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coast & ocean



Night Lights and Birds
Blue Energy



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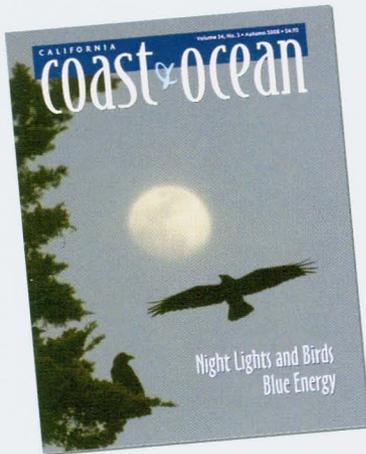
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Cover photo: Ravens at Chain of Lakes in Golden Gate Park, San Francisco, by Walter Kitundu, who was recently named a 2008 MacArthur Fellow for his work as a composer and instrument builder. He lives in San Francisco and has a residency at the Headlands Center for the Arts. For more about him and his work, including galleries of bird photos, see www.kitundu.com.

Inside Back Cover: Hands touch through the Border Fence, Borderfield State Park, by David Maung

Back Cover: Drake's Bay from Sky Camp, Pt. Reyes National Seashore, by Donald Nierlich

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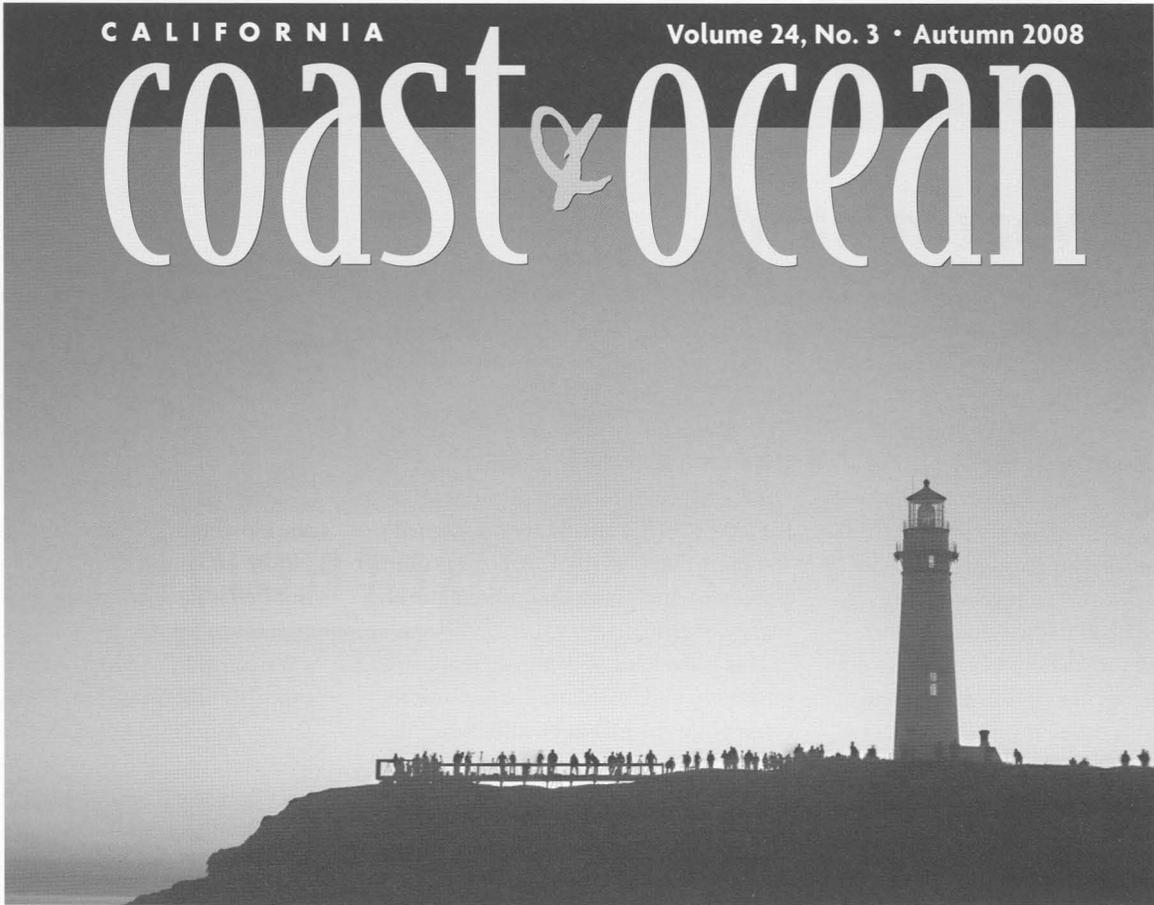
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Photographers wait for the annual lighting of the Fresnel lens at Pigeon Point Lighthouse

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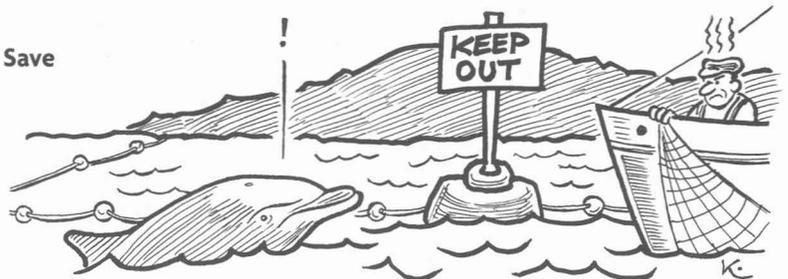


PHOTO: ANNE CANRIGHT; ILLUSTRATION: JAY KINNEY



Good Work at Hand

THIS IS A REALLY STRANGE moment. The economy is on the brink of collapse, yet there's an intoxicating sense of boundless opportunities. Can this be real?

The crumbling of the crazy mortgage pyramid scheme just before the election of Barack Obama opened the way for our country to get off a self-destructive course and begin to shape an economy based on living within our means, with respect for human dignity and nature's life-support system. When the stock market took its dive and didn't surface for air, we all saw sand where a firm foundation was needed. Now we have to build one and the money will apparently be provided.

With economists urging the White House to spend, spend a lot, and spend fast to avert another Great Depression, the new President might be able to speed up delivery of his campaign promises. It's time to work out the particulars, and everything depends on how that is done. Will the billions of dollars go to support good work already under way, or will most of it be doled out to large corporations created for profit rather than public benefit?

Projects to support and emulate abound throughout the country, and especially in California. While Washington refused to acknowledge climate change, governors, mayors, and citizens' organizations took the initiative. Solar and water-saving improvements were installed in Long Beach, Los Angeles, Orange County, Richmond, San Francisco, and elsewhere, creating new jobs in the process. The Coastal Conservancy put together collaborative projects that protect natural resources and prepare for sea level rise while also providing work and other economic benefits.

New socially conscious alternative energy enterprises sprang up, and now they hope that government will level the playing field so they can compete with fossil fuel industries, and offer support. The production tax

credit is not much use when everyone is suffering losses. They hope that the new Congress will provide an investment tax credit, "so that if you put money into a wind plant, for instance, you get a tax refund," said Charles Newcomb, chief technology officer at NexGen Energy Partners, LLC (NexGen), a small investor-owned company that deals in distributive commercial-scale wind power and other natural energy systems.

This is the kind of company that can help businesses and communities to move to green power by making it affordable. It offers a "turn-key approach" that spares the energy buyer the costs of ownership. NexGen develops a system to suit the customer's needs, installs it on site, operates and maintains it, expecting to recoup its investment during the life of the contract, 10 to 20 years. The systems are of a scale suitable for industrial plants, shopping centers, schools, wastewater treatment facilities, and other facilities of comparable size.

"Once you've got the hardware, this is one of the fastest shots in the arm to local economies," Newcomb said. There are no fuel costs with wind, and on-site systems do not require long transmission lines, as big wind farms do. Financial benefits stay local.

In a hot new book, *The Green Collar Economy*, Van Jones, founder and president of Green for All, an Oakland-based organization, points out that solutions to social problems are inseparable from solutions to environmental problems. How that principle works in practice can be seen in Richmond, a city on San Francisco Bay that has a major Chevron oil refinery, high crime, and too few jobs—and a solar energy initiative supported by Mayor Gayle McLaughlin. Jones quotes Michele McGeoy, founder of Solar Richmond, the coordinating organization: "Solar is one antidote to pollution, and jobs are one antidote to violence." Jones gives other examples, many of them outgrowths

of community organizing. It might as well be a book written for the new President.

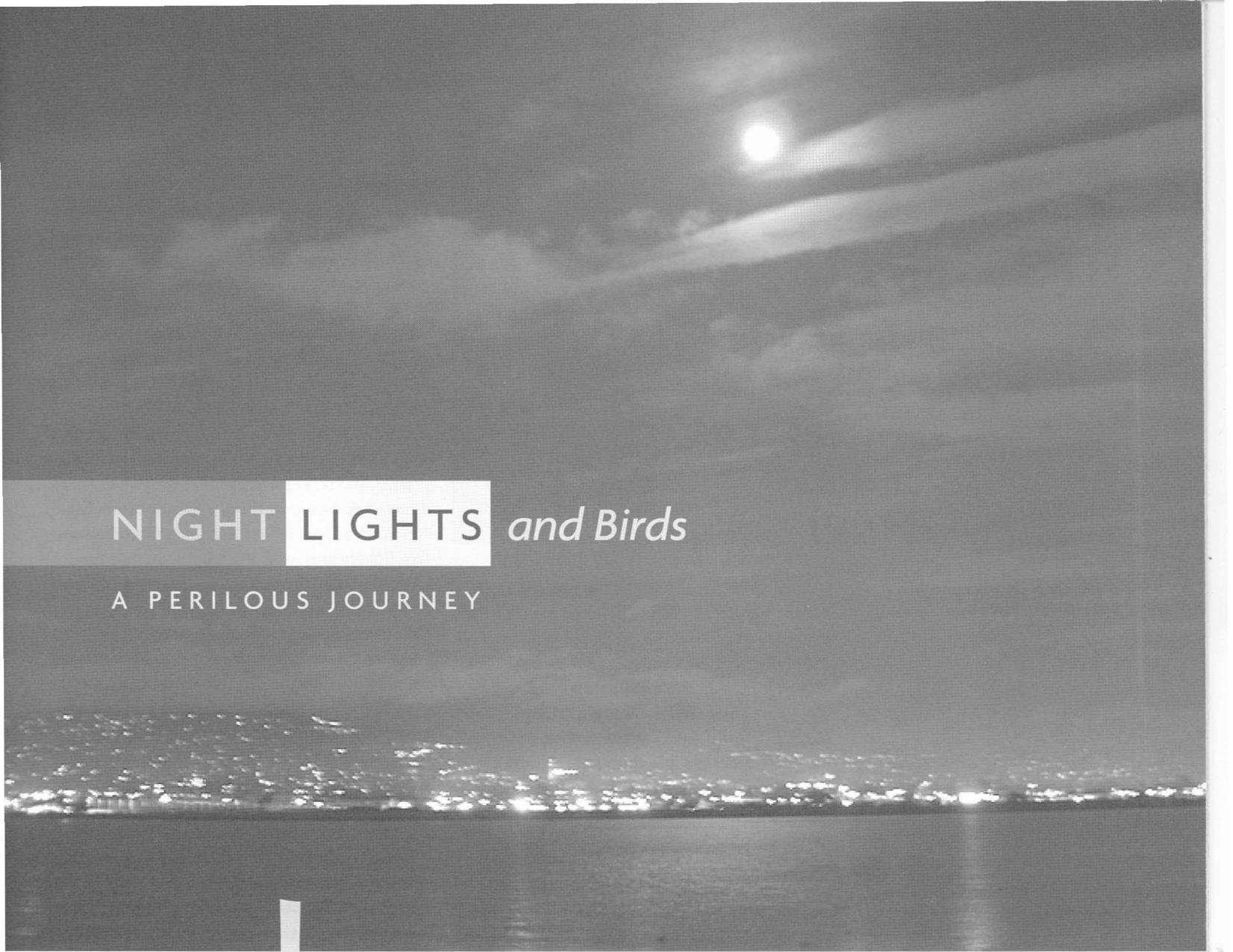
We have been in a dreadful slough of despond, but now we're up. It's one of those transformative moments that arise in American history. I was a reporter for the *Washington Post* when Kennedy stood in the blowing snow in front of the White House on January 20, 1961, and called on our better nature: "Ask not what your country can do for you, ask what you can do for your country." We had been waiting to be asked! Young Americans flocked into the Peace Corps that Kennedy created and their lives were changed by what they learned.

I was also at the March for Jobs and Freedom on August 28, 1963, when Dr. Martin Luther King's voice rang across the Reflecting Pool in front of the Lincoln Memorial: "I have a dream. . . ." My eyes were drawn to the quiet presence of a group of young people in blue overalls and crisp white shirts, the Student Nonviolent Coordinating Committee, who were already working for justice in the South. We were more than ready.

The words of these two great leaders, who appeared as though created by the country's need, are indelibly recorded in my mind, as are the words of Barack Obama on the night of November 4, 2008, in Chicago's Grant Park: "If there is anyone out there who still doubts that America is a place where all things are possible . . . who still questions the power of democracy, tonight is your answer."

A dear niece and her friends of the cell phone generation were in that vast crowd, jubilant because each had experienced the power of the vote. "Yes we can!" It was a call and response, it was the next verse to "We Shall Overcome." Many of us cried with relief and danced with joy. Democracy is still breathing. Now it's time to nurse the country back to health, and there's a lot of good work for each of us to do.

—Rasa Gustaitis



NIGHT LIGHTS *and Birds*

A PERILOUS JOURNEY

IMAGINE STANDING OUTSIDE in the Central Valley of California on a brisk October evening. A setting crescent moon pricks the silhouetted coastal range to the west as you gaze up into the starry sky. Suddenly you sense an energy, a rush of soft flurrying, in the speckled indigo overhead: birds on the wing, nocturnal migrants—Wilson’s warblers, say, flying south from their breeding grounds in Alaska toward northern Mexico, where they will overwinter. Using a sophisticated assortment of biological tools—a sun compass (useful even at night), a star compass, and even a magnetic compass—they orient themselves and navigate southward along the Pacific flyway. Flying in darkness, they avoid predation. During the day, they rest and feed, preparing for the long, demanding night ahead.

ANNE CANRIGHT

PHOTOGRAPHS BY
WALTER KITUNDU

Low-rise urban areas are much safer
than towers



A flash photo catches a great blue heron in night flight.

In fair weather, as tonight, their path is clear. Many thousands of feet high in the sky, they flap along at a steady rhythm, steering by the stars. The thought of their valiant effort stirs the soul.

Now imagine a stormy March night. The wind is howling and rain lashes at your windows. You cozy up before a crackling woodstove, not giving the idea (much less the reality) of migrating birds a second thought. The birds, though, are out there, heading north to their breeding grounds. Storm clouds have pushed them landward, where there's at least some visibility; the gale blows them about in their course. Flying along in the miserable wet, they spy a light, and another, and some more—beacons that may promise release from the dark and cold. They home toward the brightly lit skyscrapers.

Deadly Lights

These beacons, however, promise not safety, but the opposite. Confused by interior and exterior building lights and unable to see the glass, thousands of birds collide and are injured or killed each night in our large cities, particularly during the spring and fall migrations. "The worst I've experienced," said Michael Measure, founder of the Toronto-based nonprofit FLAP (Fatal Light Awareness Program), "is, we picked up over 500 birds over a six-hour period at two structures [in downtown Toronto]. We just stood there and would catch the birds as they fell. It was that bad." The annual toll in North America extends into the millions—just how many is impossible to say, but experts suggest from 50 million on up.

People have grown to appreciate that these fragile creatures are threatened by habitat loss, pollution and pesticide use, overhunting, and even feral cats, but the problem of collisions is not widely recognized. And it's not just buildings that get in the way: communication towers, wind turbines, bridges, lighthouses, oil platforms, cooling towers, and emission stacks take their toll as well. Even if the birds don't collide (at whatever time of day), the inevitable lights associated with these structures at night—ensuring pilot safety—can lure them out of the dark into the pool of visibility, where, essentially trapped by the light, they flap around until finally they drop to the ground, exhausted and vulnerable to predation. The same happens with spotlights directed skyward, such as the tribute beams at New York's Twin Towers site, and with ceilometers, light beams used at airports to gauge the height of the cloud ceiling.

Brad Keitt, a research biologist with Island Conservation, did his graduate research in the islands off Baja California, where there are huge colonies of seabirds. "On this one island," he said, "there was a lighthouse with a broken window. You'd go up there and there'd be piles of birds. Some were alive; they'd just gotten in there recently. And others were dead, had been in there for a long time. They are attracted to light, and they'd fly up and either hit the window or go through the broken window and end up inside."

Just why seabirds are drawn to light is poorly understood, but one theory is that they have a hard-wired attraction to the lighter color of the ocean, which allows them to leave the land and go to sea to feed. Travis Longcore of Urban Wildlands, a nonprofit based in Los Angeles, suggests another possibility: when fish swim through bioluminescent plankton near the ocean's surface, the moving swash of light may signal the presence of prey. Keitt told another story, of a fishing boat in Alaska: attracted to the boat's lights, so many birds were landing on the vessel that the crew feared that they would actually sink it. The captain ended up turning off the lights and shoveling the birds overboard. In the darkness, the onslaught ceased.

In fact, turning off the lights, though in that case an act of desperation, has been found to be an immediate and effective solution to the problem of bird strikes. FLAP's Measure told of a power generation station on Lake Ontario with two floodlit emission stacks 15 to 20 stories high. "There was a noted history of bird strikes

occurring at these stacks. Then in a single weekend, over a two-day period, some 10,000 birds were salvaged from around this structure.” After a study concluded that the illumination was to blame, strobe lights for pilot navigation were substituted for the spotlights, “and the problem pretty much disappeared,” Mesure said. “You will find no other environmental issue out there that is so easily resolved. How often can you say that you flick a switch, and it disappears, it stops? It’s a win-win situation—everyone benefits: you save money, you save energy, you reduce pollution, you see the night sky, and you reduce bird collisions.”

A recent study of communication towers in Michigan showed that tall towers (greater than 500 feet or so) and guyed structures were significantly more likely to kill birds than medium towers and self-supporting structures. An equally important factor in avian deaths, however, was lighting. And the findings supported the Lake Ontario conclusions: flashing lights lead to considerably less avian mortality than steady-burning lights.

Longcore said that it’s not known why steady-burning lights have this effect. “It could be this sort of overwhelming not wanting to leave and go into the darkness, once they’re in the cone of influence. You can imagine if you’re around a campfire at night: that’s a powerful thing that prohibits you from adjusting to going out into the darkness. If you steel yourself and walk away and close your eyes and adjust a little bit, then all of a sudden you can see. But when you’re right around it, it’s like this overpowering visual stimulus.”

