

CALIFORNIA
COAST & OCEAN

VOLUME 20, NO. 3

AUTUMN 2004 • \$4.95

**LNG ON OUR COAST?
THE RESTORATION ECONOMY**

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CALIFORNIA COAST & OCEAN
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Cover photo: Cape Mendocino, by Thomas B. Dunklin, taken from a U.S. Coast Guard Helicopter. "Cape Mendocino, the furthest west point in California, is one of the most spectacular places I've found along the California coast. The sea lion rookery there is truly amazing—especially when you have to walk through them, which I've done a number of times while mapping the geology along that stretch with the USGS and Humboldt State University."

Dunklin is a geomorphologist who, after 15 years of working in the watershed sciences, has turned to digital video and photography as the most effective tools for conveying the simple essence of complex natural systems. More of his work (including many forest and river panoramas) can be seen at www.thomasbdunklin.com. In this photo by Steve Sillett, Dunklin is 110 meters above the forest floor, in the tallest known tree on earth (370 feet/113 meters).

Back cover: Sea lions in the Coronado Islands by Phillip Colla

CALIFORNIA COAST & OCEAN
California Coast & Ocean is published by the Coastal Conservancy Association with a grant from the Coastal Conservancy.

The Coastal Conservancy is a state agency that works with the people of California to preserve, improve, and restore public access and natural resources along the coast and around San Francisco Bay.



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Prepress and printing: University of California
Printing Services

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Articles appearing in *California Coast & Ocean* are indexed in *Environmental Periodicals Bibliography*, *Biology Digest*, and *Environment Abstracts*.

Printed on recycled paper with soy-based ink.

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The Restoration Economy

ONLY A COUPLE OF DECADES ago, anyone predicting that ecosystem restoration would become a significant source of employment might have been dismissed as a dreamer. Not any more. Along California's coast, millions of dollars are now being spent to remove barriers from streams to allow salmon and steelhead to return, bring back the tides to degraded salt marshes that were diked more than a century ago, and clean up old industrial and military sites so they can become something else, including wildlife habitat. State and federal agencies are even studying how to remove some obsolete dams that block the movement of sand to beaches.

Natural resource restoration is generating jobs and businesses for scientists, engineers, heavy-equipment operators, and many others. With roots in citizen activism on behalf of natural places and wildlife, this economic sector is expanding, largely thanks to bonds passed by California voters since 2000, which provided more than \$10 billion for parks, recreation, and water quality improvements.

"It's a growing field in California and on the national level," said David G. Cannon, president of Everest International Consultants, Inc., a Long Beach engineering firm that specializes in restoration. "Each year I hear of one or two small businesses opening and doing this type of work. Most are started by people leaving big companies." Small firms tend to do habitat restoration and water quality improvements, he said, while large companies are more involved with construction of wetlands designed to treat wastewater. "For most big companies it's a business decision. They go where the money is. Funds are drying up, to some extent, for conventional infrastructure improvements."

The work generally referred to as restoration consists, broadly, of efforts to improve the health and condition of ecosystems. In Germany it is called *Renaturierung* (renaturizing). That is a



Culverts are being replaced to allow fish to pass.

more modest term and, in most cases, more accurate, because to restore what has been destroyed is probably impossible. To shift from projects that aim to control nature to projects that try to work with nature, however, is not only possible, it has become essential for a variety of economic and other reasons.

California is the world's fifth-largest economy, thanks in large part to enormous government investments in public works that provided an infrastructure for the development of agriculture, industry, and cities during the first half of the 20th century. These projects—from dams and new waterworks to freeway networks and huge landfills—aimed to tame the wild and put it to use. Now the unintended consequences have come due, and further taming is too costly, both in terms of taxpayers' money and of natural values.

Water diversion projects that made irrigated agriculture possible on arid lands have overdrawn the resource, with devastating consequences to fish and fishing and coastal communities. Soil salinity has become a problem in irrigated fields. The destruction of wet-

lands for housing and industrial development has buried fish nurseries and contributed to beachwater pollution. Forest practices that failed to take soil stability into account have changed entire landscapes. As dams and other structures restrict the natural flow of sand down the rivers to the ocean, California's most alluring recreational resource—its beaches—is becoming sand-poor.

