 million in settlements from responsible parties to compensate for oil-related damages. Doug Helton, oil spill coordinator at the National Oceanic and Atmospheric Administration (NOAA), who handles claims to the Federal Fund, says: "My general experience with oil spills in California and elsewhere is that OSPR is much more aggressive and goes after smaller spills." The number of marine oil spill reports in California decreased by 40 percent in the five years after OSPR went into action, from 1,284 in 1992 to 767 in 1997.

Nevertheless, a number of independent observers complain that OSPR has responded with far less zeal to orphan spills than to incidents involving identified culprits. An official within OSPR confirms that "orphan spills are played down by regulatory agencies and the Coast Guard." The official explains that these spills have, in the past, been viewed primarily as an aesthetic problem rather than an ecological problem with far-reaching implications for wildlife. Gary Gregory, interim administrator of OSPR, denies these allegations, saying "there is no difference in

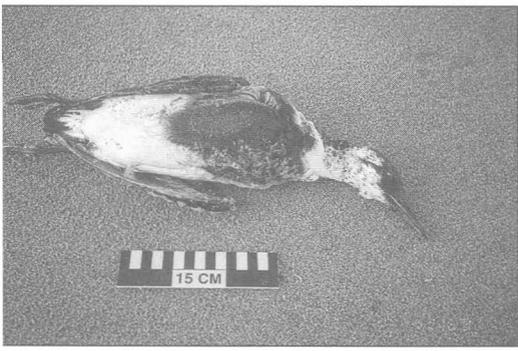
response in what we send forward for a spill, whether there is an RP [responsible party] or not."

To understand this controversy, it may help to consider that OSPR is based on the "polluter pays" principle and that in the absence of a responsible party, cleanup and restoration costs must be covered by a tax on the oil industry. SB 2040 created two means of bankrolling the newly minted state agency: the Administrative Fund for Operations (maintained through a \$.04/barrel crude oil tax) and the Response Fund, which through a



ED UEBER

Top: Workers needed packhorses to haul away tarballs at the Point Reyes National Seashore.
Below: An oiled common murre from the Point Reyes tarball incident, and a tarball on the beach.



DAN HOWARD

\$.25/barrel fee was brought to its mandated level of \$100 million in a mere six months. The \$.25/barrel fee was then discontinued, but it will be triggered automatically whenever the Response Fund is drawn down by more than five percent. This has not happened since the Fund was established.

The law specifically directs expenditure of Response Fund dollars to cover response, cleanup, damage assessment, and "actions that are necessary to fully mitigate for the damage caused to wildlife, fisheries, and . . . habitat, including beaches" for all marine spills, including orphans. Damage assessment is a necessary preliminary to mitigation efforts, but OSPR has never tapped the Response Fund to cover a Natural Resource Damage Assessment for an orphan spill. Pete Bontadelli, director of OSPR from its inception until 1998, explains that in contrast to habitat restoration, bringing back wildlife populations hurt by oil pollution is still an uncertain science. He notes that \$17 million was spent to figure out the damages of the 1991 Cantara toxic spill of metam sodium, a fungicide, along the Sacramento River, but only \$8 million was spent in actual restoration. To trigger Response Fund collections from the petroleum indus-

try for orphan spill damage assessment and wildlife projects without a drum-tight scientific case would be very difficult, he says, because "the industry looks at every case as a precedent."

Other insiders, however, speak of a reluctance to draw down the Response Fund to the point of triggering additional fees from the petroleum industry. One informed source says OSPR didn't use the fund because "Governor Wilson did not wish to assess the 25-cent fee." Another thought the agency feared that the oil industry might retaliate by calling for an audit of OSPR's expenditures.

Compensation is theoretically also available from the \$1 billion Federal Fund, but until recently this fund did not pay for orphan spill damage assessments either. Everyone in government, it seems, sought to avoid the tarbaby of an orphan oil spill, lest they end up stuck with the tab.

This impasse may have begun to resolve, however. About the time of the Point Reyes tarballs, suits filed by the States of Florida and New York were settled, resulting in a ruling by the Solicitor General that affirmed the Federal Fund's liability for damage assessment and environmental restoration claims stemming from oil spills without responsible parties. After the incident,

Ueber began to seek Federal Fund support for an investigation of the mysterious spill. The Fund subsequently approved \$300,000 to initiate an assessment. As a result, for the first time in California, a Natural Resources Damage Assessment will spotlight the ecological harm caused by an orphan spill.

"The Point Reyes Natural Resource Damage Assessment is precedent-setting, from my perspective," says Helton at NOAA. "The Federal Fund has never paid to initiate an orphan assessment before."

Who Might Be the Culprit?

OIL ON CALIFORNIA BEACHES generally comes from three sources: varied land-based pollution, natural seeps, and discharges from ships and smaller boats. Land-based pollution from diverse sources is ubiquitous, and is likely to grow as California's population increases—unless major efforts are made to prevent it. This year California residents will dump upward of 20 million gallons of waste motor oil illegally, estimates the California Integrated Waste Management Board. They will throw used oil into the trash, from which it can leak into groundwater, or will pour it directly down neighborhood storm drains, through which it will flow into rivers, estuaries, and nearshore waters.

Natural seeps occur mostly in southern California, where clouds of crude billow into the ocean, creating great tar mats at places such as Coal Oil Point near Santa Barbara. But there are also seeps elsewhere along the coast, says Keith Kvenvolden, an organic chemist with the U.S. Geological Survey who has been investigating the source of tarballs in the Monterey Bay National Marine Sanctuary. "It's very difficult to separate what might be an accident by industry from what's happening naturally down there," he says, adding that "there are tarballs just about anywhere you want to look." Circumstantial evidence points to natural seeps, but this does not rule out the possibility of oil coming from

tankers carrying California crude.

Leaks and spills from ships and boats also occur along the entire coast. Some are accidental, others deliberate. Pleasure craft with inefficient and leaky motors are a leading cause of marine pollution. A two-stroke outboard motor emits up to 30 percent of its fuel unburned. When it comes to orphan spills from large vessels, the Coast Guard generally ranks bulk freighters as greater risks than container vessels, with oil tankers considered especially risky due to their potential for large spills.

Large ships pollute by illegally leaking bunker fuel or releasing oily bilgewater. Some may do so to avoid the costs of legal onshore disposal, which average about \$70 a barrel. Bill Castle, director of OSPR's Petroleum Chemistry Lab, notes that fingerprinting of oil pollution samples collected within a 20-mile range north and south of San Francisco Bay indicates that over 50 percent of tarballs examined have been Alaska North Slope crude.