Currently, Federal Aviation Administration (FAA) guidelines specify that a tower must have flashing lights. White strobes can be used alone, but these tend to be obnoxious to nearby residents. Red flashing lights are the alternative; the catch is, they must be paired with steady-burning red lights. Joelle Gehring, conservation scientist with the Michigan Natural Features Inventory, explained that when the guidelines were established some four decades ago, the white strobe lights were found to act “like a camera flash to a pilot’s eye; it gives some sort of depth percep-

tion. The red flashing lights were not as present to the pilot’s eye, so they needed steady-burning lights as well.”

When the FAA gave permission for some of the Michigan tower lights to be manipulated, the results were definitive: steady-burning lights, even if flashing lights are present, increase the number of birds killed. Encouragingly, the FAA has recently committed to conducting conspicuity studies with an eye to changing the guidelines. “With modern technology for pilots,” said Gehring, “can we indeed turn off those steady-burning red lights and still have pilot safety? They’re pretty optimistic about either turning them off or making them only flash, and they can do both those things from the ground,” without the need for expensive retrofitting. “That would reduce avian collisions by as much as 70 percent. It’s not obnoxious to the neighbors, it’s essentially free, and it would save electricity and maintenance costs as well.”

Again: it’s a win-win situation—but one that will depend on voluntary efforts, since the FAA, assuming it approves the changes (which could happen as soon as 2010), will only allow them to be made; it will not mandate the changes. It will be up to individuals and organizations near the many communication towers sprinkled across the United States to ask tower operators to switch, and to make the case for why they should. (California alone, as of 2004, had 652 communication towers, 12 of them over 800 feet tall.)

San Francisco skyline at dusk seen from the Berkeley shore





A red-tailed hawk stretches a leg in flight at sunset.

Design and Build with Birds in Mind

If you are designing a building, make it bird-safe; for guidance, consult “Bird-Safe Building Guidelines” (www.nycaudubon.org) or the City of Toronto’s “Bird-Friendly Development Guidelines” (www.toronto.ca/lightsout/pdf/development_guidelines.pdf).

Lights Out

Around the country in our largest cities, skyscrapers glow brightly through the night. Suburban streetlights glare through bedroom windows. Unshielded outdoor lighting floods the sky, which in some places no longer reveals a twinkling firmament of stars but only a sort of extended twilight.

According to Bob Gent of the International Dark-Sky Association, a nonprofit organization that was started to benefit astronomers but has extended its efforts into the natural world, 30 percent of outdoor lighting (plus some indoor lighting) is wasted, at a cost of \$10.4 billion and 38 million tons of carbon a year in the United States alone. The good news is, the situation is fairly easy to remedy. We don’t have to turn everything off, said Gent. It’s about using the right amount of light, and only when and where it’s needed.

Saving energy is a valuable goal in its own right, but the plight of migratory birds has caught the imagination of concerned citizens as well, leading to a two-pronged argument for a

reduction in artificial lighting. In 2005, the City of Toronto (in partnership with FLAP, among other groups) launched “Lights Out Toronto!,” a public awareness campaign aimed specifically at encouraging individuals, businesses, property owners, and building managers to help reduce avian mortality. Since then, Chicago, New York City, Detroit, and Minneapolis have followed suit. In 2007, an estimated 2.2 million residents of Sydney, Australia, switched off their lights during “Earth Hour,” briefly reducing that city’s energy use by more than 10 percent. And on March 29, 2008, more than two dozen cities worldwide dimmed their lights in an hour-long demonstration of energy- and bird-saving solidarity organized by the World Wildlife Fund.

Currently, San Francisco is gearing up for its own Lights Out program, due to begin in mid-February and to continue year-round, rather than being restricted to the spring and fall migration periods. Targeting the 50 tallest buildings (34 of which are more than 400 feet high, including the 853-foot TransAmerica Pyramid), the City’s Department of the Environment and

the Golden Gate chapter of the Audubon Society, in conjunction with the American Bird Conservancy, are spearheading the effort, which will encourage installation of occupancy sensors where possible, or manual lights-out or nighttime curtain-drawing efforts. Pacific Gas & Electric, which is working with many downtown office tower owners and managers to conserve energy, is on board as well, and will offer both education and incentives.

This summer, volunteers have been pounding the sidewalks below San Francisco's skyscrapers, gathering statistics on bird mortality. "It's difficult," commented the Audubon Society's Noreen Weeden. "Most of our volunteers want to go out and see live birds. Here, people have to get up really early and walk around downtown and survey before 6 a.m., because at that time building maintenance people are out with power washers and spraying everything down, and after 6 you can't really tell." Despite this logistical difficulty, the results are conclusive—adding a little more fuel to the argument the City will start bringing this November to building owners and managers, to convince them to make a change come February.

"One of the biggest challenges," said Mesure, "is that the vast majority of people don't understand the diverse world of birds. To the average individual, a bird is a bird is a bird. If the only bird they recognize is an American robin, then every bird is an American robin." Not only that, but in an urban environment, most people encounter very little wildlife—and the most common sort of wildlife they do encounter is birds. "So in the back of people's minds," Mesure continued, "birds are holding their own. But that poor panda bear in some other part of the world that we don't see but that we hear so many horrible things about, and it's cute and cuddly, they'll gravitate toward helping to support that sort of issue. So it's about education on issues that we have right here on our doorstep."

Weeden said that the bird carcasses being collected now from San Francisco streets will be donated to the University of California Berkeley Museum of Vertebrate Zoology, which will compile a geospatial species map. The birds will also be used for educational purposes. "It's the best possible outcome, given their sacrifice," she commented. Gehring echoed this view. "I'm a scientist, and so I'm taught to not care about the individual carcass on the ground. But of course, every time I see a carcass, it bothers me. It's part

of my soul. And so it's so nice to potentially see a resolution to this issue. These birds didn't die in vain, like they've been doing for decades. Hopefully we can learn something from their death and make a difference with it." ■

Below: A heron flies at dusk.

What Can You Do?

THE AMERICAN BIRD CONSERVANCY (www.abcbirds.org) suggests:

- Take a look at your home from a bird's perspective to see which windows reflect habitat and sky. Use interior blinds and curtains or exterior screens, film, or dense application of decals and tape to make these windows visible.
- Situate your bird feeder within three feet of a window. (Feeders more than three feet away increase the likelihood of a reflection luring the bird toward the glass.)
- Keep your cat indoors.
- Move house plants away from windows so birds don't mistake them for available habitat.
- If you live or work on the upper floors of a building, keep your blinds drawn from late evening until dawn.
- Office workers and apartment building residents should ask building managers to turn off exterior vanity lights and floodlights at night, especially during migration season.
- Join a volunteer program that not only works with building managers to reduce light pollution but also rescues injured and disoriented birds.
- Go to www.flap.org for guidance on these topics or others, such as what to do with an injured bird or a baby bird, or what to do if a bird is tapping at your window.





Chaparral and Wildfire

JOSEPH SORRENTINO

SAVE THE SHRUBS” doesn’t resonate with people the way “save the redwoods” does. Yet chaparral and coastal sage scrublands are as defining a feature of California’s landscape as the ancient giants of the North Coast forests.

Like many Californians, I grew up ignorant of my natural surroundings. I took for granted the woolly evergreen shrubs blanketing coastal hillsides near my high school in Pacific Palisades, so it was something of a shock to learn last year that chaparral and coastal sage scrub are disappearing from southern California. Foothills that used to be carpeted with ceanothus and other flowering shrubs are now dirt mounds with rashes of poverty grass and tarweed. The major agent of destruction has been wildfire caused by human actions.

Large, high-intensity wildfires are a natural feature of the region and in fact are essential to the propagation of some shrubs. Now, however, they occur too often for the brush to recover.

On January 8, 2008, biologists Richard Halsey and Bill Howell took me along on tours of fire scars in San Diego County, where 40 percent of

the chaparral and coastal sage scrub had burned at least once in the previous four years. Two months earlier, wildfires had scorched more than half a million acres, and 97 percent of that terrain was scrublands. The fire perimeter spanned seven counties and four national forests, stretching as far north as Malibu and as far south as Tecate, Mexico, and as far east as San Bernardino and Agua Dulce near Santa Clarita.

Hellhole Canyon Burns Again

We set out from Halsey’s house in Escondido as the sun was beginning to dissipate the morning mist. It had rained for three days, the first heavy rainfall since the latest wildfires, and the two biologists were eager to see how the chaparral was faring. Halsey is the founder of the California Chaparral Institute, a nonprofit association of scientists, wildland firefighters, and educators that promotes understanding and respect for this ecosystem. Howell, his friend and colleague, taught biology for 30 years in the San Diego County School District and for the past 15 years has taught outdoor education programs for local trail guides. He wrote a chapter

Chaparral scorched by the October 2007 Witch Fire

PHOTOS BOTH PAGES: JOSEPH SORRENTINO

of Halsey's book *Fire, Chaparral and Survival in Southern California*.

Our first destination was Hellhole Canyon Open Space Preserve, a 1,700-acre wildland hemmed in by suburbs northeast of the town of Valley Center. Almost the entire preserve (95 percent) had burned in October 2003, and parts of it had burned again four years later.

Parking in a dirt lot peppered with ash and a blackened telephone pole, Halsey was relieved to see patches of chaparral that had survived both fires. Much of the brush was charred, but the worst fire damage we saw was across the canyon on 3,881-foot Rodriguez Mountain, which looked denuded. It was eerily quiet; there were no leaves to rustle and no creatures to rustle them.

Halsey walked down a sandy slope, through dry brush and scorched spots, his forest green chinos and blue T-shirt a patch of color against the bleak landscape. Flames had stripped the shrubs, leaving only charred branches, spiked like pitchforks. Wisps of ash on the black soil hinted of animals killed by the fire.

Unlike forests, scrublands burn to the ground in a fire. To survive, chaparral plants have evolved two regeneration strategies. Some, including ceanothus, are obligate seeders: they depend on the fire's intense heat or chemicals to break their seeds' dormancy and allow germination. Others, such as mountain mahogany, toyon, wild hyacinth, and most manzanita species, store energy in their roots and resprout from stumps. But now, all too often seedlings don't have time to mature and throw off seeds before they are incinerated again, and resprouting from stumps uses up so much of the stored energy that plants may not be able to do it if they are burned more often than every 15 years, Halsey explained.

Howell spotted two bright green stalks with needle-like leaves at the base of a crown of roasted twigs. It was a chamise stump, sprouting. Chamise is among plants that use both strategies, obligate seeding and resprouting, "and maybe that has something to do with the fact that chamise is the most common chaparral shrub around," he said.

Nearby, Halsey was snapping photos of a short crown of charred branches. "This is a ceanothus, a four-year-old seedling, dead," he said. "So stuff was trying to come back and it got hammered again," Howell explained. "The seeds came up with the first fire and everything was fine, but before they could mature and give back to the seedbank, they got burned again."

"What starts happening now, you see, you eliminate the obligate seeding species, the ones that require fire cues, because that thing is never throwing off enough seeds," Halsey continued. "It's gone and there's no recovering from this." He worries that other obligate seeders, such as species of manzanita, could also die off here.

With shrubs gone, non-native grasses may well take over. All but five percent of California's perennial grasses have been replaced by shorter-lived and shallower-rooted European species which firefighters call "flash fuels." They ignite more easily than the native shrubs, many of which have waxy evergreen leaves that seal in moisture. Their roots don't hold soil as well as the shrubs' deep roots do, leaving burned areas susceptible to erosion, nor do they support the wealth of wildlife that thrives in shrubs. Unlike native grasses, they die in the spring, prolonging the fire season. And because they can survive an annual fire cycle, they can burn every year, carrying fire to scrublands and homes.

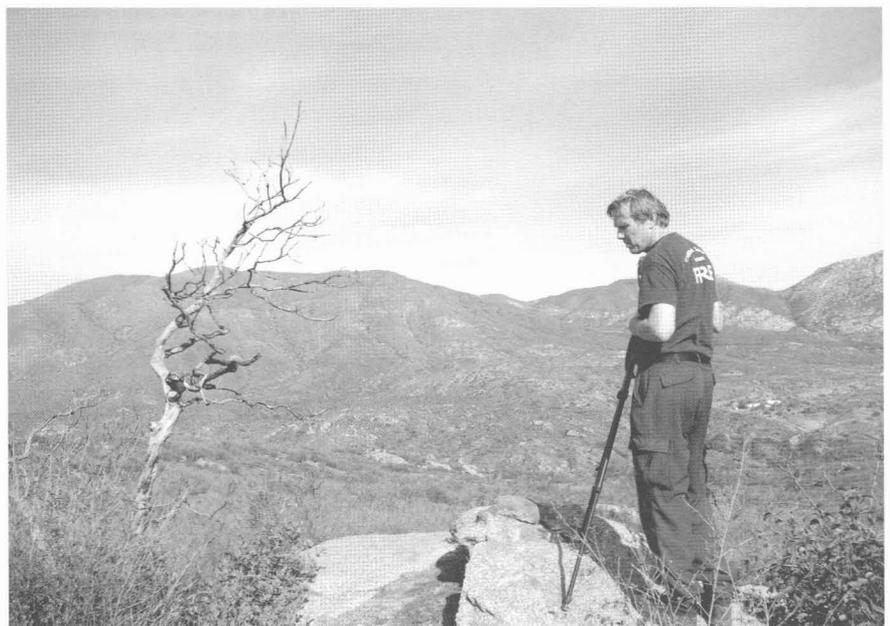
We gloomily considered the possibility that this hillside we were looking at could soon become as barren as Rodriguez Mountain.

Learning to See Differently

On March 28, 2008, I met with Richard Hawkins, then chief fire and aviation officer at Cleveland National Forest, for a tour of the San Pasqual Valley and San Dieguito River near Escondido, which burned in the October 2007 Witch and Guejito fires.

Hawkins was driving a white Ford Expedition, with green racing stripes and a green U.S. Forest

Richard Halsey stands on a ridge facing Rodriguez Mountain, where in October 2007 the Witch and Poomacha fires came together.



Service shield on its sides, and his uniform matched the truck: green chinos and a khaki shirt with a Forest Service shield on the sleeve. With his close-cropped blond hair and wild bushy mustache, he fit my image of a forest ranger and firefighter.

During his 30-year career, Hawkins served in all five of California's national forests and on hundreds of fires, and now he was ready to retire. "I'm finding that it's becoming so stressful when the wind blows that I'm actually sick to my stomach with stress, and it's just gonna kill me," he told me. "I just can't do this anymore."

Hawkins knows the chaparral and he appreciates it. Steering his truck north on Highway 78 through the San Pasqual Valley, passing white-thorns with purple blossoms, he explained how, with the deep-rooted shrubs gone, nothing holds the soil in place, and nothing catches rainwater or keeps pollutants from flowing downstream and into the ocean. Stormwater that would have filtered down into the ground begins to cascade over pavement, carrying spilled oil, detergents, solvents, pesticides, fertilizers, and pet excrement into storm drains.

After San Diego's October 2003 Cedar Fire, 49 percent of the tree canopy and 73 percent each of chaparral and coastal sage was lost, according to a study by the nonprofit organization American Forests. The researchers, who employed satellite imagery, calculated that stormwater runoff within the fire scar increased by 12.6 million cubic feet and estimated the value of retaining this additional stormwater at \$25 million.

Yet despite the benefits it provides, Californians have long viewed the brush as their enemy, and they continue to blame it for wildfires. Early settlers and cattlemen used to torch it to clear the land for homesteads and grazing, until they came to realize that by doing so they were inviting erosion, flooding, and the drying up of springs and streams.

When the Forest Service launched an educational campaign to persuade people that deeply rooted shrubs were needed to preserve the watershed and a year-round water supply for the cities, many scoffed. "The Forest Service was the environmental 'wacko' of that time," Hawkins said. Eventually, however, the Cleveland National Forest was established toward these ends, with homesteaders and ranchers' support. This national forest is 88 percent chaparral and related shrublands. Halsey suggests it be renamed the "Cleveland National Chaparral Recreation Area" so people will better understand their native habitat. The "forest" misnomer applies to Los Padres and Angeles National Forests as well. There too, shrubs vastly outnumber the trees.

Who's to Blame?

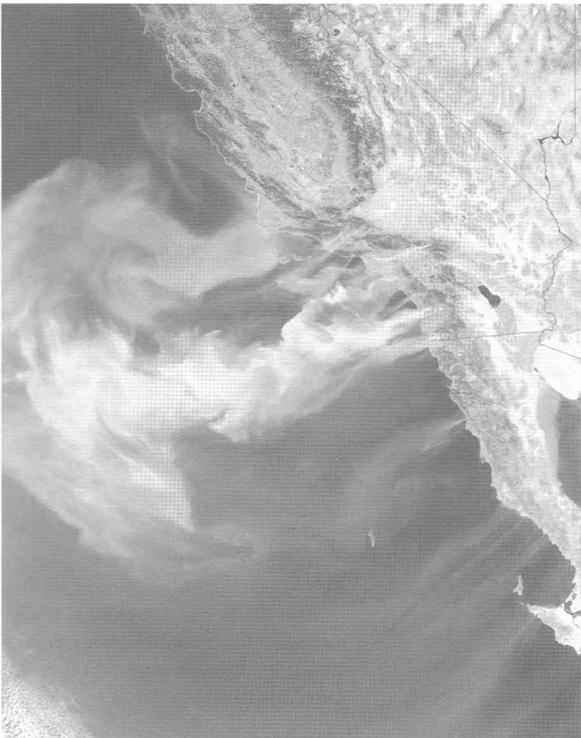
Today the conflict over chaparral pits conservationists and resource agencies, who are trying to protect it, against homeowners and elected officials who demonize it.

Halsey and others are campaigning for more sensible land use practices to make life safer for homeowners and firefighters and also for natural communities. He publishes an e-mail newsletter, *The Chaparralian*, and teaches natural history to school and community groups. "My gig is trying to get people to appreciate the ecosystem," he said. But that's still a tough sell.

On July 27, 2008, after the Basin Complex Fire burned 220,000 acres and destroyed 27 houses in Monterey County, the Carmel *Pine Cone* opined: "Unfortunately, if the Coastal Commission persists in protecting maritime chaparral from being cleared, it also won't be long before a lot more homes go up in smoke." In response,

Top: Smoke from fires in southern California, October 25, 2007

Bottom: Healthy chaparral



Coastal Commission spokeswoman Sarah Christie observed that residents chose to buy and build homes in a fire-prone region adjacent to nature preserves, and that “maritime chaparral, like the San Diego coast sage scrub, are not just fire-prone, they are fire-dependent. They have evolved over a millennium to require fire to regenerate. They have to burn, they will burn.”

As I rode along Highway 78 with Hawkins, he pointed to the road’s pastel-green shoulders. After burning, they had been sprayed with a mix of hydromulch and wildflower seeds. “That stuff’s just for show,” he said. “It won’t do much to hold the soil, but at least it’s native wildflowers.”