The turnaround began with creative activism by local citizens. The first buried urban stream in California to be "daylighted" was a stretch of Berkeley's Strawberry Creek. That happened in 1980. Since then, many more streams have been freed from concrete confinement, bringing back habitat for wildlife and aesthetic improvements to communities—and also showing that riparian restoration can be more economical than conventional hard-structure flood control. Even on the Los Angeles River work is moving forward to provide room for some flood waters to spread, recharging groundwater, rather than being rushed to the ocean at deadly speed.

(continued on page 12)

PROMISE OBSCURED
BY THE GLARE OF
CONFLICT

What's at Stake in the Klamath Basin

ORNA IZAKSON

DRIVING NORTH on Highway 96 along the Klamath River as it cuts through the rugged Klamath-Siskiyou Mountains of far northwestern California, Ron Reed catches the eye of a driver in a silver truck heading in the opposite direction.

With an exuberant shout, Reed slams on the brakes, wheels around, and parks at a pullout. We step out. Trees at the gravel's edge shade an almost invisible snippet of road winding down the hillside to a tiny waterfall. The other truck has stopped too. It's like Reed's, with the Karuk Tribe's seal on the side.

Three men get out. One pulls a large fish from the back of their truck: the first salmon caught this season at nearby Ishi Pishi Falls, the center of the world to the Karuk people.

"This is Ken Brink, we call him Binx," Reed tells me, introducing a young man in blue shorts.

"This is Earl Aubrey, we call him Scrub." The lithe older man nods in acknowledgement.

"This is Gene White, we call him Cheetoh." The third man, red baseball cap on backwards, offers his hand.

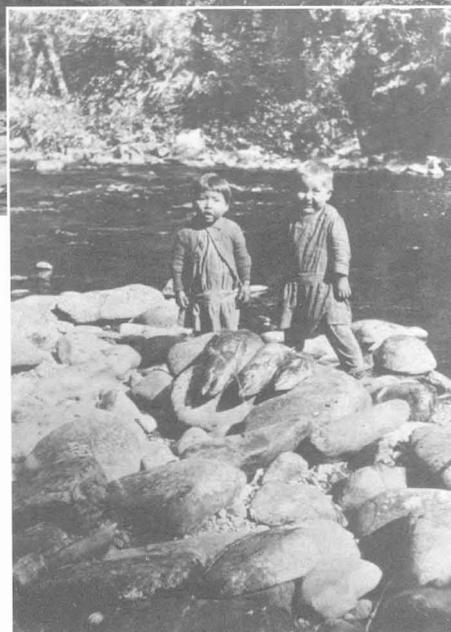
Aubrey, assisted by Brink and White, caught the spring chinook salmon in the old way: reaching far out over the whitewater and running a long-armed dipnet into deep holes where the fish rest on their way upstream. They then carried that first salmon through the riverside willows to the car and drove here to clean it.

Reed, the tribe's cultural biologist, speaks for the traditional tribal fishermen to the rest of the world. He participates in tribal and other salmon-recovery efforts, works with government agencies, and talks with the press. His background is traditional, not academic. For thousands of years, the Karuk have passed on to individuals or families the right to fish at certain places along the river. Reed has an ancestral right at Ishi Pishi Falls, where he, like Aubrey, fishes in the old way.

Brink cleans the three-foot chinook with practiced efficiency. Using a small knife, he



RON REED



ONLINE ARCHIVE OF CALIFORNIA

Top: Two Karuk fishermen use dipnets to catch salmon at Ishi Pishi Falls.

Above: Native children with salmon caught near the mouth of the Klamath River

slits the belly and removes the guts, moving the fish from slow water to fast and back again in the pool at the base of the little waterfall, washing away the blood and innards.

In the past few days a pulse of water has been released from Iron Gate Dam upstream, the farthest downriver of six Pacific-Corp hydroelectric dams that cut across the Klamath. The dams block all oceangoing fish—including salmon and steelhead—from crossing the Cascades to traditional spawning grounds as far from the sea as Klamath Falls, Oregon, more than 250 miles upriver.