How about the *Puerto Rican*, which sank in October 1984, with 91,984 barrels of refined oil products and 8,500 barrels of bunker oil, 8.5 miles outside the Golden Gate? Could it be leaking during turbulent winter storms? Castle, who has the *Puerto Rican's* oil signature on file, says no tarballs have ever matched its cargo.

When Pouring Oil into the Ocean Is Legal

SOME OIL POLLUTION is legally permitted. Under international maritime rules, tankers may discharge oil cargo tank washings or "slops." These are mostly water, but may contain oil residues up to 1/30,000 of the cargo load. A large tanker—the sister ship to the *Exxon Valdez*, say, with a total capacity of over 1.3 million barrels—could legally discharge up to 46 barrels of oil at an electronically monitored rate no greater than 30 liters per nautical mile, as long as it was under way at a distance greater than 50 miles from shore. It could release a maximum of about a barrel of oil every six miles.

HELPING BOATERS STAY CLEAN

THE CALIFORNIA COASTAL Commission's Boating Clean and Green Campaign promotes the installation of services to help boaters avoid polluting. These services include used oil collection, bilge pumping, and bilge pad distribution and exchange at marinas. The Campaign is distributing 30,000 free California Boater kits, each containing an oil-absorbent bilge pad and information about sound environmental boating practices. For the location of a used oil collection center or hazardous waste facility near you, call 1-800-CLEANUP (253-2687). For more on Boating Clean and Green, see the web site: ceres.ca.gov/coastalcomm/ccbn/ccbndx.html or call Miriam Gordon at (415) 904-5214.

International maritime rules prohibit these types of discharges in designated "special areas," including the Mediterranean, Red, and Baltic Seas, but no such protected status exists for the California coast, not even for national marine sanctuaries.

Relatively small amounts of petroleum could persist in seawater and reach shore from 50 miles out or more, says Sharon Kristofferson, an expert in modeling the fate of oil in the environment at NOAA. It is conceivable that under the right conditions, tarballs might coalesce from scattered oil releases, and be blown ashore by coastal winter winds, the way leaves are swept against a curb by a leaf blower. Coast Guard Lt. James Stewart, chief of foreign vessel boarding for San Francisco, says that such oil discharges rarely happen because waste oil in slops can be allowed to separate and then combined with new oil cargo at the next port.

When Pouring Oil into the Ocean Is Illegal

AS MANY AS 175 DEEP-DRAFT vessels ply the shipping lanes in and out of San Francisco Bay every month, cut-



ANDREW JONES/HUMBOLDT STATE UNIVERSITY

Thousands of gallons of fuel oil were spilled into Humboldt Bay in September and October this year by the *Stuyvesant* as it was dredging off the coast of Eureka. More than 80 protected birds were killed, including endangered marbled murrelets, and more than 1,200 were taken to the Marine Wildlife Care Center at Humboldt State University for cleaning and rehabilitation. These recuperated common murrelets were released back into the bay in late October.

ting through the Gulf of the Farallones National Marine Sanctuary where world-class populations of elephant seals and seabirds breed on the stony outcrop of the Farallon Islands and feed in its fecund waters. Officials who have dealt with Point Reyes orphan spills say ships illegally dump oil in their wakes. Ueber says: "We believe every year people are putting fuel from ships into the ocean in this area."

John McLauren, executive director of the Pacific Merchant Shipping Association, responds: "The industry as a whole, I think, has been pretty conscientious. We came forward and said we wanted to be regulated for oil spill purposes." Jeff Wilson, spokesman for the Western States Petroleum Association, says it's unlikely tankers would knowingly dump oil: "It is very much in the interest of the marine industry for

tankers to comply with all these laws. No company wants to undergo the pain and scrutiny, both internal and external, of a spill. Ninety-nine percent of releases are accidental. Knowing breaches of protocol or law are unlikely because there are too many eyeballs on everything."

A substantial portion of dumping and leakage may originate from ships known as "flag of convenience" carriers, registered in countries with relaxed standards. "The Coast Guard has identified certain flags that have a tendency of greater problems or substandard vessels," says Lt. Stewart. The Coast Guard lists the following foreign flags as having been detained for violations more frequently than the industry average during 1996-98: Antigua and Barbuda, Belize, Cape Verde, China, Cyprus, Equatorial Guinea, Honduras, Malta, Mexico, Netherlands Antilles, Pakistan, Panama, Romania, Russia, St. Vincent and the Grenadines, Taiwan, Turkey, Ukraine, Vanuatu, and Venezuela.

Fingerprinting Orphans

IN OIL SPILL CRIMES, there's no smoking gun but there may be fingerprints! Chemical "fingerprinting" is routinely used to match petroleum spills with the cargoes or fuels of suspected dumpers, but the term fingerprinting implies a level of precision that doesn't exist. As with its scientific cousin, DNA analysis, matches between oil samples can be made within a range of probability, but never with 100 percent certainty.

After a spill, samples arrive at OSPR's Petroleum Chemistry Lab as water, sand, oil, fur, entrails, or feathers. Lab techs extract and dilute oil for analysis, using a mass spectrometer. Compounds in the oil provide a "signature" consisting of

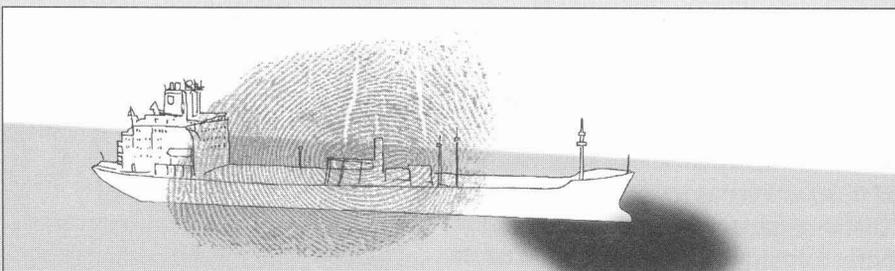
about 20 to 25 measurements with distinctive patterns.

The first step in making a match is to obtain a suspect sample of oil for comparison with the actual spill. Sleuthing to identify the possible culprit includes use of satellite imagery and transit records to show suspect ships' locations at the time of a spill. Then the U.S. Coast Guard and OSPR go to work, collecting samples from such ships. In many cases, suspect samples never become available. The "shipping lane" spill, which spread 1,300 gallons of oil along San Mateo beaches in fall 1998, could easily have become an orphan. The tanker *T/S Command* might not have been fingerprinted for the crime if the crew had not

already accidentally—and conveniently—spilled oil while docked in San Francisco Bay. Several officials believe the example of the *Command* may have helped to stanch the flow of illegal oil hemorrhaging into the sea, as no major tar ball incidents have hit Bay Area shores since that time. Fingerprint evidence in that case helped achieve a settlement of over \$9 million for damages and environmental restoration.