After the Cedar Fire in October 2003, Burned Area Emergency Response teams broadcast 43,000 pounds of ryegrass seed across San Diego County. The purpose was to get some roots down quickly, to keep soil in place. But studies later showed that the ryegrass did not significantly reduce post-fire erosion. What it did do was to speed the conversion of scrublands to grasslands. Ryegrass helped spread a 1980 fire on Otay Mountain in San Diego County, which destroyed the chaparral stand there.

“If Californians lose native plants they lose native wildlife too,” Hawkins said.

One large songbird, the coastal cactus wren, has been listed as a California species of special concern. It nests in prickly pear cacti, protected against predators by the sharp spines, and these cacti are being destroyed by the frequent chaparral wildfires. Ornithologists warn that the wren could disappear from Pacific slopes within a decade if frequent fires continue.

A Force of Nature

In fall the elements in southern California align to make the perfect firestorm. After months without rain, hot and dry Santa Ana winds blow west through the canyons toward the ocean. High pressure in the Great Basin pushes the winds toward a low-pressure area off the southern California coast. As the winds move from higher to lower elevations and squeeze through narrow canyons, compression heats and speeds them up, often to 50 miles per hour and faster. During October 2007’s Witch Fire, locals in the San Pasqual Valley reported wind gusts of over 100 miles per hour. The fire jumped right over Interstate 15 as it blazed west.

Santa Ana winds send smoke from blazing scrublands out to the Pacific Ocean. Ash settles on the water, and eventually to the seafloor. Scott A. Mensing, a professor of geography at the Uni-



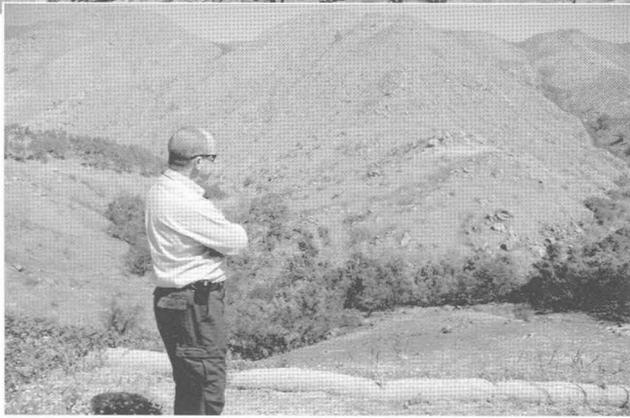
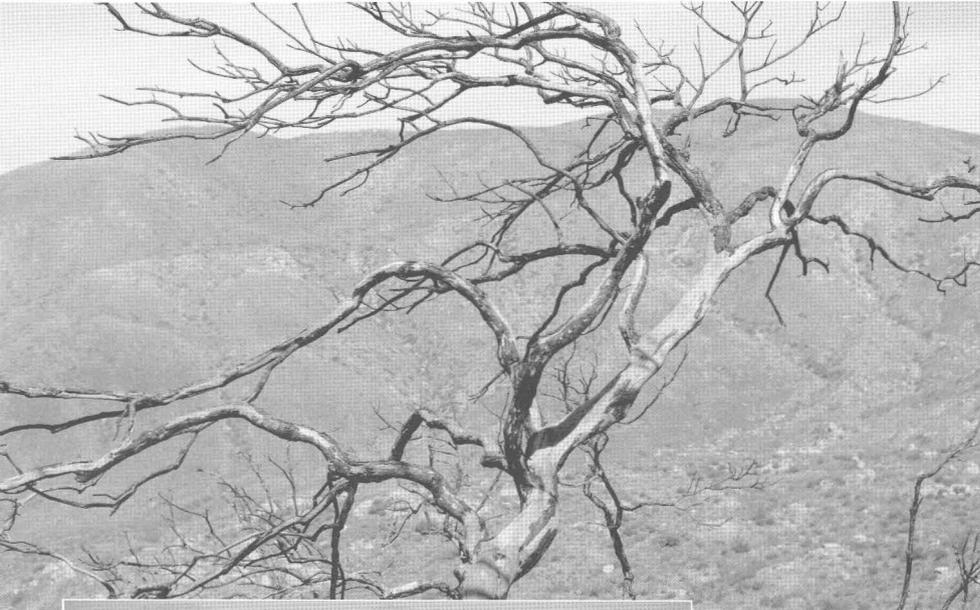
versity of Nevada, Reno, and two colleagues traced charcoal on the sea floor off the Santa Barbara coast to ash from burning scrublands. They carbon-dated it and, correlating their findings with other indicators such as pollen, reconstructed a 560-year record of Santa Ana fires. They found traces of at least 20 large fires in the Santa Barbara region during that period.

After researching charcoal records from the seafloor and the state’s fire records, scientists have concluded that these large Santa Ana fires are a natural feature of the landscape.

No one knows how much chaparral and coastal sage scrub has been converted to grassland because of human-caused wildfires. The natural vegetation of California’s coastal ranges is scrublands, yet as of 2004, Jon E. Keeley, research ecologist at the U.S. Geological Survey, stationed at Sequoia National Park, estimated that grasslands dominated by nonnative plants covered 25 percent of the coastal ranges. He is working with other ecologists to determine how many acres of scrubland were lost during the 20th century; they

Top: Overkill? The owner of this home near Hellhole Canyon Open Space Preserve has cleared 200 feet of defensible space.

Above: Eureka Springs, a housing development in Escondido, incorporates defensible space and fire-resistant architecture.



Top: Charred chaparral

Above: Richard Hawkins looks over a mountain range east of Highway 78 in San Diego County that has burned three times in the last 10 years.

expect to have results in a couple of years.

What has changed today is not the size or intensity of fires, but rather the size and distribution of the human population in the region,” Keeley told the Subcommittee on the Interior, Environment and Related Agencies of the U.S. Senate Committee on

Appropriations on November 27, 2007. “Since nearly all of our fires are started directly or indirectly by people, there is reason to believe that we can have a real impact through more focused attention on fire prevention strategies.

Fire ecologists have come to see Santa Ana fires as natural disasters akin to earthquakes or 100-year floods. Governments do not do battle with earthquakes or floods, they mitigate their potential damage using zoning, building codes, and other tools.

Hawkins and other fire professionals already understand this. They see wind-driven fires as unstoppable forces of nature, like earthquakes. Yet the public expects firefighters to crush wild-fires using air tankers, helicopters, and, in firefighter parlance, other “heavy metal.”

“The news media and elected officials fail to recognize that no number of aircraft can possibly put out a wind-driven fire; it’s never been done, it never will be. It’s not even safe for the aircraft to be up there,” said Hawkins. “It’s pretty maddening. It’s the top frustration for myself and most fire generals as we retire, that we were not able in our careers to get the news media and elected officials to believe us.”

However, because most wildfires on California’s southern coast are caused by people, people

can also prevent them from happening. “For the guys on the fire engines, the helicopters, the aircraft, and so on, they don’t live for fire prevention, they live to put them out once they start,” said Hawkins. But planners, developers, homeowners, and every citizen passing through dry flammable lands can play a role in protecting this native ecosystem.

Preventive measures include: burying power distribution lines as part of routine maintenance; investing in stronger investigation and law enforcement programs to prevent arson; doing more to educate people about the dangers of cigarettes, sparks from heavy machinery, and unattended campfires; and also by cutting fire breaks, building cinderblock walls, or spraying fire retardant along the shoulders of highways and county roads.

Most important, land use practices need to change to minimize the movement of development into wildlands, or at least to build more safely.

Building in Firetraps

“I’ll tell people straight out, ‘I’m the antichrist of the American dream,’” Hawkins said. “I’m a fire chief that doesn’t believe anybody should live on their own five acres, that we should live like the Indians did, all tightly compacted into a village surrounded by an unburnable belt of green vegetation, so the fires can just burn around us.”

Americans jealously guard their freedom to build wherever they want—even if it’s in a natural pathway for fire. Building in passes or saddles is dangerous because air speeds up as it is squeezed through them. Houses that sit directly above a canyon are especially vulnerable.

“You get this venturi effect,” said Halsey, who has trained as a volunteer firefighter. “Wind flying over the mountain creates a low pressure zone, pulling all the heat, embers, and what-not right up the canyon and through the saddle.

Firefighters watch in dismay and disbelief as homes rise up again over the charred footprints of those that have burned. The 2006 Esperanza Fire, started by an arsonist and spread by Santa Ana winds, took the lives of five U.S. Forest Service firefighters who were trying to save a house that was on top of a canyon.

“We’re the land of the free, so build where you want to build,” said Halsey. “On the other hand, don’t expect firefighters to risk their lives because of your stupidity.”

The back-to-back fires in southern California have galvanized communities to adopt more fire-

safe building codes. Many new subdivisions are building in fire-safe features. After my visit to Hellhole Canyon with Halsey and Howell, we stopped at a new subdivision, Eureka Springs, in Escondido, where freshly painted pastel bungalows popped out against the background of brown mountains. A 100-foot fuel modification zone separated the homes from the chaparral. After a long silence, Halsey said: "I'm impressed."

Building codes for roofing construction and attic venting have improved. The vents in these houses are designed to prevent embers from blowing into attics. "The number-one cause for homes to ignite are embers," Halsey said. "Embers can sit smoldering for hours, even days, which means that even after the wildfire is under control, more houses are lost."

A chain-link fence ran the length of the tract, parallel to the hills. Beyond the fence, the native plants were irrigated, so they wouldn't dry out. A park was located along the community's edge rather than in the center, to keep fires at bay and give firefighters defensible space. "There's no reason to evacuate this place at all," Halsey said.

A few minutes later, we drove by a hillside mansion that sent him into a fit. For 400 feet around the house, the slopes had been given a buzz cut. "That's obscene," Halsey said. "That's not a fuel modification zone," Howell added, "that's a moat."

Some insurance companies demand 1,000 feet of brush clearance around a house. Home-

owners who comply raze large swaths of native shrubs.

"We're building safer communities," Halsey said. "However, we're still building some homes in unsafe areas. To make them safe, the resources damage we're causing is inexcusable. I see 500 feet of clearance as not worth the house."

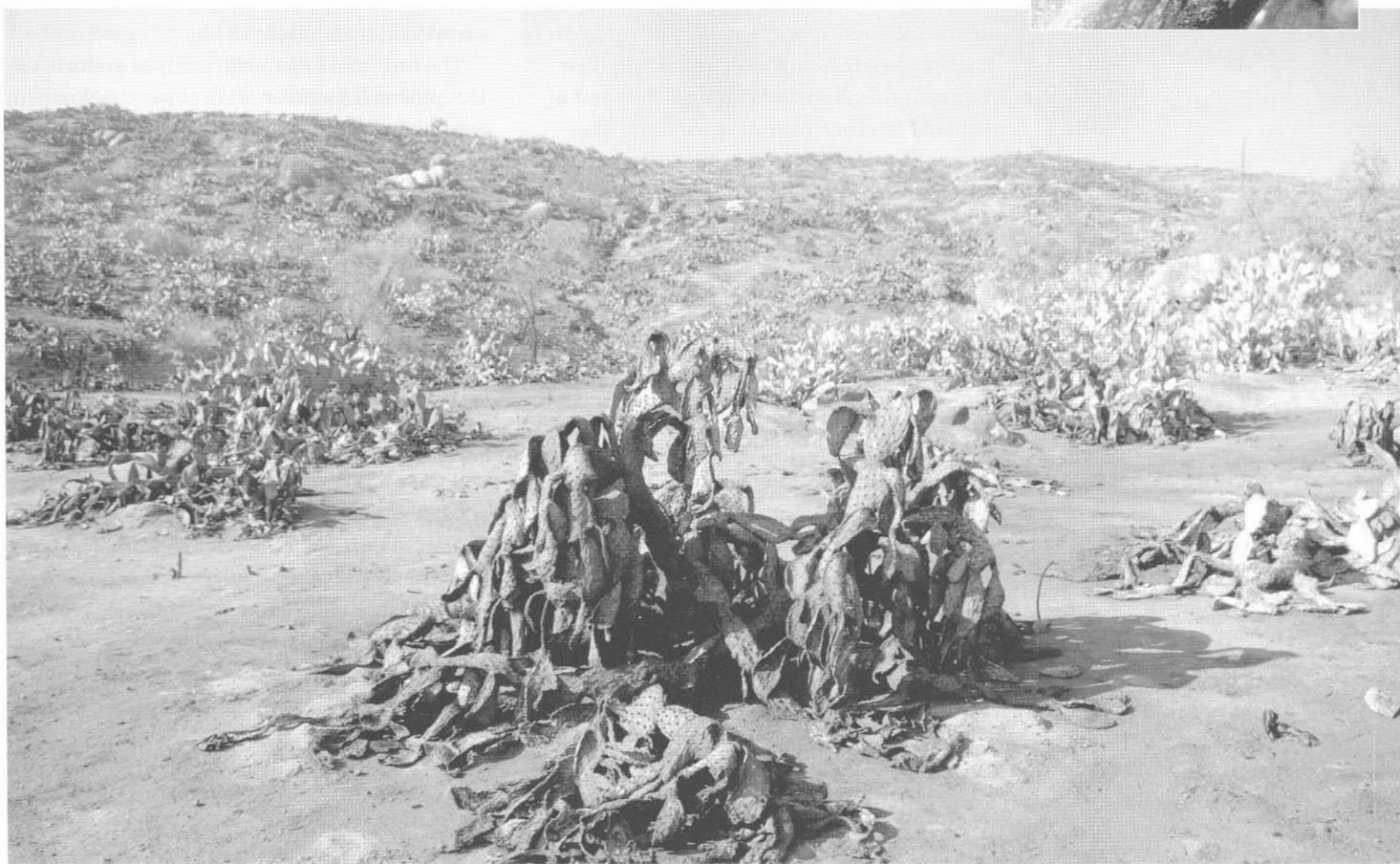
It took millions of years for native shrubs and wildlife to adapt to California's climate and fire cycle. They are the state's most common plant community. But it has taken humans less than a century to alter the fire regime so much that native plants and animals cannot keep pace. Whether we like it or not, Californian's past and future are tangled up in the thorny scrub of manzanita, black sage, and other native shrubs. With the conversion of shrubs to grasses, wildland fires are likely to become even more frequent. ■

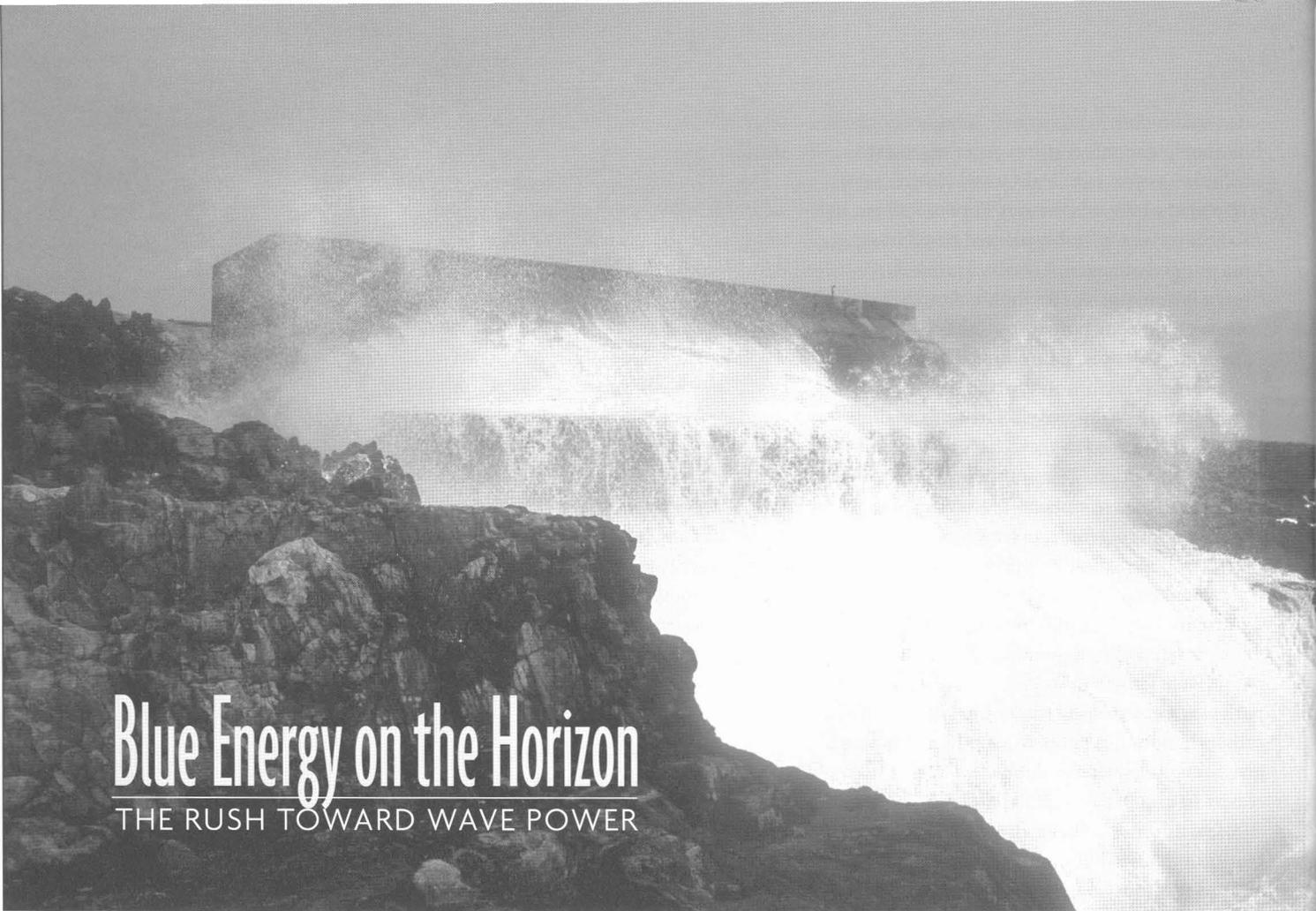
Joseph Sorrentino, an independent journalist in the San Francisco Bay Area, began his research on chaparral and wildfire as a Ted Scripps Fellow in Environmental Journalism at the University of Colorado, Boulder during 2007–08. His articles have appeared in High Country News and other publications.

A new edition of Richard W. Halsey's Fire, Chaparral, and Survival in Southern California has just been published by Sunbelt Publications (www.sunbeltbooks.com). It includes lessons learned from the 2007 fires.

Top: Cactus wren (*Campylorhynchus brunneicapillus*)

Below: The October 2007 Witch Fire burned this prickly pear cactus on the hills above San Pasqual Battlefield Historic Park.