It takes a day and a half for the water from Iron Gate to make it the 100-plus miles to Karuk country. When it arrives, the water is dirty with farm runoff and hot—as far as fish are concerned—from the unrelenting summer sun. The pulse drastically changes the shape and speed of the water moving over the rocks at Ishi Pishi Falls, creating a surge of whitewater and eddying side-pools the fish follow—in the case of this particular salmon, straight into Aubrey's dipnet.

Aubrey says the first fish of the year must go to someone who needs it. It's the tradition, and it's the way things should be. This one will go into the cooler in Reed's pickup with smaller fall chinook to feed the people attending a war dance the next night, a dance in which Reed's family and others will pray for a solution to the seemingly intractable political problems that keep the

Karuks from the fish their culture has always relied on.

Not a Simple Story

REED, BRINK, AUBREY, and all the Karuks are unsung but integral actors in the now famous battle over water in the Klamath Basin. In the black-and-white world of political debate, the region's problems boil down to a fight between fish and farmers, both of which need water to survive. The reality, of course, is not nearly that simple.

A complex of upstream wildlife refuges depends on water to protect the largest breeding population of bald eagles in the Lower 48. Flocks of tourists come to watch the massive migration of ducks, geese, and other eagle prey. Four tribes—the Klamath Tribes upstream, the Karuk, Yurok, and Hoopa downstream—have varying levels of rights to fish guaranteed under treaties, and the oldest water rights in the system. And finally, there is the coastal and river economy, which has long depended on commercial and sport fishing of salmon from the Klamath River, an economy that has largely collapsed as fish runs plummeted.

The fight in which the Karuks are engaged is not just a regional one. The powerful California water lobby, which relies on federally subsidized water in the Central Valley, also holds sway. Even Karl Rove, top advisor to President George W. Bush, has gotten into the act. According to the *Wall Street Journal*, Rove in 2002 pressured the U.S. Department of the Interior to divert more water to the farmers, thereby helping to boost the political fortunes of Senator Gordon Smith of Oregon and other Republican officeholders in agricultural regions.

It may be most accurate to portray the conflict in the Klamath River watershed as a struggle between those who rely on water diversions upstream and those whose livelihood depends on seeing that the water stays in the streams. As that struggle continues, everyone on the river is losing.

Big News

DURING THE DROUGHT summer of 2001, in an effort to enforce the Endangered Species Act, federal agencies cut off the flow of irrigation water to some 1,400 farms in the upper basin of the Klamath to leave more water for the fish. The action was

Harry Roberts and a Yurok woman hold salmon caught near Requa, at the mouth of the Klamath River, c. 1920.



ROBERTS'S COLLECTION, HUMBOLDT STATE UNIVERSITY LIBRARY

taken in light of a 1999 ruling by the U.S. Ninth Circuit Court of Appeals that the needs of protected species trumped other interests in the Klamath region. The water cutoff affected about 40,000 acres of active cropland out of about 230,000 acres covered by the federal Klamath Irrigation Project. Roughly 200,000 acres of crops and grazing lands watered from private and local irrigation systems were unaffected. Protests erupted, making national news. A few farmers defiantly opened the headgates leading from Upper Klamath Lake into irrigation canals. The water was soon shut off, and in any case it was too late in the growing season to do the farmers much good. That year the farmers took a direct hit in their wallets. According to crop reports provided by the farmer-rancher advocates who run the web site Klamath Basin Crisis, the farms served by the federal irrigation district in 2001 grew only \$17.5 million in crops—almost \$20 million less than the previous year.

In 2002, however, the fish took the hit. Despite continued drought, the U.S. Bureau of Reclamation gave farmers their usual water supply, and their crop production exceeded \$54 million. But September saw the biggest fish kill in memory, with upwards of 33,000 dead chinook salmon rotting by the riverside, as much as a third of the last even marginally healthy salmon run in the watershed.