Spill fingerprint reports characterize samples as "consistent with," "similar to," or "not consistent with" a suspect sample. "Consistent with" is the finding required for conviction. Generally, "consistent with" requires that each of the 20-odd measurements analyzed in a spill sample match suspected samples within 20 percent, and all of the same compounds must be present.

A simpler level of analysis looks at naturally occurring carbon levels, which can be used to distinguish oils of varying geologic origin even without benefit of a matching sample. The oils most commonly seen in California are Monterey Formation from offshore near Santa Barbara (including natural seeps) and Alaska North Slope oil. Bunker (fuel) oil can usually be distinguished because it has been refined.





ANDREW JONES/HUMBOLDT STATE UNIVERSITY

Eyes peering down from the sky offer a relatively new deterrent to high seas polluters. Satellite imagery helped make the case against the *T/S Command* for the 1998 "shipping lane" oil spill off the San Mateo County coast. Norwegian authorities use satellites to spot the veil of smooth water that trails behind a ship disgorging oil into the Baltic Sea, even at night, when most illegal dumping appears to occur. Staff within OSPR are currently investigating expanded satellite coverage as a means of exposing illegal dumpers. Although this technology doesn't come cheap, it could potentially pay for itself in one settlement from nabbed polluters.

Might OSPR Itself Become an Orphan?

THE QUESTION THAT KEEPS surfacing, like tar on a sun-drenched beach, is whether state and federal oil response agencies will take the steps necessary to redress orphan spill injuries to wildlife, as originally envisioned by lawmakers.

In 1998 Fish and Game, arguably one

of the most frequently reorganized agencies in state government, transferred all OSPR enforcement wardens and biologists to the agency's newly created marine region. An informed agency source estimates that subsequent to the reorganization, smaller-spill enforcement actions have declined by 25 percent and are trending lower over time. Now Governor Gray Davis has requested a review of the state's oil spill prevention and response programs, and one option under consideration is to move OSPR's prevention function to the State Lands Commission, the agency that handles spill prevention at marine facilities. Some within the agency fear its effectiveness will be undermined if its responsibilities are dispersed. OSPR was originally organized to reduce fractured and overlapping jurisdictions in state agencies.

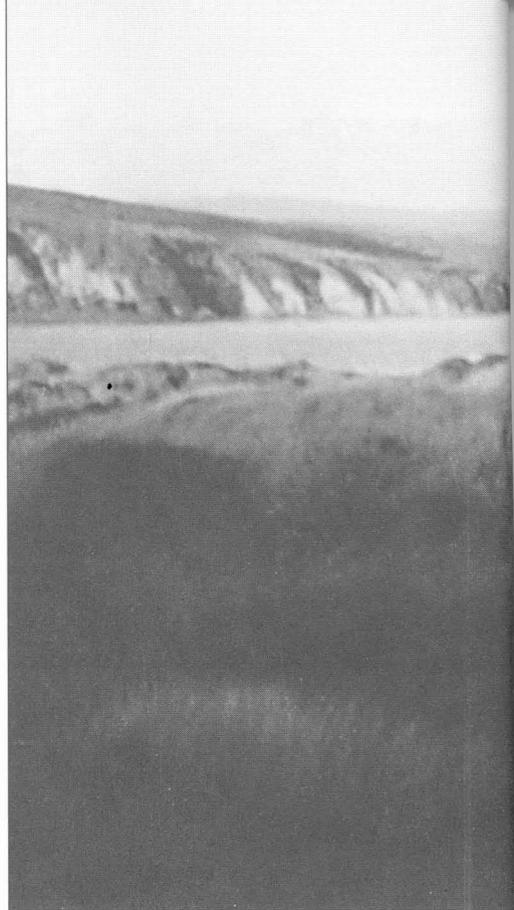
By contrast, in the State of Washington, reorganization is proceeding full steam in the opposite direction. In 1997, that state's legislature merged offices of two separate departments to create the Office of Spill Prevention, Preparedness and Response. Stan Norman, the director of Washington's new agency, muses that "any organization

can be made to work with the right people. It takes upper-level management support."

The full story behind the Point Reyes Tarballs of 1997-98 may remain a mystery, but after analyzing 59 tar and feather samples, OSPR's lab concludes: "None of the oil residue samples analyzed were from seep sources. Based on weathering characteristics, two incidents appear to have been caused by two separate releases of the same petroleum product or crude oil."

The precedent-setting natural resources damage assessment will unfold in the year ahead. It could open the door for Ueber and others hoping to make claims to the Federal Fund for money to bankroll restoration projects such as habitat enhancement, removal of accumulated tar from beaches, and projects designed to bolster depleted wildlife populations. Should that occur, says NOAA's Helton, it would set a precedent for the entire country. ■

Gregg Elliott is a policy analyst whose own close-up encounter with the Point Reyes Mystery Tarballs, and a murre struggling in tar, left an indelible impression.



Dinner Walk

NELLIE HILL

FROM THE PARKING LOT, we heard the distant ocean thundering on Limantour Beach. The tide was coming in. We'd reach the estuary—about a mile away—just after low tide and, with luck, would find enough birds still feeding in the mudflats.

The sixteen of us who had signed up for this “dinner walk” were almost all seasoned birdwatchers, including the friend who'd asked me along. Each had brought binoculars—three on tripods. I had never been on an official birdwalk before, but the idea of a small evening hike with other nature lovers in the Point Reyes National Seashore had enticed me. We'd driven from Berkeley, starting out in the hot afternoon, and arrived at the Estero Trail parking lot as a cool fog was setting in. Waiting for stragglers, we

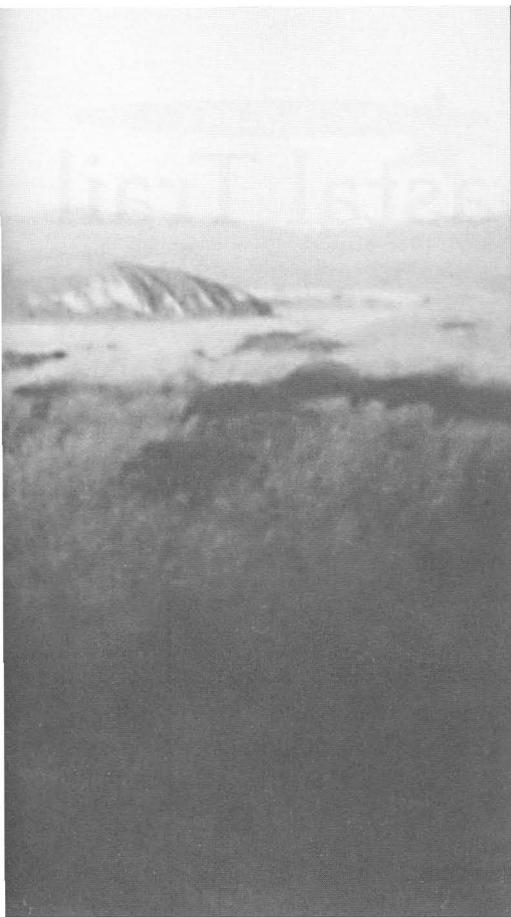
soon were cold and impatient.