Blue Energy on the Horizon

THE RUSH TOWARD WAVE POWER

EILEEN ECKLUND

PEOPLE HAVE DREAMED FOR centuries of tapping the immense power of moving ocean water to generate electricity, and now it is beginning to happen. In Europe, two experimental wave energy projects are already feeding electricity into their nations' grids. A small facility off the coast of Scotland has been operating for more than seven years, and the world's first commercial wave farm, off the coast of Portugal, began operations in September.

Experimental systems are in various stages of development in many countries, including the United Kingdom, Ireland, Norway, Denmark, Australia, Canada, and Japan. In the United States, pilot plants are being planned in Hawaii, Washington, Oregon, and California. Amid rising concern about climate change and the future of fossil fuels, the promise of endlessly renewable, emissions-free electricity is increasingly attractive.

Ocean waves generate an enormous amount of energy, and wave power may be more reliable than solar or wind energy; it also does not carry the negative side-effects of biofuels now being promoted. But the challenge of converting the waves' power to energy humans can use

is also enormous, both technologically—the machines must be able to survive extreme conditions with minimal maintenance—and socially, due to potential conflicts with other ocean values and uses.

The first (and so far only) study to evaluate the U.S. potential for ocean wave power development was conducted in 2004 by the Electric Power Research Institute (EPRI) in Palo Alto, a non-profit think tank created by the utilities some 30 years ago to undertake scientific and technological research supporting the utilities industry. In a report released in 2007, EPRI estimated that the potential for wave power generation in the United States is up to 6.5 percent of current electrical consumption, the same as all conventional hydropower. In this state, the California Energy Commission released a report in 2008 estimating that wave power could potentially supply up to seven or eight gigawatts of energy, about one quarter of the total used statewide in 2006. Due to the many constraints, however, much less is likely to be developed.

If wave power proves successful, however, and large-scale projects are developed, conservationists warn that their cumulative impacts on ocean

The first wave energy system to provide power to a national grid was developed by Wavegen, a Scottish firm, and installed in 2000 on a Scottish island.

processes, marine life, and human uses of the waves will need to be taken into account.

Getting First Dibs

In 2006 and 2007, a kind of wave power “gold rush” hit the West Coast of the United States, especially northern California and Oregon. Technology companies, local governments, and the Pacific Gas and Electric Company (PG&E) raced to stake claims with the Federal Energy Regulatory Commission (FERC) for areas offshore at sites that are believed to have the best potential for developing wave power projects. Between March 2006 and February 2007, FERC received applications for more than 40 preliminary permits for projects on the West Coast. To date, it has granted permits to seven applicants for five sites in Oregon and four in California—three in Humboldt County, one in Mendocino County.

A hydrokinetic preliminary permit from FERC grants a company priority over a specified area for up to three years, to study the feasibility of developing a wave power project there. It also grants the holder first preference for the longterm FERC license needed to begin constructing a facility. Companies that did not act quickly once the rush began risked being locked out of prime wave power areas for 30 to 50 years, the time period for which FERC licenses are issued.

“FERC’s permits are granted on the basis of ‘first in time, first right,’ kind of like mining claims,” said Rob Bovett, an attorney with Oregon’s Lincoln County. “So you had this kind of feeding frenzy up and down the coast, with people drawing boxes in the ocean.”

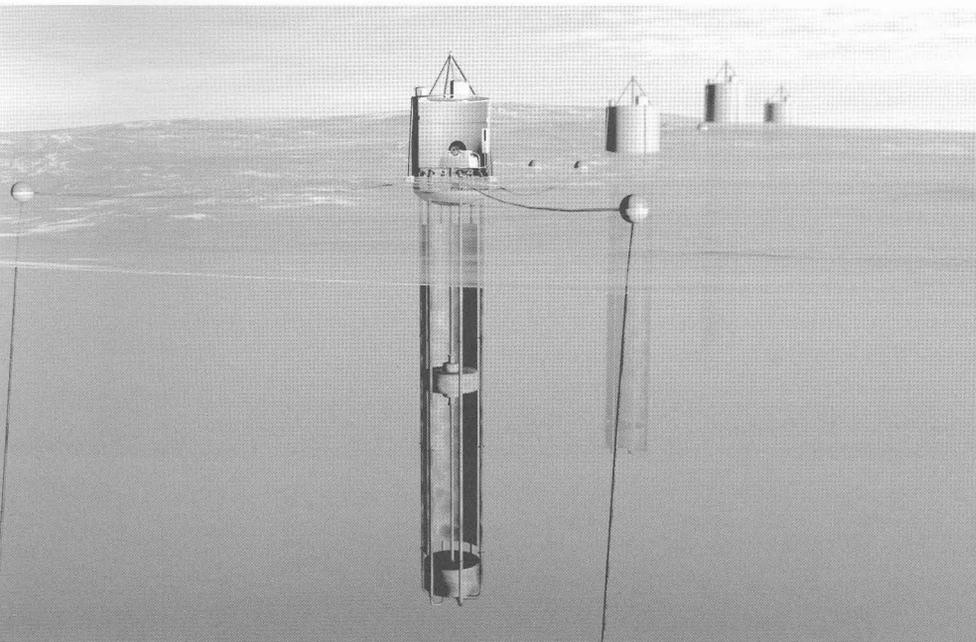
“We want people to come to us beforehand and ask us where to site these things,” Bovett said. “We want to comprehensively plan for this stuff.” The County filed an application with FERC for the waters off its coast in 2006, but FERC turned it down, on the ground that the County asked for too broad an area. In California, Sonoma County also applied for a preliminary permit for its coastal waters, and was also denied, but Douglas and Tillamook Counties in Oregon were granted permits for some of their waters.

Because some of the most promising sites for wave power installations are also the best areas for fishing, this rush to claim territory raised an outcry, especially from fishermen who were alarmed by the speed with which the permits were granted and feared that they would be excluded from fishing grounds.

“People don’t know where or when they’ll be able to weigh in,” said Humboldt County Super-

visor Jimmy Smith, who is also a commercial fisherman. “What we’ve asked is for them [FERC] to slow down.” In California as in Oregon, local governments and community groups have said they want companies to work with them to choose the best sites for testing and site construction; at the least, they want a clear regulatory process. In meetings, letters to the editor, and newspaper articles, people worried: Would wave energy projects be a clean energy boon, or would they cause harm to local economies and ocean resources?





The AquaBuOY system, by Finavera Renewables, Inc., uses the vertical movement of waves to pressurize seawater by means of two-stroke hose pumps. Pressurized seawater is directed into a turbine that drives an electrical generator. The power is transmitted to shore by an underwater cable. Finavera is working to install projects off Humboldt County; Makah Bay, Washington; Ucluelet, British Columbia; and the west cape of South Africa.

Baby Steps toward Great Benefits

At this point, wave power development is about where wind power was 15 years ago, according to Annette von Jouanne, professor of electrical engineering and computer science at Oregon State University (OSU) and director of OSU's Wallace Energy Systems and Renewables Facility, a leading wave energy research institution. Much testing will be required to determine which technologies are the most efficient for a particular location and what effects they might have on the environment.

But before the new industry can become technologically reliable and economically competitive, upfront investment will be needed. Countries leading the way, including Denmark, the United Kingdom, and Portugal, provide public funding for research and incentives to help this emerging technology become more attractive to investors. In the United States, however, government subsidies have thus far gone mostly for fossil fuels. A measure to support alternatives was attached to the \$700-billion Emergency Economic Stabilization Act signed by President Bush on October 8. It extended production tax credits for wind energy, authorized \$800 million in bonds for varied alternative energy production, and established a tax credit for marine and

hydrokinetic energy generation projects with a minimum capacity of 150 kilowatts if they are put into production by 2011.

The first significant wave power generator was invented by Stephen Salter at the University of Edinburgh in the 1970s, during the earlier oil crisis, but the project lost its funding before he was able to test his "Salter's Duck" at sea. Since then, many different types of wave power systems have been developed. Some are designed to be fixed to the shoreline, a breakwater, to the seabed in shallow water, or to an offshore platform such as an oil rig; others are designed to float, moored near the shore or farther offshore.

The Pelamis Wave Energy Converter, used in the Aguçadoura wave farm three miles off Portugal's coast, is a semi-submerged, articulated tube connected by hinged joints and moored to the seafloor by cables. As the joints move with the waves, they activate hydraulic pumps that power generators to produce electricity that is transported to shore through a submarine cable and fed directly into the national distribution grid. Three tubes have been installed thus far, at a cost of \$13 million, capable of generating up to 2.25 megawatts of electricity, enough to power 1,500 Portuguese homes. (Average household energy consumption varies widely from country to country, and even within the same country, depending on climate and other factors. In Portugal, the household average for 2005 was 3,473 kilowatt hours.) Within the next few years, 25 more tubes are to be added, raising the yield to up to 21 megawatts. The Aguçadoura system was built by the Scottish company Pelamis in partnership with a consortium led by the Portuguese utility Energias de Portugal.

The first wave energy system to provide energy to a national grid was the onshore Limpet (Land Installed Marine Powered Energy Transformer), developed by the Scottish company Wavegen and installed on the island of Islay. It captures wave energy by means of an oscillating water column: as waves flow into the column, a chamber with its bottom open to the sea, they force air through turbines, which in turn power a generator. A turbine tested there from 2000 to 2007 was capable of generating up to 500 kilowatts, enough to power 280 U.K. homes, which consume on average about 4,700 kilowatt hours annually. Now the company is testing two new turbines, with generating capacities of 100 kilowatts and 20 kilowatts.

Other promising technologies include buoys whose bobbing motions drive generators, and a system called the Wave Dragon, developed by a Danish company of the same name, which directs waves up a ramp and into a reservoir, where it is released through turbines that convert it into power. On the U.S. West Coast, buoy systems predominate among those being studied. In 2007, FERC granted a license to Finavera Renewables, a firm based in Vancouver, Canada, for a

Who's In Charge?

One major obstacle to developing ocean energy in this country is the lack of clear regulatory authority. FERC, an independent regulatory agency within the Department of Energy, decided in October 2002 that it has the authority to license wave power projects, basing its claim on Part 1 of the Federal Power Act, passed in 1920 to site hydroelectric dams on rivers. Some

Before the new industry can become technologically reliable and economically competitive, upfront investment will be needed . . . In the United States, however, government subsidies have thus far gone mostly for fossil fuels.

demonstration project that will place four buoys in the waters off Makah Bay, near Washington's Olympic Peninsula. The project is expected to generate up to one megawatt of electricity, enough to power 150 homes in nearby Neah Bay. (In 2006, average U.S. household electricity consumption was 11,040 kilowatt hours, and in Washington State it was 12,732.) New Jersey-based Ocean Power Technologies has also developed a buoy system that it has tested off Hawaii and Spain, and is among the companies planning projects off Oregon and California.

The greatest potential for wave power generation lies in regions with strong prevailing westerly winds, especially continental Europe's western seaboard, the United Kingdom's northern coast, and the Pacific coasts of Australia and North and South America. The Oregon coast is well suited to wave power development, as is California's coast north of Point Arena, according to EPRI.

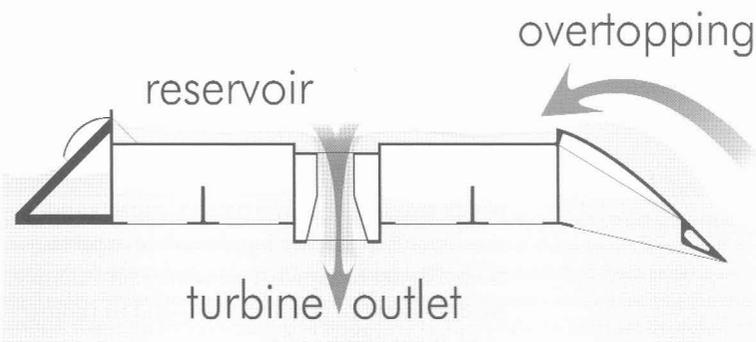
Where coasts lack the conditions needed for wave-generated energy, other types of ocean energy generators are being explored. "Tidal energy in France is about as well developed as wave energy in Scotland and offshore wind energy in the Netherlands," said Rod Fujita, a scientist with the Oceans Program of the Environmental Defense Fund (EDF). The United States has been lagging, taking baby steps, he said.

question whether FERC's authority extends into the ocean, however, and the Minerals Management Service (MMS) of the Department of the Interior has asserted its own authority over wave power projects on the outer continental shelf, beyond the states' three-mile boundaries.

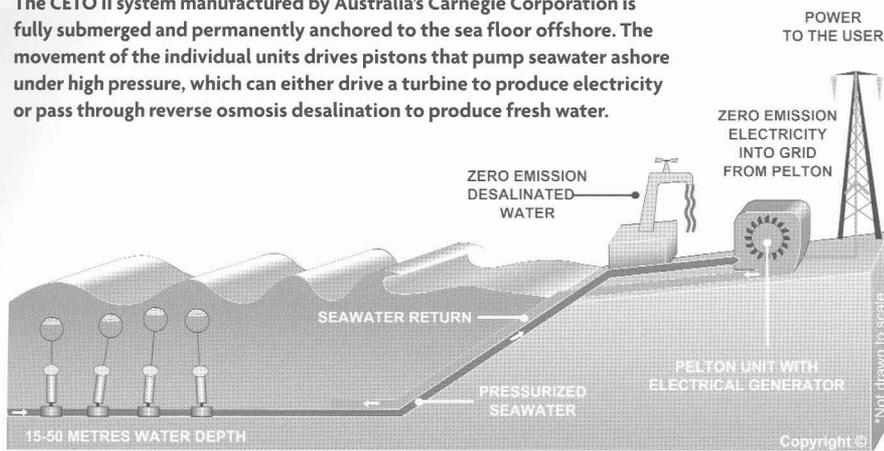
"One of the things we're faced with is, fundamentally, who's in control?" said Bovett, of Lincoln County, Oregon. "You have the U.S. Department of Energy battling the U.S. Department of the Interior, sending nastygrams to each other. Congress needs to go in and amend the Federal Power Act and clean all this up; right now, there's too much uncertainty all around."

FERC's assertion of authority helped to catalyze the recent "gold rush" (as did EPRI's assessment of wave power's potential), but as long as that authority is not fully established, investors

The Wave Dragon, moored in deep water, uses a ramp to maximize overtopping of waves into a reservoir above sea level and run it through turbines. Made in Denmark, it is being tested there and off Wales and Portugal.



The CETO II system manufactured by Australia's Carnegie Corporation is fully submerged and permanently anchored to the sea floor offshore. The movement of the individual units drives pistons that pump seawater ashore under high pressure, which can either drive a turbine to produce electricity or pass through reverse osmosis desalination to produce fresh water.



“Ocean energy, which is created by the effect of the sun, wind, and spin of the Earth, holds great promise for reducing worldwide fossil fuel use, an essential step in defending the oceans from climate change–driven environmental damage,” declares the draft vision statement. “It is an elegant symmetry that power drawn from waves and tides could actually help ensure the health of the oceans themselves. Moreover, it is far more palatable to draw renewable power from the oceans than to extract more oil from them, as is currently being proposed.”

Exploring the Unknown

Although wave-generated power may be one of the most benign ways of producing energy, these projects are expected eventually to be large-scale, with as yet unknown impacts on ocean processes, marine life, fisheries, and the shore. At a workshop at OSU’s Hatfield Marine Science Center in October 2007, scientists identified some key issues requiring study. These include the emission of electromagnetic fields that can affect fish and other sea creatures that use the earth’s electromagnetic field to navigate, alteration of coastal currents and offshore sand movement, and the possibility that sea turtles, marine mammals, and other ocean creatures

are likely to hesitate. “Uncertainty of regulation is a bane of industry,” said Fujita. While the jurisdictional issue is being settled, however, EDF and others see an opportunity to shape standards.

“We do have a chance to get it right this time,” Fujita said. “It has not reached the point where it’s hard to regulate. We have a tendency to wait until there is a crisis—as happened with commercial fishing, for instance.”

EDF has organized a group, which includes leading participants in the ocean renewable energy and hydropower industries and conservation organizations, to explore opportunities

It is increasingly likely that the sea will be part of the greening (or, maybe more appropriately in this case, bluing) of our energy production portfolio.

—Rod Fujita

and challenges presented by ocean renewable energy. They agreed on a set of principles, and on September 9 this year published a draft “Shared Vision and Call to Action.”

The approach the group favors is based on performance standards and a strong regulatory framework, rather than a prescriptive approach, which relies on trying to predict impacts and then specifying technology based on expectations. “Better to say what we want—for example, we don’t want to grind up fish—and let industry work it out,” Fujita said.

might become entangled in lines and cables. Also suggested was the possibility that the installations, if large enough, could affect migration corridors for salmon, crabs, sturgeon, whales, and other creatures. Lighting on the structures could affect seabirds. A report published by the National Oceanic and Atmospheric Administration this fall detailing the workshop findings recommended that installations should not be placed in sensitive areas, including anywhere near to shore at a depth of less than 40 meters. (See <http://hmsc.oregonstate.edu/waveenergy/>)

“We may change things in the ocean we can’t predict,” said Richard Charter, a Bodega Bay resident and consultant with Defenders of Wildlife who has been involved with offshore issues for 30 years. “The upwelling that occurs between Fort Bragg and Point Arena is incredibly productive, one of only a few such places in the world’s oceans. That is a global resource. You might not want to pick one of the world’s top four upwelling spots to put a wave array in.”

“It’s a really exciting new technology, with a lot of potential upsides,” said Pete Stauffer, Oregon policy coordinator for the Surfrider Foundation, but “there are likely to be significant impacts, at the local scale, to the nearshore environment.” Surfrider members are interested in seeing these projects proceed, Stauffer said, but in the right way, with “good environmental assessments, sitting away from sensitive areas, and monitoring.” Surfrider members also worry that wave power installations could diminish surfing waves and interfere with other recreational uses.

Many conservationists support scaling the projects up over time, to incorporate what is learned from monitoring. By adopting this adaptive management approach, installations can be modified as they grow, and even shut down if they prove to be too harmful.

California’s Waves

Other than environmental concerns, one of the biggest worries shared by communities in both Oregon and California is that broad exclusionary zones might be set up around the facilities, shutting out other users.