Public Works and Farming Values

ECONOMIC PRINCIPLES are often invoked by those who want to balance the demands of resource extraction and wildlife needs. On the Klamath, this means balancing the needs of farmers, fishermen, tourism-dependent communities, tribes, and imperiled species. But the easiest factors to quantify aren't parallel from one end of the basin to another. Many reports lump very different kinds of operations under a single heading, making it difficult to tease apart fishing and farming numbers.

Farming in the upper basin dates from the 1860s, when European Americans began cultivation around the lakes straddling the Oregon-California border. The big push came with the Federal Reclamation Act of 1902, when Congress made irrigation of the arid West a national priority and began to support the dam building and

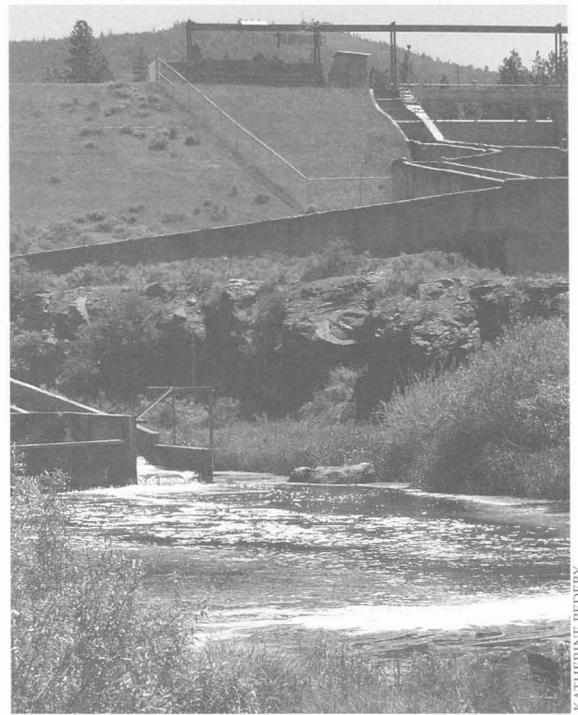
diversion projects. The effects of such water projects on resident and migrating fish were either not understood or simply ignored.

The region's marshes and seasonal lakes were relatively easy to reroute, and in the winter the lakes could store water for farmers' summer use. Sixty thousand acres of near-desert and former lake bottom were transformed into irrigated fields for growing alfalfa, hay, potatoes, onions, and horseradish. After each of the World Wars, the federal government gave away land in the Klamath to veterans by lottery. Along with the gift of land was the promise of water to irrigate that land.

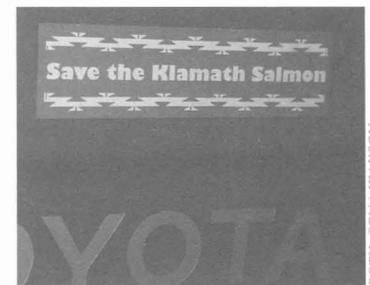
The Klamath Project was one of the first three major federal reclamation efforts, according to Dan Keppen, executive director of the Klamath Water Users Association. In 1910, a dam was built on Clear Lake, slowing and controlling the Lost River. In 1923, the Malone Diversion Dam, one of five on the Lost River, began to send water to Tule Lake Sump, an area once part of Tule Lake. From there it was pumped through a range of hills and down to Lower Klamath Lake. What was once Tule Lake is now farmland and the town of Tulelake, California. "Essentially, where once you had a lake you now have communities," said Keppen.

Aaron Douglas, an economist with the U.S. Geological Survey, estimates that upper basin crops now bring farmers around \$100 million a year, based on figures generated by the Bureau of Reclamation. In 1998, that money was worth a total of \$283 million as it was spent and respent throughout the region, according to a 2004 report by the National Research Council (NRC).

But while roughly 2,500 upper basin farmers make some money from their land, that money is not always a livelihood. According to the NRC report, only 60 percent of the farmers considered farming their primary occupation, and nearly 30 percent of farm operators spent more than 200 days per year working at an off-farm job. For 43 percent of the farms, annual sales bring in



The antiquated fish ladder at J.C. Boyle Dam. Phosphate foam from farm runoff feeds algae blooms in the pool below the ladder.



Top: A farmer in the upper Klamath Basin protested the 2001 water cutoff.