We began to walk in a clump, our dinners slung in backpacks over our shoulders, and stopped after only a few steps. Not a word or shuffle from the humans, but a fluttering rustling just off the trail. Fifteen pairs of binoculars were directed toward the sound. The sixteenth pair was mine. These little feathered things were what I'd always thought of as bush birds, busy brown creatures that hopped and bounced and fluttered in the chaparral and poison oak alongside the trail. I'd never thought of trying to identify them. “A winter wren,” our leader said.

Someone referred to the subtle stripe by its eyes. Evidently the wren family has several members, each with a different name. Why hadn't I realized that before? More flutters and swishes—another kind of wren with a different stripe. I positioned my binoculars: to

The almost-full moon had risen, giving a soft glow to the land. Our shadows leaned sideways from our feet into the grass, and the dim moonlight felt warm.

my surprise, the bird was right in the middle of my vision. I wanted to shout for someone to look at what I'd done—I was seeing the bird, mid-eye! Fortunately, the urge to share my experience quickly diminished. I looked calmly



CHARLENE CHARLES

and noted with surprise how fat the little thing was. Without the binoculars I had seen it as just a speck in the branches, smaller than the leaves.

We walked on, stopping frequently to look at more wrens, still different wrens. I understood from the low murmurs of our leader and the followers that we expected to see more than wrens. Another rushing, slushing sound—was I the first to see? A deer. Where? Behind that tree. Deer in California often trot along city streets; and even venture onto my deck to nibble the geranium. Nevertheless, a feeling of excitement hovered over our group. This was a wild deer, in its natural habitat. It disappeared into the trees before everyone was able to see it.

Onward into a dense stand of tall fir. We heard a loud flapping overhead—two turkey vultures settled with a flourish into the branches, and we stared up at them through our lenses. Exquisite forms, feathers as clear as brush strokes, bills outlined with a pen's precision. Beautiful and grotesque at once. "Vultures are often bald," our leader explained, "to keep them free of bacteria and infection from the carrion they eat." As we

began walking forward another flapping startled us, and fifteen or twenty buzzards rose from the treetops, their wings thick as a ceiling. Farther on, egrets were roosting high in the firs. As we continued downslope we kept looking back at them, white clouds in the dark branches. Across the narrowest spot of the estuary was an old, small wooden bridge. Here we sat and opened our picnics. Egrets homed into the trees behind us like jets emerging from the twilight one after another to land at an airport.

As my companion and I sat on the bridge, our legs dangling, drinking rum-laced tea and eating our supper, I saw a white flash in the shallows beyond. Minutes later someone called out that a tiger shark had swum under the bridge, riding the landward-flowing tide, which gurgled and murmured like a river. The daylight was dimming now into a monochrome twilight.

Just at the lingering point of after-dinner, I noticed people standing, folding blankets, and zipping their packs. Must be time to go, and just as well: we had grown chilled, sitting in the wind that swept through the estuary from Limantour. The surf on the oceanfront

beach sounded like thunder, or possibly human drumming, calling us.

We turned our backs to the sound and the darkening water and trudged upslope, through the grove of fir. The almost-full moon had risen, giving a soft glow to the land. Our shadows leaned sideways from our feet into the grass, and the dim moonlight felt warm. I dropped to the back of the group—no need now to listen so attentively to our leader's bait calls, the shhhp-shhhp and high-pitched cackles.

He added a low whistle and whooo-whoos to the repertoire, and several people remarked that a little answering shriek was surely an owl's call, but we saw no owls and heard no whoos. The three tripods at the head of the group looked for all the world like three crosses on the shoulders of some pagan-Christian priests. None of us spoke, hushed by the close of our foray and end of day. We had gone out with open minds and hearts and were satisfied. ■

Nellie Hill is a poet who lives in Berkeley.

For information about Marin County Open Space Nature Walks, call the Marin County Open Space District: (415) 499-6405.

Dispatch from the Coastal Trail



COURTESY JAY KENT BIEN

WHEN HE FIRST CALLED, from a pay phone at the Seven-Eleven store in Lompoc, Kent Bien, 55, had already been running for 29 days, following the route of the California Coastal Trail. He had started May 30 at the Oregon border and hoped to make it to the Mexican border. He had little time to spare for talk: in another 24 days he was due back in Hawaii, teaching math again at Kapiolani Community College.

Covering about 14 miles a day, Bien was on schedule, but reaching his goal was not his prime objective. He paused to explore, take notes and photos, get food, and talk with people. The run itself had been "terrific" thus far, both by day and sometimes by night—"on moonlit nights especially." On the darker nights along the shore, he had learned to avoid snowy plovers, electric fences, and elephant seals. "I detoured once after hearing a very large snort." In Montana de Oro State Park, he learned that yellow flowers can show the way: mustard has been planted along some trails to enable people to follow them even when they are grown over. At hostels where he stayed when he was not camping Bien met people from all over the world, heard of their experiences and of what was down the road. "I never knew much about hostels before," he said.

"Now I'm a complete advocate."

Bien began running after he retired from the U.S. Navy SEALs in 1986. "I like to run long stretches," he said, "but on my island, Oahu, if I run more than three days, I'm running in circles." So he looked for a bigger challenge and chose the 1,100-mile California coast.

Volume 1 of *Hiking the California Coastal Trail*, by Bob Lorentzen and Coastwalk's executive director Richard Nichols (1998), looked like a good guide for the northern stretch of the coast, Del Norte County to Monterey. But where was Volume 2? Bien called Nichols and learned it was in draft, moving toward publication in 2000. A deal was struck: the authors provided Bien with a copy of the manuscript; he agreed to take notes and check facts. If he succeeded in reaching the border, Bien would be the first to run the entire Coastal Trail route, as far as Nichols knew, and certainly the first to do so using the guidebook.

Military life had prepared Bien for traveling light. In his backpack he had a sleeping bag, bivouac sack, notebook, camera and camcorder, a GIS system, the guidebook, and a cell phone for emergencies (a phone card worked better, he found, for he was often out of cellular range). He also carried water, but no food, except in

the Lost Coast wilderness, figuring he could get that en route.