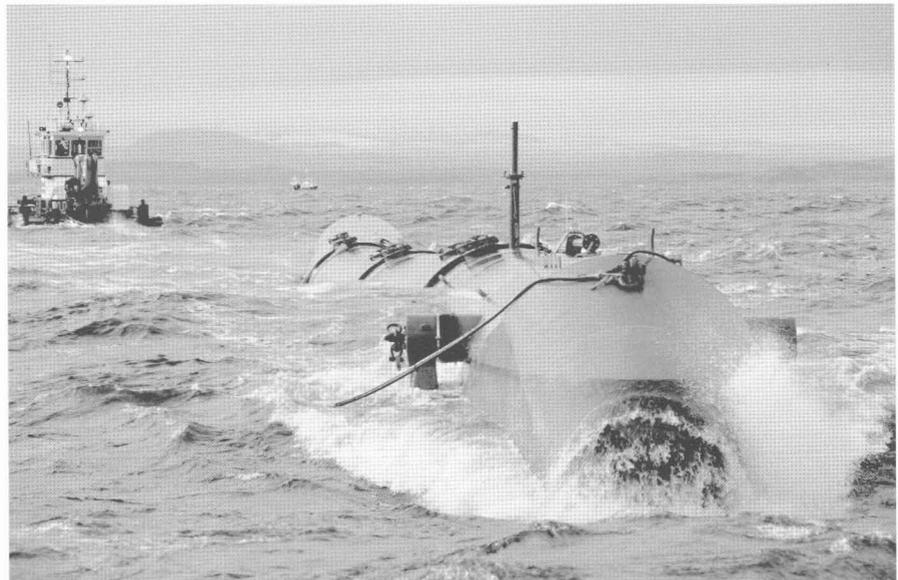
Off Fort Bragg, PG&E received a preliminary FERC permit to study an area of “68 square miles right in front of the harbor, which is almost 100 percent of the fishing grounds,” said Jim Martin, West Coast regional director of the Recreational Fishing Alliance and a member of Fishermen Interested in Safe Hydrokinetics (FISH) Committee, a Mendocino County-based alliance of recreational and commercial fishing associations.

Another PG&E study site, off Eureka and the Samoa Peninsula in Humboldt County, is 136 square miles, “right in the middle of prime crabbing grounds,” said Zeke Grader, executive director of the Pacific Coast Federation of Fishermen’s Associations.

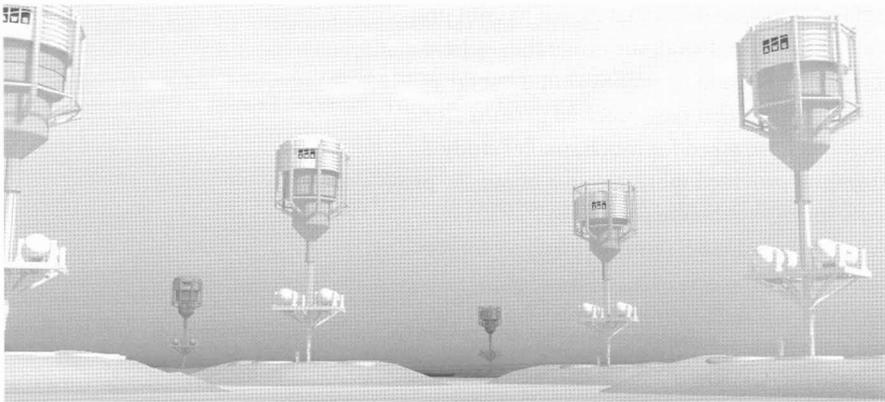
The fishermen aren’t worried that they’ll be shut out of the entire area awarded in the permits—the wave farms would be much smaller—

but they are concerned that PG&E has not provided more specifics about where they believe the facilities would be sited within these areas. Other projects that have received permits along the coast have asked for much smaller study areas and provided more specifics about the projects, including their expected size.

Bill Toman, PG&E’s project manager for the North Coast wave projects, responded that the company has not pinpointed any sites yet. “We wanted to study a large area systematically to find the one place to put the demonstration project,” he said. “We’ve got a football field that we’re



The Pelamis Wave Energy Converter is a semi-submerged, articulated structure made of cylindrical sections linked by hinged joints. The wave-induced motion of these joints is resisted by hydraulic rams, which pump high-pressure fluid through hydraulic motors that drive generators to produce electricity. Power from all the joints—and from multiple units—can be fed to a junction on the seabed, then sent to shore through a seabed cable. Three Pelamis units are deployed off Aguçadoura, Portugal, four are planned off Orkney, Scotland, and seven off the coast of Cornwall, England.



The Archimedes Waveswing, made by Scotland's AWS Ocean Energy Ltd., is a cylindrical buoy moored to the seabed. Waves move an air-filled upper casing against a lower fixed cylinder. As a wave crest approaches, the water pressure on the top of the cylinder increases and the upper part, or "floater," compresses the gas within the cylinder; as the wave trough passes, the cylinder expands. This movement is converted to electricity by means of a hydraulic system and motor-generator. A pilot plant was installed off Portugal in 2004.

going to try to find a place to put the football on. We'll be looking at small areas one at a time."

Before a company can begin building a wave facility, it must apply to FERC for a license and also obtain permits from other federal and state agencies, including the Fish and Wildlife Service and, in California, the State Lands Commission and Coastal Commission. Coastal communities and fishing groups will have a chance to provide input as part of these processes, but many believe that will be too late. "This is the time for people to get involved, before there's a proposal on the table," said Martin. "Once you have a proposal, it's usually already a done deal."

PG&E will not make decisions about specific sites or technologies until it has collected data and met with federal and state agencies as well as local groups and governments, Toman said.

"We want to understand all of the stakeholders' issues and concerns, so we can put together a testing program that everyone is comfortable with." Input from the fishermen will be key, he said. "We would view them as one of the most valuable knowledge assets we could incorporate in the process."

Eureka crab fisherman Dave Bitts, for one, remains skeptical. "Let's face it, we're a flea. The fishery is important to us [fishermen]—it's what we do—and to the com-

munity, but compared to carbon-free energy? That's a gorilla."

PG&E, like all private California utilities, is under a State mandate to get 20 percent of its electricity from renewable sources by 2010, and hopes that each of its study sites might provide up to 40 megawatts when fully built out. If test results are promising, PG&E would contract with a technology company to first build a demonstration project of no more than five megawatts, then, if it is successful, expand to a commercial facility within the next seven to ten years.

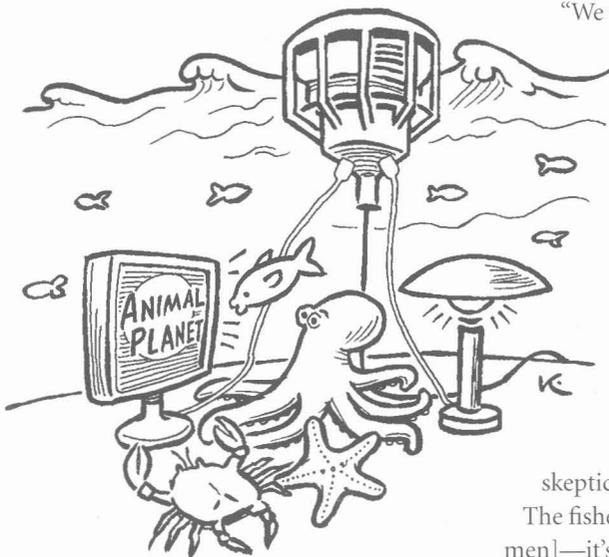
"Hopefully by the time we want to build the commercial project, the federal government will have [the jurisdictional dispute] resolved," Toman said.

Oregon Takes the Lead

Oregon has jumped out in front to both guide and encourage the development of this emerging industry off its coast. Lincoln County was one of the first applicants, in 2006, for a preliminary permit from FERC, attempting to assert its local authority early in the process when it could count the most. After FERC denied the County's application, Commissioner Terry Thompson said that the County "accomplished what we wanted to. We got people's attention, made them aware of the situation."

In February 2007, County commissioners established Fishermen Involved in Natural Energy (FINE), a 19-member advisory committee, which has worked with energy technology companies and OSU to determine the best test sites off the County's shores. "So far, we've had minimal conflicts [over test sites] due to the involvement of FINE," said Thompson, who is also a fisherman. Testing is now on the fast track. Last summer, OSU tested a wave energy buoy off Lincoln County, as did Finavera Renewables. Finavera's buoy sank shortly before it was to be removed and was not recovered until nine months later. "One of the things we learned from Finavera is that it's really expensive to recover one of these things if it sinks," Thompson said.

The Oregon Wave Energy Trust, an association of industrial, academic, and state agency representatives, was established in 2007 to help support research and development, and to work with coastal communities and other stakeholders to develop the state's wave energy industry in "a responsible manner." OSU, the Department of Energy, and the University of Washington are establishing the Northwest



National Marine Renewable Energy Center, funded in part by the Department of Energy, to help accelerate the development of wave power technologies and to study possible environmental impacts.

Community groups up and down the Oregon coast are beginning to organize to gain some leverage over siting and other potential issues. "We're at the beginning," Thompson said. "The stakeholder groups really need to get together, to unify and share information, if they want a say in the process. We haven't yet gotten to the point where the different groups are communicating."

In 2009, Oregon will begin revising its Territorial Sea Plan to include a comprehensive plan for siting wave projects, a project many see as the first step toward zoning the waters off its coast (see sidebar). The State of Oregon and FERC signed a memorandum of understanding in March 2008 in which the agency agreed to consider Oregon's comprehensive siting plan when issuing permits.

Oregon is well ahead of other states both in encouraging wave power and ensuring that it is developed appropriately. "Oregon is leading the nation on this, no doubt," said Roger Bedard, EPRI's ocean energy leader.

While many coastal residents are concerned about the way wave power projects are proceeding in the current regulatory environment, most are eager to see it develop as an industry, if it can be done without harming the environment or other users.

"Fishermen don't oppose the concept of wave energy, generally speaking," said Zeke Grader. "We're interested in the potential for clean, non-carbon energy—we want to remove some of the old hydro dams [in rivers along the coast], and that power would have to be replaced somehow. But people are very much concerned about the loss of important fishing grounds, between this and the Marine Protected Areas."

"If they can do it and it's safe for the environment, who would be against it?" Jim Martin said. ■

Ocean Zoning?

The pressures of industrialization are bumping up against a growing chorus advocating for the protection of large swaths of the ocean as sanctuaries and marine protected areas. With mounting pressures to permit aquaculture farms, liquefied natural gas (LNG) terminals, and wave power projects, and with the potential return of oil drilling, conflicts will inevitably arise. Who will decide what sites, if any, are appropriate for various uses, and which should be off-limits to all industrial activity? How will fisheries be protected? How will the proposed industrial projects affect the new system of sanctuaries and marine protected areas along the West Coast? Some are suggesting California take a look at what others have been doing to balance these demands.

"We're kind of entering a new world for the California coast," said Richard Charter, who serves on the advisory council of the Gulf of the Farallones National Marine Sanctuary and works as a consultant for Defenders of Wildlife. "We'll be looking at an industrialization of the ocean in the next few decades."

The idea of zoning coastal waters is gaining ground in some circles. Australia was the first country to implement an offshore zoning plan, in 1975, when it created the 133,000-square-mile Great Barrier Reef National Marine Park.

Since then, the idea of more comprehensive, multi-use, ecosystem-based zoning, or "marine spatial planning," has been widely discussed in academia and among scientists, and has recently begun to be implemented in Canada, Belgium, the Netherlands, Germany, and Australia. With the passage of its 2008 Oceans Act, Massachusetts became the first U.S. state to mandate a comprehensive zoning plan for its waters. Controversial proposals for wind farms off the East Coast helped spur passage of this legislation.

Rhode Island has begun a similar effort, and Hawaii, Florida, North Carolina, and New York have also expressed interest, said Barry Gold, marine conservation initiative lead for the Gordon and Betty Moore Foundation, which is working to establish marine spatial planning in the United States. In California, "people are talking about it," but so far the idea has not gone beyond the discussion phase, Gold said.

Oregon is in the process of amending its Territorial Sea Plan to designate certain areas as marine reserves, and in 2009 will undertake a comprehensive assessment of its coast to determine the best sites for wave power development. Many see these as the first steps toward developing a comprehensive zoning plan for the state's offshore waters, and a process is underway, spearheaded by the Oregon Coastal Zone Management Association, to involve coastal citizens.

The idea of zoning coastal waters requires a shift in thinking from managing separate uses of the ocean, such as fishing and drilling, to planning how to manage a specific place. It will also require changes in governance—at the very least, a cooperative effort among the various agencies and governing bodies that have jurisdiction over some aspect of activities within coastal waters.

If zoning is eventually adopted along the West Coast, it is likely to be a long and potentially painful process, especially for those who are used to having free run of the seas. "It's going to be very, very tough for the fishing industry to handle," said Terry Thompson, a Lincoln County, Oregon, commissioner and fisherman. "Fishermen have had the ocean pretty much to themselves."

But with demands on ocean resources and territory growing, the status quo may soon become unworkable. "It's almost the Wild West out there now," Gold said.

—EE

ALOW, EERIE MOANING DRIFTED across the docks in San Francisco's Gashouse Cove, followed by a burst of loud crackling. I walked through the entry to Fort Mason and found a group of about 50 people, bundled in jackets and woolly hats, huddled around a tape recorder. It was cold here in the early-morning fog, and we expected that soon we would be much colder, as we headed out the Golden Gate toward the Farallon Islands aboard

Captain Joe Nazar's catamaran *Kitty Kat*.

Along the way we hoped to see many kinds of wildlife, but first we were getting to listen to some sounds from under the water: recordings of whales, snapping shrimp, and noise from ships' propellers played for us by Roger Bland, professor

of physics and astronomy at San Francisco State University and an expert in underwater acoustics. Bland would be riding along with us to make more recordings, and to allow passengers to listen in on passing ships and other underwater noise. (No whale songs, though—their low-frequency vocalizations must be converted to a higher pitch before humans can hear them.)

This late-September voyage was one of five special trips in 2008 arranged by Seaflow, a non-profit organization dedicated to protecting marine life from ocean noise pollution, and the SF Bay Whale Watching company. In addition to looking for wildlife, passengers on these trips learned about the dangers that vessel traffic poses to marine animals within the Gulf of the Farallones National Marine Sanctuary, from oil spills and collisions to the noise pollution that may disrupt the animals' ability to communicate (see *Coast & Ocean*, Vol. 23, no. 4). On each trip, Seaflow staff also collected data on the ships they encountered, recording the size, speed, location, name, and nationality, obtained through the ships' electronic identification system. Jackie Dragon, the group's campaigns director, told me that they have found that many ships are violating the (voluntary) speed limits in the Sanctuary, and that they don't always stay within the designated shipping lanes, cutting corners to make better time.

Aboard the *Kitty Kat*, we spotted a container ship just outside the Golden Gate, the first of many we would see that day. Bland dropped his hydrophone, an underwater microphone, over the side, but the ship was too far away and the wave churn too loud for us to hear its propeller. Nazar tried to get us closer to the huge vessel, but it picked up speed and was soon far out to sea. Not long after, we saw our first humpback whale, and turned to the day's main business:

SCOUTING FOR SEA SOUNDS

A Listening Trip with Seaflow

STORY AND
PHOTOGRAPHS
BY EILEEN ECKLUND



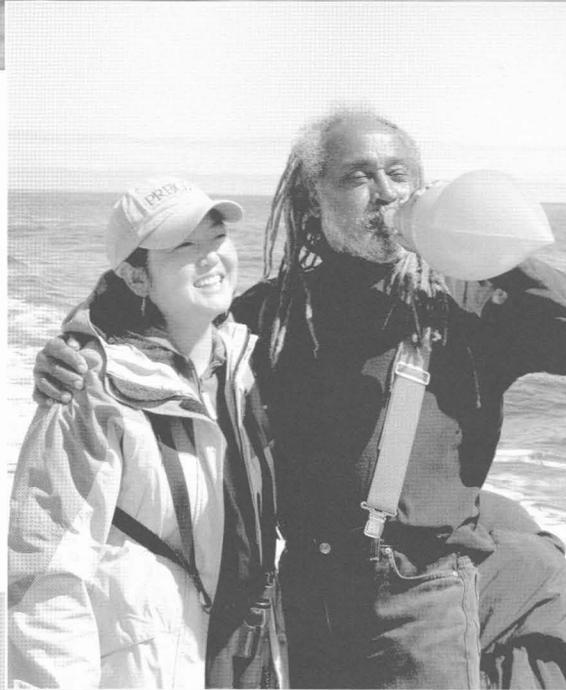
The catamaran *Kitty Kat* heads out to sea under a high, thick blanket of fog.

enjoying the abundant wildlife above and below the waves.

As we motored toward the Farallons, the sun emerged from the fog and schools of dolphins leapt alongside our bow. Jellies drifted by. We saw pairs of humpbacks, and even a small pod of five or six whales, and Bland was able to make some new recordings. Naturalist Melinda Nakagawa helped us identify birds, including cormorants, phalaropes, and sooty shearwaters. Up close, the rocky, desolate-appearing Farallons were bustling with activity, pelicans and murrelets crowding the rocks, the waters just offshore swirling with fat, sleek sea lions. In spring and summer, when more than 400,000 seabirds may nest here, the stench and noise can be overpowering. This late in the year the smell was quite faint, a blessing for those in our group with queasy stomachs.

Also aboard was French entrepreneur Pierre Lavagne, and along the way he demonstrated an instrument he invented, the Shelltone, which you can blow into to make sounds that he said are “inspired by the ocean and by whale songs.” The idea came to Lavagne on a beach one day, and he spent the next two years working with acoustic engineers and musicians to design and build the instrument. Made of molded plastic in the form of a conch shell, it produced a sound like a moose in pain. I asked what he planned to do with it. “You tell me!” he replied.