Bottom: A common bumper sticker in the Klamath region



Heavy irrigation, as in this upper Klamath Basin hayfield, continued after water needed by salmon was diverted in 2001.

ORNA IZAKSON



Blythe Reis has seen fishing-related business at her Sandy Bar Ranch plummet.

less than \$10,000, and that only with the help of generous subsidies, including power and water. Nineteen percent of the farms received government payments averaging \$6,720 in 1997, the NRC reports.

The 2001 water shutoffs, and farmers' response to them, led congressional leaders to put \$50 million into the 2002 farm bill to support more efficient water use, Keppen says, with farmers putting up 25 percent in matching funds. Some of that money has gone to more efficient water use, but some of it encouraged farmers who had not been irrigating to begin doing so, said farmer Jean Anderson.

A major subsidy—low electrical rates—may end soon. That loss would be a major financial blow to farming in the upper basin. In 1917, the Bureau of Reclamation, which oversees water storage and distribution, struck a deal with the California and Oregon Power Company (COPCO), PacifiCorp's corporate predecessor, to give farmers within the upper basin a massive discount on electricity. According to a report by the Oregon Natural Resources Council (ONRC), the total subsidy averaged \$9.9 million for nearly 2,600 farmers. That money is made up by PacifiCorp's shareholders and ratepayers.

Under that agreement and subsequent amendments, farmers in most of the upper basin pay between 0.3 and 0.6 cents per kilowatt hour for electricity; comparable users elsewhere in Oregon and California

pay about 5.5 cents, according to the report. The deal also includes free powerline extensions and exemptions from standard fees.

The subsidy expires in 2006, and ONRC says it's unlikely to be renewed—with devastating results for farmers. For instance, farmers in the 41,000-acre Tulelake Irrigation District currently pay roughly \$40,000 per year to run their pumping plants; without the subsidy, the ONRC report calculates that amount would jump to \$667,820 annually.

Fishing Values

WHERE THE KLAMATH River enters the Pacific Ocean, the economy already has been devastated.

Klamath River salmon runs were once the third largest in western North America, according to Glen Spain of the Pacific Coast Federation of Fishermen's Associations (PCFFA). He estimates that without the dams, rerouted water, and extensive logging, the river would support a \$4.5-billion sustainable annual fishery today.

Real-world numbers are harder to pin down, but it is clear that the fishery has largely collapsed, and fisheries managers have severely restricted catches of foundering Klamath River runs. Ralph Brown, a commercial fisherman, county commissioner, and member of the Pacific Fishery Management Council from Brookings, Oregon, says that it's difficult to make good comparisons about the value of the fishery.

In a presentation to farmers, Brown noted that the salmon fishery offshore from the Klamath watershed took in \$13 million in 1978—worth a fair bit more as that money cycled through the community. In 1980, that increased to \$18 million—and then plummeted. By 1984 it was just \$6 million; today's catches bring in about \$1 million locally each year. In the same period, the number of boats with permits to catch Klamath River salmon dropped from 8,000 to about 2,000.

The crash of the salmon runs has also affected communities along the river that historically have depended on sport anglers. Blythe Reis has owned and run Sandy Bar Ranch in Orleans, a 78-mile drive from the coast, for 12 years. Her riverfront cabins used to be filled with anglers from September through December. "Now I book between one and two months for fishing," she says. "Half of the September business is not even fishermen. What I'm having as far as my fishing clientele are the people

who've been coming forever" to Sandy Bar and that stretch of the Klamath River. "If their goal were to catch fish, they wouldn't be coming here. We're not seeing the new generation of fishing people."

Shops, restaurants, and other services in the region also feel the loss. "There used to be 26 drift-boat guides between Happy Camp and Weitchpec," Reis says. "Now there's six."

Since 2000, restrictions on ocean sport fishing between Fort Bragg and Coos Bay, Oregon, have been reduced, according to the PCFFA's Glen Spain. Brown says the community feels the difference. "People are just kind of more buoyant, life just looks a little rosier," he says. Spain predicts, however, that severe restrictions will soon be imposed on both sport and commercial fishing. Because of the massive fish kill in 2002 and the low number of adults expected to return from that year's juvenile stock, he says, "We're at the point where we can't afford to catch any Klamath fish."