What sustained him on this extraordinary endeavor, *Coast & Ocean* inquired. "I drink at least a quart of half-and-half a day, and I eat the biggest bagels I can find, smeared with cottage cheese," said Bien. "I buy hunks of cheese and a jar of peanut butter every other day, and ice cream. It's true that I am lacking in vegetables, but the other day I ate some wonderful blue berries from a bush."

Apparently this is a perfect diet for this particular runner. At 145 pounds, Bien stands a slim 5'10". He had knee problems early on but worked those out and at the time of this phone call from Lompoc was feeling "extremely strong."

As we talked, he had been sipping a pint of his beverage of choice. Now he was done and had to be off. He'd call again if he got a chance, he said.

From Nichols and others we heard that Bien continued to make good time. We tried to catch up, but found only his voice-mail trail. On October 6, on *our* voice mail, he reported: "I did finish, on August 20, having crossed the sloughs of the Tijuana River with backpack overhead—80 days. It was a wonderful trip. Now I'm enthusiastic about doing the Appalachian Trail next summer." —RG



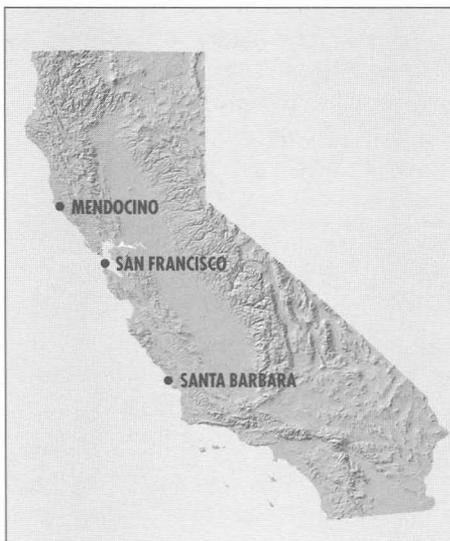
Coastal Conservancy News

GAVIOTA COAST RANCH PROTECTED BY CONSERVATION EASEMENT

THE 30-MILE GAVIOTA COAST in Santa Barbara County is one of southern California's last open coastal landscapes. Development pressures are growing and so are property prices and tax assessments, putting the future of agriculture at risk. Family ranches are being turned into coastal estates. The 660-acre Freeman family ranch, on the slopes behind Refugio State Beach, would have been a prime target for such conversion until its owners opted to sell a conservation easement to the Land Trust for Santa Barbara County.

In September, the Coastal Conservancy approved \$400,000 to help the land trust meet the \$900,000 purchase price. The California Resources Agency has committed another \$200,000, Santa Barbara County \$75,000, and private foundations have contributed \$20,000. The land trust expects to be able to raise the rest of the money needed. It has an option to purchase the easement that expires in June 2000.

The easement will permanently pre-



vent any subdivision of the Freeman Ranch and preserve it for agriculture. The Freemans graze 40 head of cattle on their land and will continue to do so. The easement will also protect oak woodlands, a mile of Refugio Creek, and a spring-fed freshwater wetland.

"My kids and I are in agreement to do this, and the rest of the generations will have to live with it," Leslie Free-

man, who owns the ranch with his brother James, told a reporter. "This is also a way for us to help keep the ranch because inheritance taxes for farmers are terrible."



KAREN BUTTS, COURTESY SLIDE RANCH

Studying a tidepool at Slide Ranch

WHAT WHALE TAIL LICENSE PLATE FUNDS HAVE BOUGHT

THANKS TO THE MORE THAN 30,000 motorists who bought the Whale Tail License Plate, the Coastal Commission was able to award a total of \$175,000 in grants to 24 nonprofit organizations and public agencies for coastal access and environmental education projects. The Coastal Conservancy, with its \$146,000 share, funded wheelchair-accessible pathways at Cabrillo Beach in San Pedro.

A grant of \$6,238 to the California State Parks Junior Lifeguards Program and Police Activities League in Ventura enabled 60 children age 9-15 to take part in the Channel Islands Coastal Experience Camp. The program includes classroom presentations, kayaking trips, and snorkeling excursions.

A new ramp to improve access to the water by windsurfers has been completed at Oyster Point, in San Mateo County, along with another quarter-mile of Bay Trail. Both were funded by the Coastal Conservancy.



KAREN RUST

A \$70,000 grant to S.E.A. Camp Monterey Bay is helping to launch a residential science camp for elementary and secondary school students, their families and teachers. This program, scheduled to start in summer 2000, will combine hands-on outdoor activities with classroom projects, mentorships, and field seminars.

A \$10,000 grant is helping Slide Ranch, in Marin County, to expand its programs seaward. Thousands of school children have learned about farming, sustainability, and steward-

ship at the ranch. Now they will also visit tidepools and learn about human interdependence with sea life.

A total of \$20,000 in Whale Tail funds went to three of the Commission's partners in the Adopt-A-Beach program: Northcoast Environmental Center in Humboldt County, Yosemite National Institutes in the Marin Headlands, and Heal the Bay in Los Angeles County. Adopt-A-Beach programs involve civic groups, businesses, families, and schools in caring for specific beaches year-round.

With \$22,500 in Whale Tail funds, matched by funds from the Coastal Conservancy, the Los Angeles County Department of Beaches and Harbors is buying 18 balloon-tired beach wheelchairs, which can roll across the sand and along the water's edge. The chairs will be distributed to selected beaches along the 31 miles of L.A. County coastline by summer 2000.

In addition to these and other grants, the Commission, working with the California State Parks Foundation, distributed a total of \$11,000 in smaller grants among 15 volunteer Coastal Cleanup Day county coordinators, to cover expenses ranging from advertising to port-a-potties.

The Conservancy used its share of Whale Tail funds as part of its \$409,000 grant to improve wheelchair access at Cabrillo Beach Park. The funds will help build over 1,000 feet of new wheelchair-accessible trails and a 300-foot boardwalk with observation deck. They will enable all visitors to observe life in tidepools and enjoy programs at the Cabrillo Marine Aquarium.

To order a Whale Tail Plate, or for information about the grants program or the Adopt-A-Beach program, visit the Coastal Commission's website: ceres.ca.gov/coastalcomm, or call (800) COAST-4U. You can also order a plate at the DMV. —Chris Parry

TEACHERS, FOR YOU

The annual River of Words Environmental Poetry and Art Contest is again accepting entries from students age 5-19. The deadline for submissions is February 15, 2000. Information and entry forms are available from River of Words at International Rivers Network, 1847 Berkeley Way, Berkeley, CA 94703; phone (510)848-1155; FAX: (510)848-1008; e-mail: irn@irn.org; and on their website: www.irn.org/row, where you can also see this and past years' winning entries.