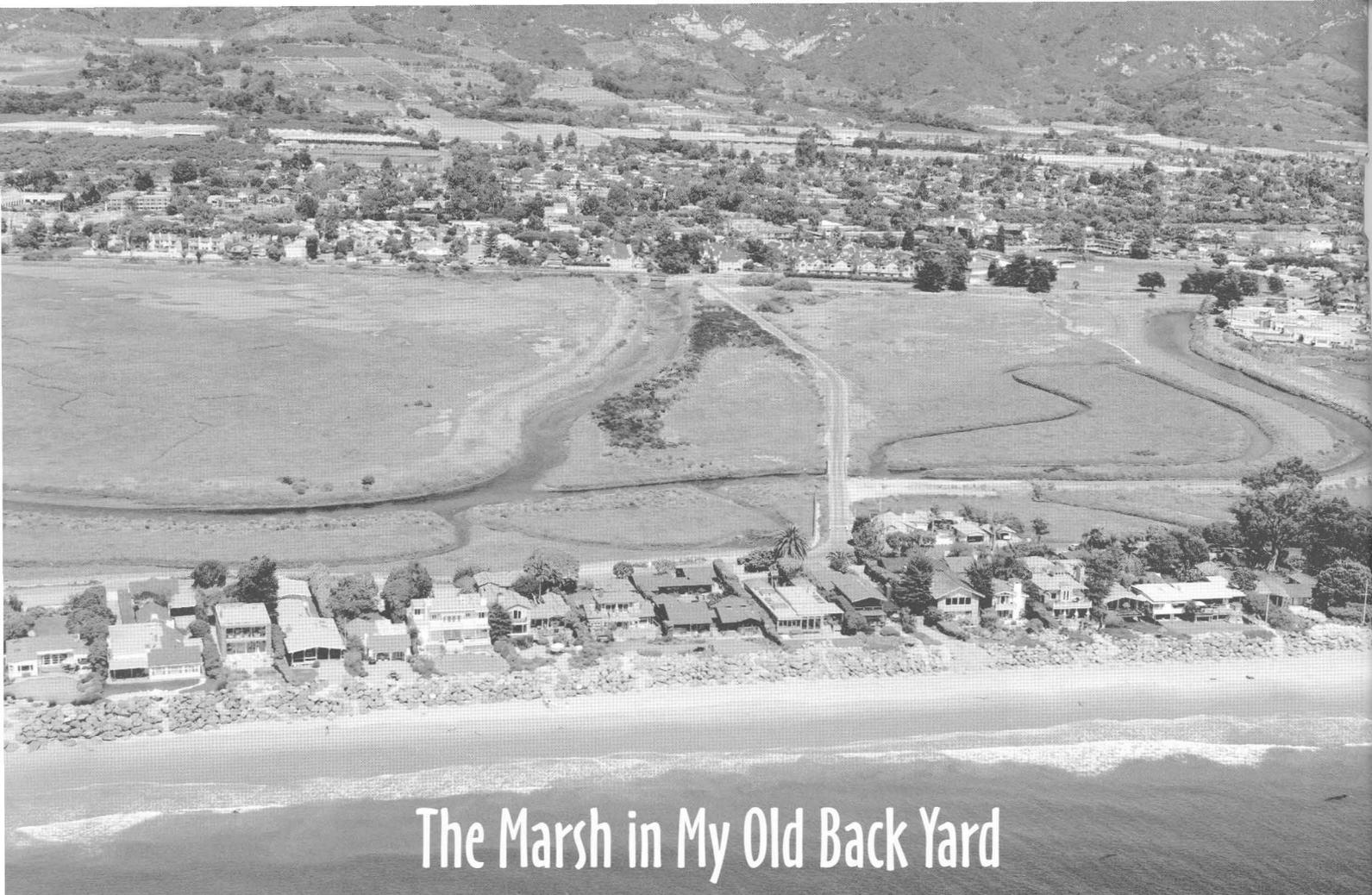
As we headed for home, exhausted but exhilarated, two container ships loomed out of the fog still hanging over the Golden Gate. We were running late, though, and there was no time to stop and listen. ■



Top: A crane hoists scientists and supplies ashore at Southeast Farallon Island.

Middle: Verne Bryant, owner of SF Bay Whale Watching, plays the Shelltone with naturalist Melinda Nakagawa at his side.

Bottom: A container ship sails out of the Golden Gate as the *Kitty Kat* returns.



The Marsh in My Old Back Yard

CHUCK GRAHAM

DAWN ON THE CARPINTERIA MARSH was a salty calm. Long shadows slowly retreated beneath a thin layer of dewy mist across a palette of purple, red, green, and yellow pickleweed.

As the morning sun warmed the wetland on a full tide, gadwalls, ruddy ducks, widgeons, and blue- and green-winged teal emerged from the dense pickleweed. White-crowned sparrows filled their beaks with seeds rummaged from saltbushes, and a lone osprey made several swooping passes overhead.

I walked out to the most recent addition to the reserve, the bridge connecting the City of Carpinteria's Salt Marsh Nature Park to the adjacent South Marsh. Where Franklin Creek empties into a channel swollen with the incoming tide, it was crowded with Northern pintails, buffleheads, and pied grebes. Several stoic great blue herons and snowy egrets stood frozen along the steep banks, as a variety of fish breached just out of reach of their sword-like beaks.

Later in the day, after the tide receded, the slick mudflats, dotted with cone-shaped California horn snail shells, glistened a milk-chocolate

brown in the baking sun as whimbrels, long-billed curlews, and marbled godwits tiptoed in the murky shallows. All of this wildlife diversity was thriving in one of California's last remaining coastal estuaries.

Living and Watching

From 1975 to 2000, I was fortunate enough to grow up and live on the marsh in Sandyland Cove, in one of 40 homes built in a row between the ocean and the South Marsh. The marsh was literally 20 steps out the back door, the ocean about the same distance out the front door, with a great surf spot nearby. No need for an alarm clock: waves constantly crashing on the beach and the long, dry rattle of the belted kingfisher were guaranteed wake-up calls each morning.

A love for nature evolved during those early years, but I had no idea how a marsh works. That didn't come until much later—1998, to be exact. That's when the 15 acres along Ash Avenue, east of the University of California reserve and a stone's throw west of our house, received a massive facelift. What had become a wasteland of tangled weeds, dirt, and trash was

Above: Carpinteria Salt Marsh; the author grew up in the house just beyond the far right of the photo.

Opposite top: A new footbridge being installed; it provides public access to part of the South Marsh next to a gated community.

Opposite bottom: American coots (*Fulica americana*) at sunset

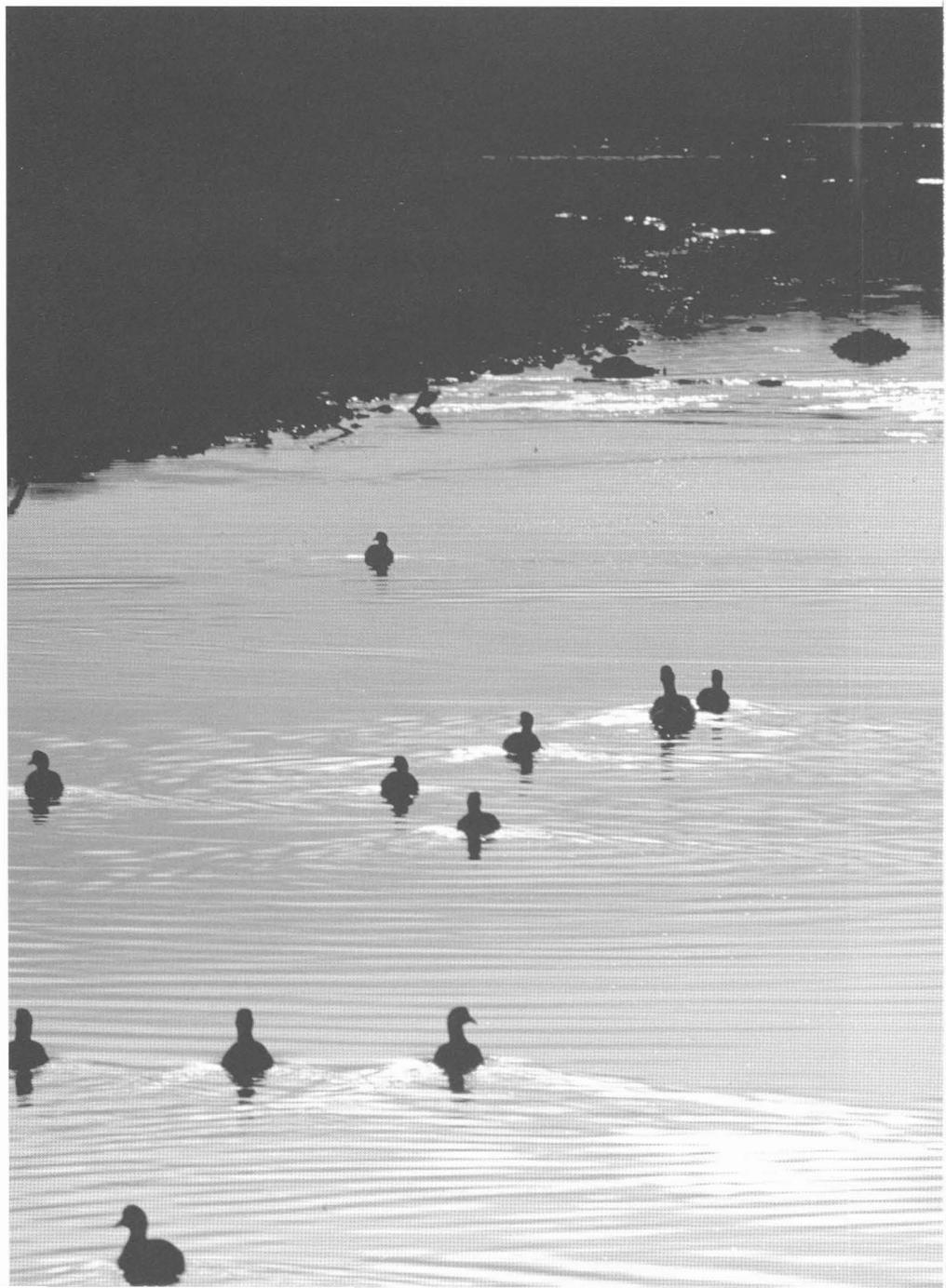
restored to something like its true self, a functioning salt marsh. When the restoration project began, the only obvious signs of wetland life were occasional herons and egrets foraging for rodents and snakes. During the next three years, huge amounts of fill were excavated and hauled away, sinuous tidal channels were built, invasive alien plants were removed, and natives were planted. During most of my years on the marsh I hadn't been aware of what had been happening to it. From the perspective of my doorstep it looked vast. But it had been shrunk to about half the size it was 200 years ago, much of it filled in to construct tract homes and businesses, which happened along most of the California coast. Only ten percent of the historic southern California wetlands remain.

In the 1970s, the last remaining portions of the marsh to the west of our house were targeted for a marina, and a condominium complex was planned for the scruffy 15-acre area along Ash Avenue.

"That's where it was headed," said Michael Feeney, executive director for the nonprofit Land Trust for Santa Barbara County. "It would've been all over."

Instead, local people and several agencies and organizations joined forces to save this remnant slice of wetland habitat, and then continued to collaborate to reclaim more of the historic Carpinteria Marsh. The main partners in these efforts were the City of Carpinteria, the California Coastal Conservancy, the Land Trust, and the University of California's Natural Reserve System, but many others joined in. There had been a shift in perception in the early 1970s about the value of wetlands, leading to legislation, including the California Coastal Act, to protect them.

The City of Carpinteria bought the threatened 15 acres along Ash Avenue with the help of the Coastal Conservancy to create the Salt Marsh Nature Park. The Sandyland Cove Homeowners Association donated the adjacent 120 acres to the U.C. Reserve System to protect them from potential development. About half of the 95 to 100 acres in private ownership are protected by conservation easements and managed by the U.C. Reserve System. Altogether, 230 acres of wetlands are now protected. Restoration work continues. Few people who whiz by on Highway 101 see much more than a large green space bordered by houses and industry. Not many know the story of this rescued coastal wetland within Carpinteria's beachside community.



TOP: LAND TRUST FOR SANTA BARBARA COUNTY; BOTTOM: CHUCK GRAHAM

Return of the Natives

Seven years after restoration work was completed at the Carpinteria Salt Marsh Nature

Park, willows, California poppies, wild roses, salt-bush, pickleweed, and other native flora grow in the upland areas. In the tidal channels live mussels, snails, clams, and a variety of fish species. The mouth of the estuary at the county beach in Carpinteria is a nursery for halibut. More than 200 bird species have been recorded across the wetland and in the upland habitat.

“From Point Conception to San Diego,” said

U.C. Reserve Manager Andrew Brooks, “it’s one of the healthier marshes in southern California.”

As a result, the role of U.C.’s Carpinteria Salt Marsh Reserve has expanded beyond its traditional function as a research site for graduate students. “It’s now serving as a reference and study site for all aspects affecting watersheds, offshore kelp beds, and anything else surrounding the marsh,” said Brooks. It attracts multi-campus, multi-agency research groups funded by the Environmental Protection Agency, the National Science Foundation, the National Institutes of Health, the National Oceanic and Atmospheric Administration, and others. Studies are undertaken not only in the reserve but throughout the protected marshland.

Brooks said I wasn’t imagining the diversity of avian species. “There’s more food, the water quality is good, and the overall health of the marsh is allowing birds to be supported,” he said.



Opening the Flood Gates

After the nature park was completed, the Coastal Conservancy, the Land Trust, and the Santa Barbara Flood Control District went to work on another section of the marsh—34 acres south of the access road and bridge to Sandyland Cove, known as Basin 1 and South Marsh, in the U.C. reserve. Feeney said all the old construction rubble, rocks, fence posts, and other debris were removed, and public access paths were installed. “It’s exciting to see you can actually get it done when you figure we started this project in 2002,” he said. “The key all along has been the Coastal Conservancy, all the restoration. They’ve been the lead horse.”

As in the nature park project, improving the health and longevity of the marsh was at the forefront. A slew of projects was finished, including the restoration of historic tidal circulation channels that benefit breeding habitat for fish and invertebrates, such as the California oyster. Existing channels were deepened and new ones were created to help reduce silt and the algae growing on the mudflats. New cobble beds were created to encourage shellfish colonization. More non-native flora was removed, such as ice plant, castor bean, myoporium, and mustard, and 18,000 native wetland and upland plants were planted, including two rare wetland species, salt marsh bird’s beak and salt marsh goldfields, which provide vital habitat for the endangered Belding’s savannah sparrow and a variety of other birds. The finishing touches were the new footbridge crossing the Franklin Creek channel and the 1,200-foot interpretive path at the north end of Basin 1, at the southeast end of the marsh.

“It’s been the community interest and support, and it was the persistent efforts of everyone, from the people who live around it, biologists, researchers, birdwatchers, and resource agencies,” explained Feeney. “There’s been a huge increase in awareness of the importance of the salt marsh and the willingness of people to make it a priority to protect it.”

“One’s never finished when it comes to restoration,” said Janet Diehl, project manager for the Coastal Conservancy. “Sedimentation is a big issue, particularly on [UC’s] portion. It’s natural sediment from the foothills constrained at the mouth of the marsh.”

Next, the Land Trust and Coastal Conservancy have their sights set on restoring what is known as Basin 3, located on the western region of the U.C. reserve and some protected marshland in private ownership. “The conservation easements are kind of a step in the process of

Opposite top: A white-crowned sparrow (*Zonotrichia leucophrys*) feeds on a saltbush.

Opposite bottom: Birdwatching from Carpinteria Salt Marsh Nature Park

Below: A dried-up mud flat in the U.C. reserve



integrating all the management and restoration efforts," said Feeney. "Through the easements, not only are they agreeing to not disturb the marsh, they're agreeing to allow us to take the lead in management and restoration."

For the past eight years I have been living on the mountain side of the marsh, passing it daily on my way to work, lifeguarding on the city beach, and at my favorite surf spot where the mouth of the marsh spills into the ocean. After ten years of restoration, all the improvements to the marsh are evident in the growing biodiversity across the swath of channels, upland habitats, and expanse of pickleweed. As I stood on

the banks of a tidal channel snaking its way toward the ocean on this particular day, tranquility was interrupted by a common merganser coming up for air during a fishing expedition. Its breach startled a flock of American coots, a blur of black feathers heading toward the western fringe of the marsh. Perhaps it was the lone gray fox peering over the pickleweed that started the tumult. Be that as it may, for me this was another cherished moment in the cycle of life within the Carpinteria Marsh. ■

Chuck Graham, a freelance writer and photographer, has been living in Carpinteria for 33 years. His work has appeared in Wildlife Conservation, Sea Kayaker, Forest Magazine, and elsewhere. He's the editor of DEEP magazine, a surfing and ocean lifestyle publication. When he's not lifeguarding on Carpinteria City Beach, he leads kayak tours at Channel Islands National Park. See www.chuckgrahamphoto.com.

For docent-led trips in the Carpinteria Salt Marsh Nature Park, call (805) 684-8077. For the U. C. Reserve System call (805) 893-4127 or see <http://nrs.ucop.edu>.



Left: Reflections in a pool in the U.C. reserve



LA Water

Letting the Land Clean and Save

“We can meet the future of a growing California if water is used much more efficiently, if the management of that resource is better integrated and holistic, and if land use policies are tied to water availability.”

—Dorothy Green, *Managing Water: Avoiding Crisis in California*

THERE WAS A TIME, DECADES AGO, when water agencies in Los Angeles worked pretty much in separate realms. Water supply, floodwaters, and the collection and disposal of dirty water were separate responsibilities. In the late 1990s, however, the Departments of Public Works and Water and Power decided to work together. They began a process of integrated resources planning, working with hundreds of citizen groups, businesses, and other organizations, as well as with other agencies. That process began with the Bureau of Sanitation and culminated in 2006 in a master plan to integrate management of drinking water supply, wastewater, and stormwater as the city grows.

“This effort puts City San at the forefront of comprehensive planning because, by fully educating a cross-section of the community to the problems and tradeoffs that will need to be made, it has built support for a more enlightened approach that has resulted from examining multiple resources together and adopting multipurpose solutions,” Dorothy Green observed in her 2007 book. She was one of the first to begin nudging the water powers toward this kind of thinking.

Since 2006, the City has taken steps both large and small—but with cumulatively large potential—to make the most of the water it has. It has strong support from Mayor Antonio R. Villa-

raigosa, who in May 2008 issued an action plan, *Securing L.A.’s Water Supply*, with the premise that “the City will meet all new demand for water—about 100,000 acre-feet per year (AFY)—through a combination of water conservation and water recycling.” The proposed strategy is an aggressive multi-pronged approach that includes investments in state-of-the-art infrastructure and conservation technology, and expansion of water recycling.

The City now has weather-based irrigation controllers in 44 parks and facilities. It has

RASA GUSTAITIS

PHOTOGRAPHS BY
DON NIERLICH



This sidewalk along Oros Street is shaped to allow maximum absorption of runoff around trees and in planted areas.



Entrance to Steelhead Park at the end of Oros Street



Inside the park, sycamores are doing well. Some stormwater is captured in a depressed area and treated by the soil as it percolates down.



For neighboring residents, and for hikers and bicyclists along the Los Angeles River bikeway, Steelhead Park is an oasis.



At Rio de Los Angeles State Park, some parking spaces are surfaced with pervious asphalt, others with small octagonal pavers with gravel between them. Almost all the plants in this park are native.

approved the installation of graywater systems. It is working to expand wastewater storage capacity for reclamation, and has completed a report on alternative street surfacing materials for adoption by the City Council.

Land use practices and engineering guidelines are being revised to improve water supply and treatment. “We’ve only begun to use the land and its natural processing capacity as BMPs [Best Management Practices],” said Commissioner Paula A. Daniels of the Board of Public Works in the Department of Public Works, who founded the Green Street Committee in May 2007. “The momentum is there.”

Greening Streets, Making Parks

The first Green Streets demonstration project was created by the nonprofit North East Trees, on Oros Street. This residential street in the Elysian Valley neighborhood ends at the concrete embankment of the Los Angeles River. Stormwater and runoff from sprinklers and hoses used to stream down the gutter and empty straight into the river through a culvert. Now runoff is captured to remove pollutants, help recharge groundwater supplies, and nourish the little riverside Steelhead Park, created as part of the project.

The sidewalk on one side of Oros Street has been reshaped to allow runoff to percolate into the ground around trees and beside the curb, where grass strips have been replaced with drought-tolerant native plants. The water is cleaned as it passes through the soil, and some flows to Steelhead Park.

The City of Los Angeles Department of Public Works will create another version of the Oros Street project along a block of Riverdale Avenue, which also deadends at the river, with dirty water draining through a culvert. The Coastal Conservancy is providing \$500,000.

“We hope to learn from these projects what designs and vegetation work best, what the water quality benefits are, and the volume of water that can be captured,” said Daniels. “We hope to have these designs be part of all new capital improvement projects done by the City. “We’re making a lot of changes, and the people in the City of L.A. are with us.”

Pioneering in Santa Monica

With water shortages looming and water pollution a growing concern, other communities in Los Angeles County are likewise taking steps toward water recycling and stormwater capture. The City of Santa Monica has built an urban runoff recycling facility—the first of its kind in the country—which treats between 300,000 and 500,000 gallons a day of dry-weather runoff that would otherwise empty from stormdrains into Santa Monica Bay. That's 95 percent of total dry-weather runoff, said Neal Shapiro, the City's urban runoff manager. The treated and disinfected water is reused in landscaping and also for flushing toilets and urinals. By so doing, the City offsets two to four percent of its potable water use.

In November 2006, with 67 percent of those voting in favor, the City of Santa Monica passed Measure V, a parcel tax for projects to improve the quality of its urban runoff, increase water conservation and groundwater recharge, and at the same time provide recreational and habitat benefits, on land and in the marine environment. The City depends on clean beaches; they are important to its quality of life and economic wellbeing. It also must meet state water-quality regulations and L.A. County's local runoff regulations, which have become more strict.

Among the City's other innovative projects is the Beach Green (see story next page) which turns a seldom-used beachfront parking lot into a grassy recreational space while leaving the option of using it for parking when needed. Shapiro would like to see the Beach Green replicated all along the coast in parking lots behind beaches, but it's still in testing stages, has not had a winter yet, he said. "We have to see how it works and how the public likes it." ■

Rio de Los Angeles State Park has sportsfields, a playground, a wetland, and trails on 40 acres. Water conservation and stormwater capture and treatment are built into the design. Landform grading rather than hardware does almost all the work.



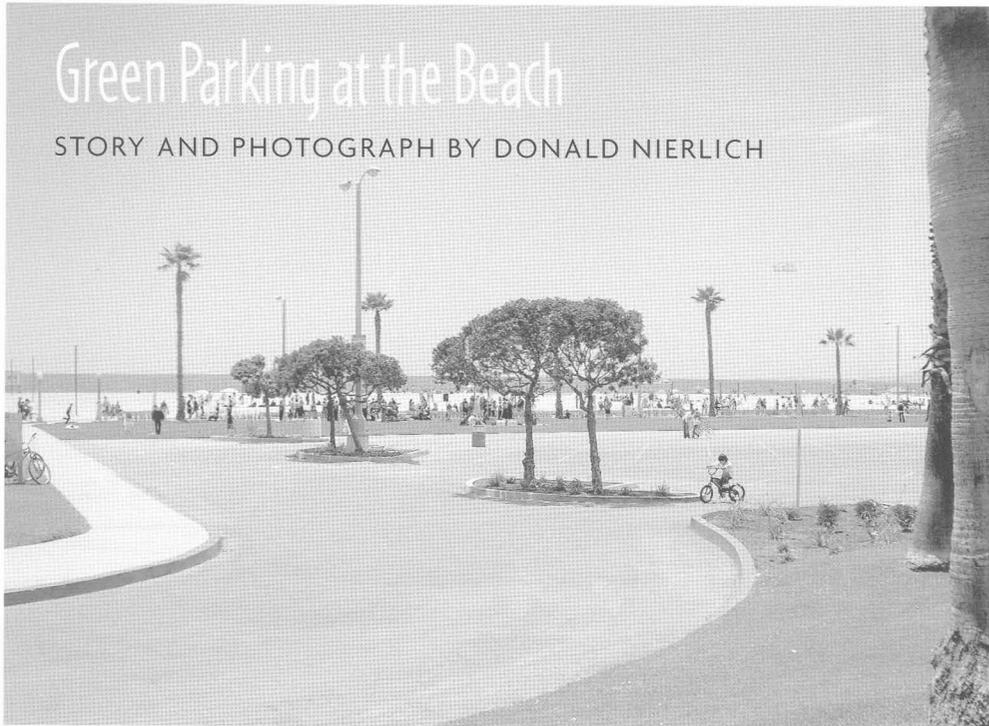
Top: Athletic fields surfaced with artificial turf are bordered by an earthen swale designed to contain stormwater and let it flow down into a freshwater wetland.

Middle: Basketball courts with hard surfaces are bordered by grassy areas that absorb stormwater runoff.

Bottom: Willows were planted beside the wetland on the park's opening day, Earth Day 2007.

Green Parking at the Beach

STORY AND PHOTOGRAPH BY DONALD NIERLICH



SANTA MONICA'S WIDE, SANDY BEACHES are backed by many parking lots originally built to meet the summers' weekend crushes. However, after an analysis of parking records for five years revealed that the lots were only fully needed for at most six days of the year, the City decided to convert one blacktop lot with 83 parking spaces into a lawn—not a conventional lawn, but one engineered to provide several very different features. Above ground, the lawn will provide a green space for recreation and a surface for parking cars when needed; below ground, it will prevent dirty stormwater from draining directly onto the beach.

Construction of the one-acre Beach Green project, just north of Ocean Park Boulevard, was completed last May, and it is an experiment. If it works as expected, it will help to improve water quality in Santa Monica Bay and maintain the groundwater supply. City engineers estimate that the lawn will capture 80 percent of the stormwater that falls on it or drains to it from an adjacent parking area, and that (assuming typical runoff) as this water percolates down through the soil, virtually all pollutants will be removed.

To stabilize the lawn to allow parking and to create a biological filter in its root-zone, a patented lawn system, Netlon Advanced Turf, is being used. Specifically, the design incorporates

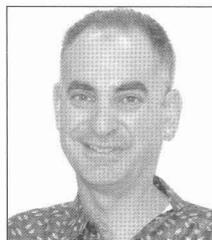
a large quantity of coarse polypropylene mesh, in several-inch pieces, into the topsoil mix. The linked strands of the mesh form a stable matrix that includes the topsoil and the roots of the grass. The final installation, about 14 inches thick, is made up of layers: grass, topsoil, sand, gravel, and rock. Unique to this project, drainage pipes were installed at the base to allow for drawing test samples of water at two depths.

The grass used is a variety that was developed in Israel, tested in Florida, grown in Arizona, but never before used in California. It tolerates salt and sun. The plants surrounding the lawn are California natives, including dune grass, two varieties of buckwheat, and Catalina ironwood trees, according to Joshua Rosen, a designer with Mark Tessier Landscape Architects of Santa Monica, who worked on the project.

During four storms of the 2008–09 rainy season, the City will analyze water collected at the surface and subsurface ports, and test it for insecticides, various organic chemicals, bacteria, and other substances commonly found in runoff. "Hopefully this will be a successful demonstration project, and others will be swift to take it up," said Neal Shapiro, water resources section supervisor and urban runoff management coordinator for the City's Environmental Programs Division.

Don't anticipate that grassy parking lots will replace the asphalt kind very quickly, though, cautioned Karen Ginsberg, assistant director of the City's Community and Cultural Services, which oversees the project. This one cost \$900,000, far more than asphalt paving does. The State's Clean Beaches Initiative provided about \$700,000, with funds coming mainly from Proposition 13 (2000), the State's Water Quality Bond Act, and the City contributed a match of \$200,000, largely in staff time. If the evaluation shows that the turf is effective in clearing the runoff, however, and the model is adopted widely, installation costs should come down.

Perhaps, if one factors in the gain of recreational space and the aesthetic value of the grass surface, plus the water conservation and public health benefits, such projects could prove to be a good investment. ■



A Change of Climate

It is hard not to get my hopes up.

I was unexpectedly moved by Barack Obama's election as president. I say unexpectedly because I think of myself as a hard-bitten political cynic, and during the last two months of the election campaign I was practically living on the polling websites. ("I'll be up in a minute honey. I just need to take a look at a brand-new Quinnipiac poll on left-handed decline-to-state-voters in South Dakota.") As my liberal friends became increasingly fearful of an October surprise, convinced that something bad would happen to derail the Obama train, I actually became more and more sure of the Democratic landslide to be.

Despite expecting Obama to win, like millions of Americans I teared up during his acceptance speech, thrilled by a President-elect who spoke to all that is best about the United States of America, and did so in complete paragraphs. Now, as I write, we are in the interregnum period peculiar to American government, waiting for our lame-duck President to get out of the way so our new President can take office. What will the future bring? How will the new administration deal with the enormous backlog of issues and problems facing the nation?

Pretty much everyone working in conservation and the environment will breathe a huge sigh of relief when the Bush family decamps for Texas. The Bush administration has been by far the worst presidency in history as far as our land, water, and air are concerned. Not to mention the food we eat, medicines we take, cars we drive, and so on. In particular, we have lost eight years in the battle against climate change. Over the course of two terms, President Bush not only took no meaningful action to deal with carbon dioxide emissions, but actually prevented states from doing anything and gave India and China a perfect excuse for inaction.

President-elect Obama has made it clear that things would be different in his administration. I certainly hope it's true, but I can't help but remember our last Democratic administration, that of President Clinton. In most respects that was a good time for the environmental community (for many of us it was the good old days). Bona fide environmental leaders were running things in the federal government, and a great deal of good work was accomplished. Clinton created the President's Council on Sustainable Development, signed the Kyoto Protocol (although he did not submit the treaty to the Senate), and after the 1994 elections stood firm against Republican attempts to roll back environmental laws and regulations through the appropriations process. During the Clinton administration, the EPA's budget was increased, and many of the country's natural resources were put under greater protection. President Clinton issued an executive order to require polluters to disclose information to the public, expanded the public's right to know about toxic releases, and signed the California Desert Protection Act in 1994.

Nevertheless, the Clinton administration was unable to do anything significant about climate change. They certainly tried; there was, for instance, an ill-fated attempt at a tax on the carbon content of fuels, shot down in Congress in the first term. The United States never did ratify the Kyoto Protocol, and President Bush has been able to undo by executive order some things Clinton did by executive order.

Still, there is reason to believe that this time things will be different. Not just because both candidates for president talked about climate change during the campaign, and not just because Obama mentioned it during his acceptance speech. The fact that Democrats picked up seats in Congress in two election cycles back to back will cer-

tainly be helpful, but what I suspect will prove to be most helpful in the years ahead is that public opinion has shifted.

During the last five or six years, increasing numbers of Americans have told pollsters that they believe climate change is happening, and that they are able to observe changes where they live, and where they camp or hunt and fish. The scientific consensus on climate change and the dangers it poses is now deafening, and \$4-per-gallon gasoline gave us a taste of what things will be like after world oil production has peaked. And of course a key moment of the Bush presidency, and the beginning of the end of Bush's approval ratings, was the loss of New Orleans to Hurricane Katrina.

I have something in common with President-elect Obama. I started my career as a community organizer too. In fact, my basic training in politics and campaigns came from working for ACORN in Boston many summers ago. Barack Obama clearly thinks like a community organizer, and campaigned like a community organizer. One thing community organizers learn early on: you must begin where people are. That is to say, you can't convince them to be concerned about things that they are not concerned about, or believe things that they don't believe. Good organizers know what is important to their communities, and help them achieve it.

I said at the beginning that I'm trying not to be too optimistic. And yet, beginning in January, we will have a President who understands that climate change is an enormous threat, who has said that he wants to do something about it, who seems to have the skills to mobilize our country, whose citizens seem ready, finally, to embrace some change. I will try to keep my enthusiasm under control.

Sam Schuchat is the executive officer of the Coastal Conservancy.

COASTAL CONSERVANCY NEWS

COASTAL CONSERVANCY ACTIONS

In October and November, the Conservancy approved projects that will extend hiking trails and wildlife corridors, add strategically important land to parklands, help sustainable grazing to continue, provide new campsites and affordable overnight rentals in coastal parks, begin construction on the largest wetland protection project ever undertaken in California, and accomplish other conservation and public access goals. The projects approved include the following, mostly funded with the help of Proposition 40 and other voter-approved bonds.

Jazzing up Crystal Cove

The ongoing restoration of the Crystal Cove Historic District at Crystal Cove State Park in Orange County has been a big hit with visitors. The 13 restored cottages there that are available for affordable overnight lodging are occupied more than 95 percent of the time.

Together, State Parks and the Crystal Cove Alliance have restored 22 historic structures in the district since work began in 2003. The restoration will continue with the help of \$1 million in Proposition 40 funds from the Conservancy for a \$6-mil-

lion project that will include rehabilitation of three cottages as an “educational commons” and new whole-access pathways throughout the commons area; restoration of two more overnight rental cottages; conversion of one cottage into a museum and lifeguard station; restoration of the bank of Los Trancos Creek; and conversion of several garages into park facilities and another garage into a public restroom (there is now only one public restroom in the historic district).

These upgrades are expected to greatly increase the number of visitors, and to double the 4,000 students who come there annually to study California geology, biology, and environmental and earth sciences through the Crystal Cove Alliance’s education programs.

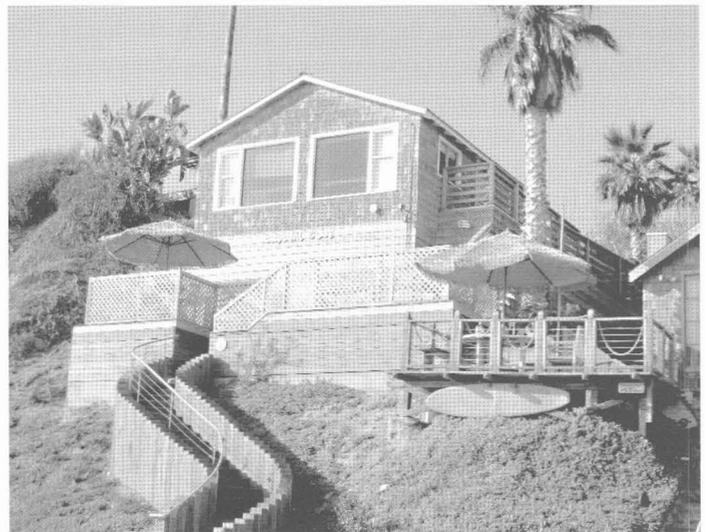
More South Coast Wilderness

Citizens have worked for many years to create the South Coast Wilderness, a greenbelt along the Laguna Beach coast, much of which was once part of the Irvine Ranch. So far, the Wilderness comprises 20,000 acres. Soon 4.5 more acres will be added, with the purchase of the 4.5-acre Bunn property, next to Laguna Coast Wilderness Park, about a mile inland from the beach in the

Laguna Canyon Creek watershed. The City of Laguna Beach will use \$679,000 in Proposition 12 funds granted by the Conservancy for the purchase, which will protect coastal sage scrub habitat against development, expand public access, and connect

Below : The Bunn property will be added to the South Coast Wilderness.

Bottom: Two restored cottages at Crystal Cove State Park



TOP: LAGUNA CANYON FOUNDATION; BOTTOM PHOTOS: GREG GAUTHIER



trails to the regional network. This will be the ninth property purchased since 2003 with Conservancy funds for addition to the South Coast Wilderness.

Palos Verdes Purchase

The Palos Verdes Nature Preserve in Los Angeles County will expand with the acquisition of the 190-acre Upper Filiorum property and the 28-acre Plumtree property by the City of Rancho Palos Verdes. This will link the Three Sisters Reserve on the west with the Portuguese Bend Reserve to the east, and will provide long-term protection of coastal sage scrub habitat that supports the California gnatcatcher, cactus wren, Palos Verdes blue butterfly, and other special status species. It will also provide trail connections and habitat linkages to other parts of the Preserve. The Conservancy approved \$5.5 million of Proposition 84 funds to the City, which will own the land, with a conservation easement over both properties held by the Palos Verdes Peninsula Land Conservancy (PVPLC), which will manage these and other parts of the Preserve. Management is also being coordinated with the California Department of Fish and Game and the U.S. Fish and Wildlife Service under the state's Natural Communities Conservation Planning process. The City, the PVPLC, and the Wildlife Conservation Board will also contribute funds to the purchase. The City and the PVPLC are working on a plan for better public access, trails, parking, and fire and brush management for when these properties are added to the reserve.



Montaña de Oro State Park to Expand

Montaña de Oro State Park will expand from 8,000 to 13,500 acres with the addition of 2,400-acre Wild Cherry Canyon and other protected lands near Avila Beach, in San Luis Obispo County. The American Land Conservancy (ALC) will buy the 160-year leasehold on Wild Cherry Canyon from the San Luis Bay and Pacho Limited Partnerships in early 2009, and immediately transfer these rights to State Parks for public recreation and resource protection. Then, by no later than 2025, the Pacific Gas and Electric Company (PG&E), which operates the nearby Diablo Canyon Nuclear Power Plant, will transfer the underlying fee title, while retaining some access rights.

The Coastal Conservancy approved \$5 million of Proposition 84 funds toward the

Top: Views across lands to be added to the Palos Verdes Nature Preserve in Los Angeles County.

Above: Wild Cherry Canyon, above Avila Beach in San Luis Obispo County

\$24-million purchase price in November. Also contributing are State Parks, the Wildlife Conservation Board, California Transportation Commission, Central Coast Regional Water Quality Control Board, San Luis Obispo Council of Governments, Hind Foundation, and other private donors.

Wild Cherry Canyon lies within the southeastern portion of the area known as the Irish Hills, a largely undeveloped, 60,000-acre rugged and mountainous coastal landscape southwest of San Luis Obispo. With rolling hills of maritime chaparral, grasslands, and dense coast live oak woodlands, the property provides

habitat for several threatened and endangered species, including the California red-legged frog, western pond turtle, and pallid bat. The land was considered likely to be developed due to its proximity to roads and services and its ocean views.

Eventually, environmental campsites may be established in Wild Cherry Canyon, and a 20-mile stretch of the California Coastal Trail is to be built between the communities of Los Osos and Avila Beach. New trail links are also being considered between the park and both the Port San Luis Lighthouse and the Bob Jones City-to-the-Sea Trail.

Freshwater Wetlands Protected at Watsonville Slough

The Watsonville Slough complex in southern Santa Cruz County is the largest area of freshwater wetlands on the Central Coast. The Land Trust of Santa Cruz County will soon acquire four properties totaling 486 acres in this area, so as to protect and enhance these wetlands, improve floodplain function and public access, and preserve agricultural lands.

The purchase price is about \$15 million. The Conservancy is contributing \$6.5 million in Proposition 84 funds, the Wildlife Conservation Board has approved \$5.5 million, and the Nature Conservancy will contribute \$1.5 million. In partnership with the Conservancy and WCB, the Land Trust has applied for \$1.6 million in U.S. Fish and Wildlife Service National Coastal Wetland Grants and also expects to raise local funds to contribute to the project.