RIVER OF LIFE

	flowing		
	carving its		
	way through		rocky
	Tibetan		plateaus
Breaking the silence	across wide		rolling plains
criss-crossing the	nourishing		rice fields
following soapy	suds of country		washing
Zig-zagging	through		the Gorges
Impressive	monuments		guiding the
path of	the		Yangtze
watching new	developments		rise
smiling at	eyes opened		in awe
viewing the	majestic		scenery
carrying a	thousand hidden		grains of memory
collecting,	depositing souvenirs		from its travels
in an ever	growing		treasure box
a pot of	gold		sparkling
at the end	of this		life giving
	rainbow		



The poem is in the shape of the Chinese character for water.

—Ru-Woei Foong, age 14
Shanghai American School, Shanghai, China
Teachers: Brian Compton and Angela Kocher
1999 River of Words International Grand Prize Winner

SAN FRANCISCO BAY TRAIL GRANTS

THE COASTAL CONSERVANCY has approved \$2.5 million to the Association of Bay Area Governments (ABAG) for grants to extend the Bay Trail in various locations. ABAG will work closely with Conservancy staff on criteria for proposed projects and will administer the grant round. Once all grant applications have been reviewed and evaluated, the proposed projects will be brought back to the Conservancy for final approval and funding. The California Conservation Corps is expected to be a close partner in projects requiring construction work.

The 400-mile Bay Trail is a trail network circling the San Francisco Bay shoreline. Since 1981, the Conservancy has funded over \$7 million in Bay Trail projects. For more information, contact

Laura Thompson at the Bay Trail Project, ABAG, P.O. Box 2050, Oakland, CA 94604-7970. Phone: 510-464-7909. Or see www.abag.ca.gov.

NAVARRO RIVER IMPROVEMENTS

WITH \$200,000 APPROVED by the Conservancy in August, the Mendocino County Resource Conservation District will develop and design projects to improve habitat for coho salmon and other wildlife in the Navarro River Watershed. One of the biggest problems is soil erosion, which releases sediment that smothers spawning habitat. The improvements will be based on the watershed plan prepared with \$98,000 in Conservancy funds and guidance from community organizations and government representatives.

MAPPING TECHNOLOGY FOR NONPROFIT GROUPS

THE CONSERVATION TECHNOLOGY Support Program is accepting applications for around 50 grants of computers, software, and training in mapping technology. Interested nonprofit conservation and environmental organizations can find information at www.ctsp.org. Applicants must be tax-exempt and based in the U.S. Some international groups with U.S. sponsors may qualify. Applications are due January 7, 2000, and decisions will be made by April 2000.

NOW SO LITTLE FOR SO MUCH

THE COASTAL CONSERVANCY'S unique *San Francisco Bay Shoreline Guide* is available for just \$12 (plus sales tax) until January 31, 2000. This beautiful full-color book, published by the University of California Press, will take you around the Bay along the 400-mile Bay Trail. You'll discover wildlife, geography, and layers of history, as well as new parks and trails. A great gift for yourself as well as others. Send a check or money order for \$13.02 payable to Coastal Conservancy, 1330 Broadway, 11th floor, Oakland, CA 94612. Or order from the University of California Press, (800) 777-4726.



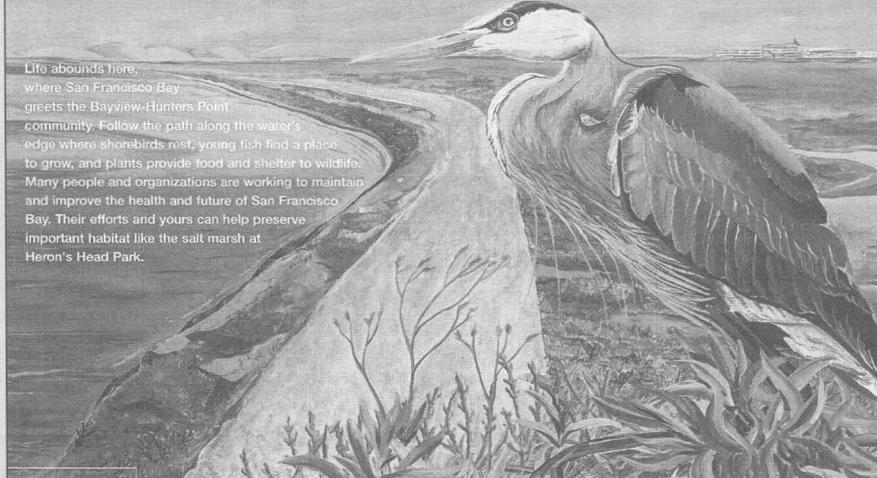
In the early 1970s (above and right), hundreds of thousands of tons of fill (concrete rubble, soil, brick, and other construction debris) were dumped into the bay at India Basin in San Francisco to build a peninsula that extends into the waters for a third of a mile. This landfill was to support a shipping terminal and, perhaps, another bridge across San Francisco Bay. But neither project materialized and, over



the years, plants and birds began to take over. This year, the Port of San Francisco, San Francisco Public Utilities Commission, and Coastal Conservancy removed some of the fill and reshaped the shore to allow the tide to rebuild an eight-acre saltmarsh. In collaboration with people in the community, they created Heron's Head Park, with a trail that offers great views and opportunities for nature study and fishing. The new park was officially opened October 21. Below is an interpretive panel, one of seven by Ryan Jones and Nicole Zaborsky.

WELCOME TO HERON'S HEAD PARK!

Life abounds here, where San Francisco Bay greets the Bayview-Hunters Point community. Follow the path along the water's edge where shorebirds rest, young fish find a place to grow, and plants provide food and shelter to wildlife. Many people and organizations are working to maintain and improve the health and future of San Francisco Bay. Their efforts and yours can help preserve important habitat like the salt marsh at Heron's Head Park.



PHOTOS COURTESY PORT OF SAN FRANCISCO—TOP: DON MASKELL; AERIAL: TOWILL, INC.



The Los Angeles River: Its Life, Death, and Possible Rebirth, by Blake Gumprecht. Johns Hopkins University Press, Baltimore, 1999. 369 pp., \$39.95 (cloth).

HAVE CARRIED *The Los Angeles River* with me for a month, savoring every word, and everyone who sees the title has the same question: "Is there a Los Angeles River?" There most assuredly is, although few visitors would recognize the fifty-mile concrete ditch as a river. Geographer Blake Gumprecht has crafted its biography from an array of sources detailed in 52 pages of bibliographic notes: explorers' journals, government documents, popular publications, academic symposia, guidebooks, local histories, biologic and geologic surveys, and historic maps.

The story begins with an evocative chapter describing the river and its riparian landscapes as Spanish explorers encountered them. Marshes, willow thickets, and cottonwood groves spread across the coastal plain, where wildlife thrived. Riparian habitats supported the people now known as the Gabrielino, one of the largest concentrations of indigenous people in what is now California.

The next chapters focus on the river's transformation by Europeans and Euro-Americans, who felled riparian forests and planted vineyards, diverse crops, and ornamental plants. Los Angeles became a garden paradise set on an increasingly barren coastal plain, as irrigation ditches and city waterworks desiccated the river's flow. Yet central as the river was to regional prosperity, its reputation grew increasingly sinister: the channel was a conduit for waste, a refuge for stray livestock, a den of thieves and transients.

The modern era cast the Los Angeles River as a central threat in this most hazardous of regions—a steep stream draining easily eroded mountains where most

precipitation comes from a few violent storms. Massive flood control projects have reshaped the river as a water

freeway. Indeed, Gumprecht muses that water traveling through flood control channels may make better time than cars traveling on the region's congested highways. Flood control has also altered the river's character: Today bus drivers learn to drive in its wide concrete channel, and Hollywood shoots chase scenes and

films about aliens there.

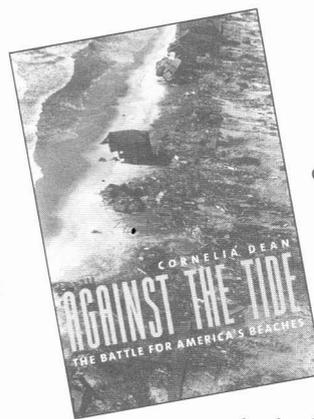
The book concludes with a lively discussion of the river's rediscovery by environmental activists and visionaries whose efforts focus on three sections not entirely encased in concrete—places where the river may still afford opportunities for environmental restoration or new recreational space. "What will happen to the Los Angeles River?" asks Gumprecht. "It has never been more impossible to say. Only a fool would bet on its future. But a few years ago, only a fool would have cared."

Exquisite maps and dozens of captivating photographs bind the reader to this work, and Gumprecht, a former reporter for the *Los Angeles Times*, writes beautifully. *The Los Angeles River: Its Life, Death, and Possible Rebirth* deserves the attention of everyone who cares about the California coast.

Nancy Lee Wilkinson is a professor in the Department of Geography at San Francisco State University.

Against the Tide: The Battle for America's Beaches, by Cornelia Dean. Columbia University Press, New York, 1999. 279 pp., \$24.95 (hardcover).

CORNELIA DEAN'S provocative book is important reading for students of coastal politics and processes as well as for anyone else interested in coastal protection. For over two



decades, coastal engineers and geologists have debated the role of coastal structures

and whether or not they damage the beaches they're built on. That debate, and the patterns of development that create a demand for coastal armoring, are the substance of this book. Concerns about beach management are especially urgent now as Congress considers whether to continue to fund hard structures and "soft" measures such as beach nourishment. Dean comes down clearly and persuasively on the side that argues for leaving beaches alone.

Against the Tide starts with a riveting account of the hurricane that struck Galveston, Texas, in September 1900 and then proceeds to make a compelling case that there are now too many people and too much property value in harm's way, vulnerable to hurricanes and other coastal storms.

The author, who is science editor of the *New York Times*, spoke with virtually all the key people studying coastal processes. She discusses these processes and the three most controversial management techniques that affect beaches—armoring with seawalls, construction of coastal inlets, and beach nourishment—then concludes that all three are ill-advised.

Her antipathy toward structures is evident in statements like: "Seawalls damage virtually every beach they are built on. If they are built on eroding beaches—and they are rarely built anywhere else—they eventually destroy them." Or, regarding the jetties near Charleston: "The jetties began to show their evil effects, and the beach at Folly Beach began to retreat." She also questions beach nourishment, but with a more balanced approach, asking: "Who benefits from this project?"

It is impossible to fault Dean's understanding and appreciation of beaches or to argue with her conclusion that "erosion is not a threat to the beach. If sea level is rising, the beach will simply retreat." However, she does not effectively reconcile her suggestion that we leave shoreline processes to nature with the vast amount of development that has already occurred in many places.

Only near the end of the book does she discuss the underlying economic and political forces that have caused our beaches to be developed in such unwise ways. In this area though, her research is less thorough than elsewhere. She concludes that neither the Coastal Zone Management Act nor the National Flood Insurance Program (NFIP) have slowed the pace of destructive development, then goes on to flay insurance as a cause of such development. Yet the patterns of development that is destructive to beaches were well-established many years before the NFIP was created in 1968. The beach lots in the Lucas case, over which the Supreme Court chided the State of North Carolina for overzealous regulation, were nearly the last lots in a subdivision created before the NFIP. Because they preceded this law, the Supreme Court told North Carolina it had to permit these lots' development.

Property ownership in the United States is driven by speculation. Partly because interest payments on homes, even second homes, are tax-deductible, ownership is an attractive income shelter. Beachfront ownership, particularly of rental property, changes frequently, far more frequently than hurricanes recur. Demand for coastal property remains high, and its value continues to escalate, despite known hazards. Most of those who make money from developing real estate have already taken their profits by the time beach erosion becomes a serious threat.

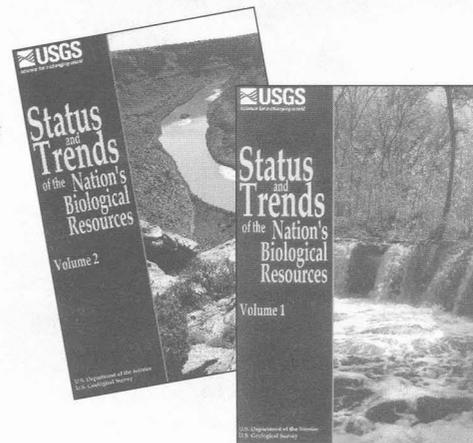
Dean correctly notes the close ties between development and local politics. In most areas, development boosts the local economy, and it is difficult to

say no to short-term benefits because of vague future threats. As Dean notes, "Public officials in coastal areas often have too much of their political capital tied up in coastal development. They don't want to know about long-term erosion rates."

The book is highly readable and well-researched, though a few errors do creep in. The Santa Ana River supplies sand to Ventura's beaches, not Santa Barbara's, and the beach in front of the O'Shaughnessy Wall in San Francisco is generally wide, not "narrow to nonexistent." It would also have been helpful to the reader to have more discussion of the differences between West and East Coast beaches. The East Coast barrier islands that are subject to major erosion from hurricanes have much finer sand than West Coast beaches. This finer sand is much less resistant to erosion, therefore both waves and currents can and do dramatically alter the shoreline of these barrier islands.