The Watsonville Slough complex comprises riparian habitats, upland grasslands, and freshwater wetlands. It provides critical habitat for California brown pelicans, tricolored blackbirds, long-billed curlews, white-faced ibises, and other coastal and migratory birds, as well for the federally listed tidewater goby, south-central California coast steelhead, California red-legged frog, and other aquatic and riparian species.

The Land Trust's acquisitions will link two isolated Department of Fish and Game Ecological Reserve units and various other parcels so that a total of 850 acres of contiguous lands are protected in the Slough complex. The Land Trust will hold title to the newly acquired lands and manage them. It expects to help preserve farming opera-



Views of the Watsonville Slough complex: (top) white pelicans in Hanson Slough; (below) Tai Slough

tions on the property, while reducing soil erosion and sedimentation that is affecting the Slough's drainage capacity and water quality. Rowcrop farming will continue in upland areas, with revenues from rents applied to restoration, management, and further acquisitions.

Work to Begin on South Bay Salt Ponds

With a total of about \$15 million now secured for construction on the first phase of the 15,100-acre South Bay Salt Ponds Restoration Project—the largest wetland recovery project ever attempted in California—on-the-ground work can soon begin.

In November, the Conservancy authorized \$4.25 million from Propositions 50 and 84 funds for the project's first phase, with a number of other agencies contributing to the total. The Conservancy also authorized \$300,000 for the South San Francisco Bay Shoreline Study, which will identify specific flood control, habitat restoration, and public access improvement projects in the South Bay, including areas surrounding the salt ponds. These funds allow habitat restoration and public access construction to begin.

The former Cargill salt ponds will be reconfigured into a complex of managed

ponds and tidal wetlands to create conditions more closely resembling the historic landscape of San Francisco Bay. Public access will be improved, with trails, viewing platforms, cultural and environmental resource interpretive stations, waterfowl hunting, non-motorized boat launches, and parking areas.

Phase I will include five public access projects (interpretive platforms and overlooks) and six wetland construction projects. Restored wetlands are expected to provide not only improved habitats for a variety of wildlife, but more resilience to tidal flooding as sea level continues to rise.

Chaparral Spring to Enhance Mount Diablo Protection

Protecting the unique habitats of Mount Diablo and the surrounding wildlands has long been a focus of the East Bay Regional Park District (EBPRD), especially where it is possible to preserve wildlife corridors through large areas. The 333-acre Chaparral Spring property lies between EBRPD's 1,030-acre Clayton Ranch to the east and Mount Diablo State Park to the south. With its diverse habitats and shared borders with other parkland, it was a prime target for addition to the wildlife, open space, and recreational corridor between the State Park and the EBPRD-owned Black Diamond Mines Regional Preserve.

The Conservancy's approval of \$1.4 million in Proposition 84 funds to the EBPRD will enable the district to purchase the property from the nonprofit Save Mount Diablo (SMD), which bought Chaparral Spring in 1994, using private funds, with the intent of transferring it to a public agency for management. Chaparral Spring will be combined with the Clayton Ranch to form a new regional preserve focused on wildlife corridors and trail networks. SMD also secured an agricultural easement that allows limited grazing over 150 acres, which EBPRD likely will continue to lease to a local rancher.

Chaparral Spring includes the saddle between Mount Diablo and Black Diamond mines, the divide between the Marsh Creek and

Mount Diablo Creek Watersheds, with many canyons and dramatic views from the higher elevations. The property has grassland, oak savannah, blue oak woodland, chaparral, broadleaf evergreen forest, deciduous forest, ponds, and riparian corridor habitats. Wildlife there includes 17 special status species—California tiger salamanders, Alameda whipsnakes, Cooper's hawks, sharp-shinned hawks, and golden eagles among them—as well as rare plant species, including two endemics, the Mount Diablo sunflower and the Mount Diablo globe lily.

New Napa Park

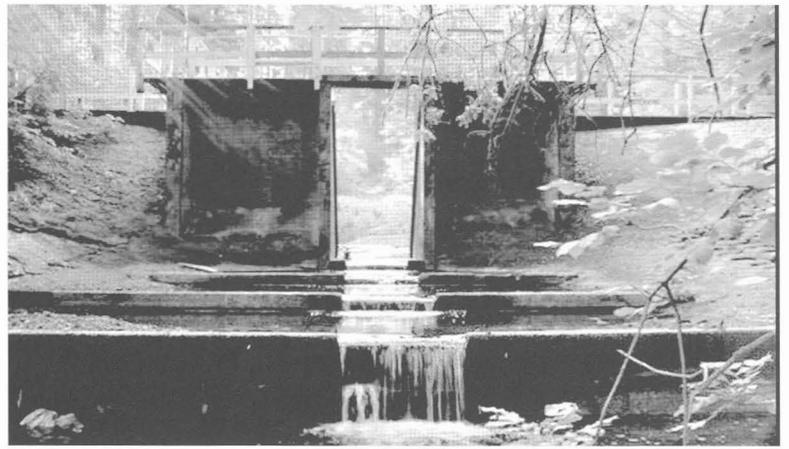
A new regional park will be created in central Napa County, east of St. Helena, with trails, campsites and cabins or yurts, a swimming pool, and many miles of multi-use trails. To make this park possible, the Conservancy approved \$1.65 million in Proposition 84 funds toward the purchase of the 673-acre Moore Creek property, adjacent to the City of Napa's Lake Hennessey watershed property. The Napa County Regional Park and Open Space District and Napa County will provide the remainder of the \$3.38 million needed to acquire the property and to plan and implement public access improvements.

This land is centrally located and well-suited for recreational uses. More than two miles of Moore Creek (a major tributary of Lake Hennessey, primary water supply for the City of Napa) runs through and along the border of the property, and the acquisition will open up public access to the north side of the Lake. It will also leave only a 4,000-foot gap in public and land trust-owned properties in the 25 miles between Lake Hennessey and Mount St. Helena, and will enable the creation of almost a fourth of the long-planned Napa Crest Trail, which would eventually encircle Napa Valley.

The Moore Creek property also has notable biodiversity, with a mix of oak woodland, coniferous forest, chaparral, grassland, and riparian habitats, and the benefits from being adjacent to large areas that are protected by conservation easements.

This house on Humboldt Bay's North Spit, built by Charles Stamp as his family home, is being renovated by Friends of the Dunes to serve as a visitor center and coastal interpretive center. It is envisioned as a "gateway to the dunes" and hub for a network of trails to and along the coast. The Conservancy provided \$525,000 in 2006 to help Friends buy the 113-acre property for \$585,000, and in September approved \$750,000 for the renovation.





About 200 acres of grassland will continue to be grazed by cattle, but they will be kept away from the creek and prevented from overgrazing, to keep the land from being degraded.

Access for Fish and People

The Camp Meeker Dam on Dutch Bill Creek in western Sonoma County was built in the 1950s to create a seasonal swimming hole and beach area, but now the dam is identified as one of the worst barriers to fish passage in the Russian River watershed. Another is a culvert at Market Street in nearby Occidental.

With funding approved by the Conservancy, the Gold Ridge Resource Conservation District and the Camp Meeker Recreation and Park District will remove the dam and reconfigure the culvert to restore free passage for salmon and steelhead. In place of the dam, a prefabricated 80-foot steel pedestrian bridge will be installed, improving public access across the creek. As part of this project, stream

banks will be stabilized and revegetated, and a more natural meander and grade change will be created. These improvements will help return the natural transport of gravel from upstream and provide better fish habitat.

The Conservancy's contribution of \$494,500 in Proposition 50 funds to the Gold Ridge Resource Conservation District will be matched by money from Sonoma County and several state and federal agencies. The project will restore fish passage to 3.4 miles of Dutch Bill Creek, one of only five remaining streams in the Russian River system where wild juvenile coho salmon are known to be present in each year of the species' three-year reproductive cycle.

Humboldt County Trails

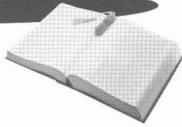
The City of Arcata is about to begin planning, engineering, and other preliminary work for 3.8 miles of California Coastal Trail that will run from the north end of Arcata through the city and a mile south, to Bracut Marsh. Much of the trail will be built

Top: Moore Creek in Napa County

Above: Camp Meeker Dam on Dutch Bill Creek in Sonoma County will be removed.

within the right-of-way of the North Coast Rail Authority. The City will work closely with the Authority, and with the nonprofit Redwood Community Action Agency (RCAA), which works to coordinate trail-building efforts in Humboldt County. The City expects to begin construction in 2010, as soon as the final design and environmental review are completed. The Conservancy has been involved with trail building around Humboldt Bay for 30 years, and has approved \$1.065 million in Proposition 40 funds for this Coastal Trail project.

The Conservancy also granted \$900,000 in Proposition 40 funds to RCAA toward the completion of Phase I of the Humboldt County Coastal Trail Implementation Program, which aims to complete the California Coastal Trail along the entire Humboldt County Coast.



UNDERSTANDING OUR GRASSLANDS

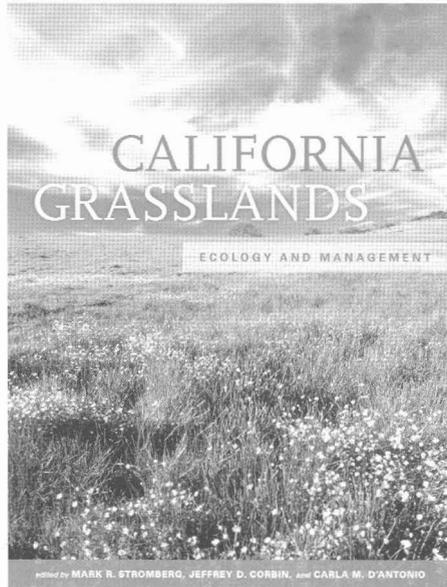
California Grasslands: Ecology and Management, edited by Mark R. Stromberg, Jeffrey D. Corbin, and Carla M. D'Antonio. University of California Press, Berkeley, 2007. 408 pp., \$55 (hard cover).

Those who would “restore” grasslands habitat and the native species that depend upon them, be warned: The composition of grasslands in California prior to European contact is unknown. And though scientific understanding of grasslands ecology has increased substantially, the management of grasslands in California appears to be as much art as science. Such is the theme of this remarkable new textbook from the University of California Press.

California's landscape has been highly altered for a very long time. Grazing began in earnest with the arrival of the Spanish. During the 1950s and later, property was managed with intensity and fervor. Forests were cleared rapidly for timber production; pastures were heavily fertilized and treated with herbicides to increase production; brushlands were mechanically and chemically cleared to increase pasture. Habitats were fragmented and degraded, and populations of native species faded or disappeared. Invasive and deliberately introduced species frequently gained the upper hand in modified areas.

But grass lovers must not despair. Grass is resilient. It preceded mankind (as evidenced by its presence in dinosaur dung), and it may yet outlast us. Moreover, the presentation of this much practical information on grasslands ecology and management is encouraging. Never before has so much information on the topic been assembled in any one place as in this book, practically divided into a brief overview, and sections on history, resources, ecological interactions, and policy and management.

Insofar as existing research permits, the reader can trace the ecology of our grasslands through time, and is given practical directions for future research and restoration measures. Facts are cogently related,



and anecdotes are debunked. For instance, whether grazing helps or hinders native perennial grasses appears to be demonstrable, at best, on a site-specific basis. Conversely, the notion that grazing simply degrades habitat is an oversimplification. A silver lining to the dark cloud of climate change is that research on carbon sequestration by grasslands will provide a better understanding of California's natural mosaic.

Much public and private funding has been spent to “improve” our grasslands for various purposes. It is reassuring that future efforts can be guided by such a thorough and easy-to-use resource.

—Michael Bowen

ALL ABOUT TROUT

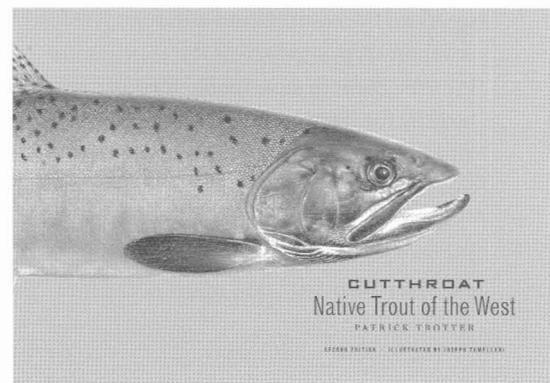
Cutthroat: Native Trout of the West (Second Edition), by Patrick Trotter, illustrated by Joseph Tomelleri. University of California Press, Berkeley, 2008. 560 pp. \$34.95 (hard cover).

Is the use of meristic characters (physical features with countable elements) preferable to genetics for the identification of trout? Where does mitochondrial DNA analysis fit in to trout taxonomy? If these burning questions keep you awake at night, then one way or another, Trotter's work is the solution to your insomnia.

But if your trout interests are more pedestrian, fear not; the reader who surmounts or skips over the daunting introductory chapters is rewarded with a series of detailed chapters on the 12 remaining and two extinct cutthroat subspecies of the western states. These well-written and sufficiently detailed regional descriptions tell a compelling tale indeed of how indigenous trout have fared under man's “improvement” of the West. What's more, these chapters are accompanied by the glorious illustrations of Joseph Tomelleri, which alone are worth the price of this work. Tomelleri is rightfully acknowledged to be one of the finest and most anatomically correct trout artists ever, rivaled in my opinion only by the early 20th-century works of Charles B. Hudson.

There are minor flaws to this fine work. In such a thoroughly documented book—footnotes and sidebars to excess—there are curiously unsupported notions. For example, regarding nomenclature, Trotter states that “[f]ishery scientists abhorred the name cutthroat,” but provides no substantiation for this assertion. The work also draws very heavily at times upon Dr. Robert Behnke's works; one wonders if Behnke's more portable *Native Trout of Western North America* wouldn't be an easier reference work.

It is also fair to warn any prospective consumer that this book contains myriad references to the author's personal angling history, a subject whose interest is mostly limited to armchair anglers. Overall, how-



ever, this scenic coffee-table work is diligently researched, well-written, and sure to brighten many an armchair angler's evening.

—Michael Bowen

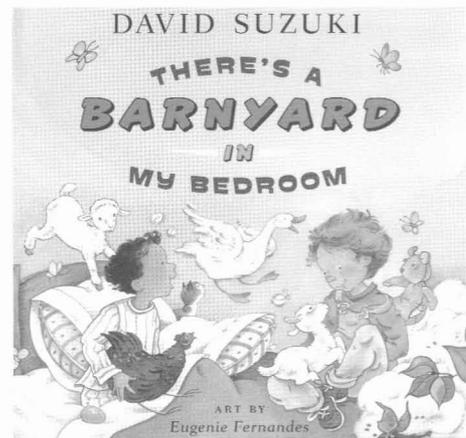
NATURAL LEARNING

There's a Barnyard in My Bedroom, by David Suzuki, illustrations by Eugenie Fernandez. David Suzuki Foundation and Greystone Books, Vancouver/Toronto/Berkeley, 2008. 58 pp., \$19.95 (hard cover).

Two children discover that everything in their house comes from nature. They learn how to see air, and how to travel

through time, with just a little guidance from their parents. This delightful three-chapter book invites learning in a most natural way, unmarred by deadly good-for-you words that can so easily kill a child's curiosity and enjoyment. David Suzuki is a scientist who clearly enjoys sharing his knowledge with children. A glossary, which includes "pollinate," "lava," "ice age," and "fungi," and a list of suggested activities will allow parents and teachers to make the most of these pages.

—RG



LETTERS

CLEARING UP FOREST MATTERS

Editor:

I greatly appreciated the latest *Coast & Ocean*. Excellent coverage of Malibu's Carbon Beach and the Presidio's museum conflict. Thank you for your ongoing and insightful coverage of these "controversial" topics; and the courage to represent the public viewpoint!

I found the sustainable forestry articles interesting. However, to include in the one-page editorial "Sustainable Forestry—With Owls and Fire" mention of only two "for profit" timber companies, Mendocino Redwood Company and Humboldt Redwood Company, as sustainably managed along with the "nonprofit" conservation timber companies was slightly misleading. There are many other "for profit" timber companies which are managed sustainably and are continuously improving their forests. In my opinion, the competition and mix of forest company types, as well as the continuous improvement in sustainable forestry, is healthy for the timber industry, the public, and the forest. I applaud your coverage of this issue.

The Conservation Fund has truly paved the way with their management of the Garcia River Forest. It takes many decades to

attain long-term sustained yield of timber products while enhancing public trust forest resources. The past 20 years have seen four timber company ownerships for this one 24,000-acre coastal redwood forest. Each ownership improved the forest to what it is today. With a conservation easement held by the Nature Conservancy, the Garcia River Forest is an exemplar "sustainably" managed forest. None of this would have occurred without funding participation of the State Coastal Conservancy for the acquisition.

Bob Whitney
Willits

PRESIDIO FINANCES

Editor:

An excellent presentation ["Museum War at the San Francisco Presidio," *Coast & Ocean*, Summer 2008] with wonderful photographs. Thank you.

Regarding this one paragraph: "Much more money will be required to realize the vision in the management plan adopted in 2002 after wide public discussion. How it should be raised is at issue in the current controversy."

I have been a student of the finances of the Presidio Trust Corporation since it got

started in 1996. In its first forecast in 1998, revenue from leasing buildings was estimated to be \$37 million by 2012. I wrote to them explaining why revenues would grow to \$60 million. After approving the 850,000-square-foot Lucas Film project, based on financial need, they shortly raised their forecast revenues to \$60 million. The Trust has not been truthful or informative to the public concerning its financial status.

Now we have obtained the Trust's newest internal draft forecast of revenues: \$80 million in 2013.

More important, the Trust documents show a surplus in revenue over operating expenses rising from \$10 million this year to \$40 million by 2022. The Presidio area ruled by the Trust with its own revenues is the richest national park in the entire National Park system.

The Trust Five Year Construction Plan includes rehabilitation of the Main Post historic buildings with their surplus funds. Ground rent paid by the art museum, if built, would be inconsequential. Financial need is not a rationale for the art museum or lodge or any other non-park related projects.

Donald S. Green
San Francisco



For years, a tiny section of Border Field State Park in San Diego has played a big role in the lives of many families divided by the border. It has been a place to visit, gossip, and share a picnic moment on both sides of the U.S.–Mexico border fence.

This unique opportunity is about to end. In May 2009, the U.S. Border Patrol is slated to finish construction of a controversial 3.5-mile border barrier project that will cut through the park. A second fence, north of this one, will block any chance of this kind of encounter. Access will also be closed to the beach, where people visit through a barrier of metal tubes that extends into the ocean.

—DM

David Maung's photo story on the construction of the border project and its effects on people will be published in the winter issue of Coast & Ocean.



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