In closing the book, Dean offers public ownership of beaches as an alternative to development. She also shows how nonprofit groups such as the Nature Conservancy can be effective partners in preventing unwise development. But she leaves us without solutions to the larger problem of coastal overdevelopment in the hurricane belt. As many of us watched Hurricane Floyd gather power on its approach to the East Coast, we shuddered to think about the destruction and loss of life that would occur if it struck Florida in a densely developed area. Dean's book points out the near miss of Hurricane Andrew and the virtual impossibility of evacuating the most vulnerable portions of the East Coast. No doubt we will all revisit this issue as the toll from Floyd becomes understood, and when the next "Big One" comes ashore in a populated area.

Jim McGrath, a coastal engineer, manages the environmental department of the Port of Oakland.



Status and Trends of the Nation's Biological Resources, edited by M. J. Mac, P. A. Opler, C. E. Puckett Haeckler, and P. D. Doran. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA, 1998. Two vols., 964 pp. \$98 (paper, boxed).

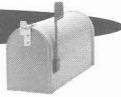
THIS COMPREHENSIVE, readable, and handsome report by the U.S. Geological Survey (USGS) attempts to provide a thorough yet accessible picture of how the nation's native plants and animals are doing; what forces, natural and human, have led to their current situation; and what we can expect for them in the future. It was prepared by more than 200 experts, most from government agencies or academia, and is based on scientific research but written in nontechnical language.

Part One examines seven major factors that affect biological resources: natural processes (e.g., fires, floods, hurricanes, volcanoes), land use (urbanization, agriculture, draining wetlands), water use (municipal use, irrigation, dams, dredging), climate change, nonindigenous species, environmental contaminants, and harvest (logging, hunting, fishing).

Part Two describes the effects of those factors on 15 geographical regions as well as on marine resources. The substantial "California" section focuses mainly on the western part of the state, where human activities have massively altered the landscape, reducing most native plant communities by 85-99 percent and threatening many native animal species.

Status and Trends is a surprisingly attractive production for a massive

continued on page 40

**Editor:**

The summer issue of *Coast & Ocean* reminded me that in the early 1960s, when I was a deputy clerk for the Los Angeles County Board of Supervisors, the Board decided to provide 11 public accesses to the beach between Santa Monica and the Ventura County line. As my husband and I were ardent surf fishermen, I was ecstatic. However, we soon discovered newly posted NO PARKING signs at or near the entrance to each access. At this same time a well-known actress received considerable amused publicity for sitting on Topanga Beach with a gun across her knees warning anyone who dared to trespass on HER beach. Since that time many more houses have been built in Malibu and up to the Ventura County line. Broad Beach Road had already been made off-limits to the public.

When we moved to Oxnard in the early 1970s, my anxiety over the fate of the remaining public beaches became a cause, which I have pursued for the last 30 years. We had planned to retire near the beach at Fifth Street, and we found that beach almost all blocked by houses built on the sand. Not long after, the access road to the Mandalay Edison plant was fenced. More houses and a hotel were built at the end of Harbor Boulevard. It was then I realized that children were growing up in Oxnard never knowing they had beaches so close to home.

What upset me most about the last issue was the lack of any mention of Ventura County. Not in "New Money for the Coast," nor "Nibbling away at the Public's Coast," not even in the review of a book, *Natural History of the Islands of California* on the last page. Has Ventura County truly been given to developers and uncaring cities? I won't give up, but obviously I am a voice in the wilderness. I wonder if people will care after the beaches are all gone.

Cynthia Leake
Camarillo

We did not publish anything on Orange, Humboldt, and Del Norte Counties either in our last issue. Can't do all 15 coastal counties each time! This issue, however, has the Channel Islands stories, and other articles are coming soon. There may be less coastal citizen activism in your county than in some others, but you are definitely not alone. —Ed.

Editor:

We just received a copy of *Coast & Ocean*, first time we've received it, and I read it cover to cover. It's excellent.

A question about the red fox and its endangering rare species. I remember reading in an article that it's a problem around the airports and naval property in Alameda, too. It seems they could be trapped and spayed just as dogs and cats are. It wouldn't eliminate this generation, but it could strictly control the future. Is there some reason this isn't done with foxes?

I'm curious and look forward to your answer. Keep up the good work.

Robert Nixon
by e-mail

Wildlife biologist Ron Jurek at the Department of Fish and Game explains that (1) A sterilized fox remains a predator, and time is running out for the endangered rails, (2) Trapping foxes is difficult and to trap them all nearly impossible (except on islands—see page 12); if a few remain, they could keep the population going, (3) If trapped foxes are put back into the wild and the problem continues, once-trapped foxes might be impossible to trap again, (4) Wild animals have many diseases; introduced species moving into new areas can infect other predators. —Ed.

Editor:

Yours is an excellent journal—very immediate! In all these coastal land purchase/management programs, so worthwhile, there needs to be attention to protection of natural resources and exotic species removal.

Training of high school and college students in botany, biology, soil ecology, geology is going to be so important to these stewardship jobs. Projects as often as possible must include a requirement for these conservation field activities.

It is troubling to some of us to find projects hammered through sensitive ecosystems by the trail-building groups. Trail-building requirements can be quite lethal to the landscape. Are the weedy species in the proposed areas removed before commencement of trail building? Does trail funding include allocation of funds for weed removal? Each time trail disturbance occurs, weedy exotics come in.

Does everyone agree that other species besides ourselves need to be accommodated in our plans for natural areas? Both the San Francisco Ridge and Bay Trails seem to forget their environmental good intentions.

Sue Smith
San Francisco

P.S. I greatly enjoy our Bay Area trails and volunteer at weed removal.

Books

continued from page 39

government report, with hundreds of color photographs and strong, clear maps, graphs, and tables. Bringing together a vast amount of critically important information, it reminds us that humans are dependent on ecological functions that may be threatened by loss of habitats. If there is yet time to turn the tide of habitat destruction, this document could serve as a valuable tool in that process.

Status and Trends of the Nation's Biological Resources can be ordered from the USGS by phone: (202) 512-1800 or fax: (202) 512-2250, or purchased at U.S. Government Bookstores. It will soon be on CD-ROM and online at www.usgs.gov. —HMH



STEPHEN R. GLEESMAN

What's coming up in the next issue: Many big electrical power plants along the coast are now obsolete. What's next for them and the land around them? . . . How a tiny coastal town is taking control of its future . . . The marine reserve controversy . . . A scuba diving life . . . and more.



Coastal Conservancy

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