A Tradition Undermined

REED GOT THE COOLER full of salmon for the war dance earlier in the day from Tommy Willson, a Yurok friend downriver. The Yuroks have fishing rights along the lowermost 44 miles of the Klamath River.

It's an old tradition, going downstream for ceremonial fish, an extension of a barter economy that has existed as long as the tribes have been neighbors. But this tradition has been undermined by federal restrictions that give unequal weight to treaties signed by the different tribes—and have impeded the Karuks in their practices. Because their 1851 treaty was never ratified by Congress, the U.S. government does not recognize their subsistence fishing and hunting rights. Unlike the Yuroks and Hoopas downstream, they need the same licenses and must abide by the same restrictions on their traditional lands as any non-tribal hunter or angler.

Traditionally, the Karuk brought a deer or elk to trade for salmon with the Yurok. But according to the state Department of Fish and Game, it's not yet hunting season. "It's almost shameful that I'm coming down here and have to offer money," Reed said on the way to Willson's. Willson, for his part, said he'd much prefer a deer or an elk, but he understands. "The Hoopa [whose reservation abuts the Yuroks'] got



screwed a little bit" in their dealings with the federal government, he said. "We got screwed a little bit more. But the Karuks got screwed a lot."

When Reed explained that the fish were for a family war dance the next day, Willson asked, "Who are you going to war against?"

The simple answer: That which keeps the people away from the fish. "We've got these management practices that are taking our food from us, our culture, our tradition," Reed explains. "They are disrupting the single resource that we depend on as an independent nation. . . . Back in the day, if people were obstructing our food like this, it would have been war."

Yurok Tommy Willson, left, sells fall chinook salmon to Karuk cultural biologist Ron Reed.

ORNA IZAKSON



At J.C. Boyle Dam, almost the entire flow of the Klamath River is diverted into turbines that generate electricity.

Restoration— A New Economy

WHILE CONFLICTS of interests between upriver and coastal people have made news, a bigger, more hopeful story has gotten little media attention.

Public money has been flowing into the region to restore the natural economy—to repair years of damage to streams and watersheds for the sake of the salmon and steelhead—and in the process has created new jobs. The flow of dollars began during President Bill Clinton's administration, after protections for the threatened northern spotted owl and marbled murrelet put much forest land off limits to logging. The federal funds were intended as an investment to help the region make the transition from dependence on the timber industry to something else. Local people went to work decommissioning roads, replanting eroded stream banks, and taking out failing culverts. Many were retrained in high-value skills they can use for their livelihoods in a new restoration economy.

According to a 2004 report by Forest Community Research, based in Taylorsville, California, public agencies and private entities ranging from the National Park Service and Bureau of Indian Affairs

to Humboldt County Public Works spent \$4.6 million for restoration in Humboldt County in 1995; by 2002 they had invested a total of \$14.5 million.

"Half of my fisheries techs are ex-loggers," says Toz Soto, a fisheries biologist with the Karuk tribe. "They were loggers or fishermen."

Earle Crosby, watershed restoration coordinator for the Karuks, is a part of that new restoration economy. Starting in 1998, the tribe hired 18 tribal members through a program that trains heavy equipment operators. They began decommissioning roads in the national forest that might collapse in winter rains and destroy salmon spawning grounds.

During the training, laborers and operators made between \$10 and \$16 an hour—a decent living wage for the remote, rural area—with unemployment benefits kicking in during the off-season. For those who found jobs after training, the pay rose to the prevailing wage—\$31.42 to \$47.51 an hour.

The tribe's two restoration projects along Steinacher and Irving Creeks have a combined budget of nearly \$4 million over six years, from a variety of federal sources. Crosby says nearly 75 percent of that money stays in the local community or the region. Other Klamath Basin tribes have undertaken similar restoration initiatives.

Reis, of Sandy Bar Ranch, is a big fan of restoration: "I would like to see my taxes going to do restoration work in this area—or restoration work anywhere." However, she says, the federal money may now be drying up, along with prospects for fish recovery.

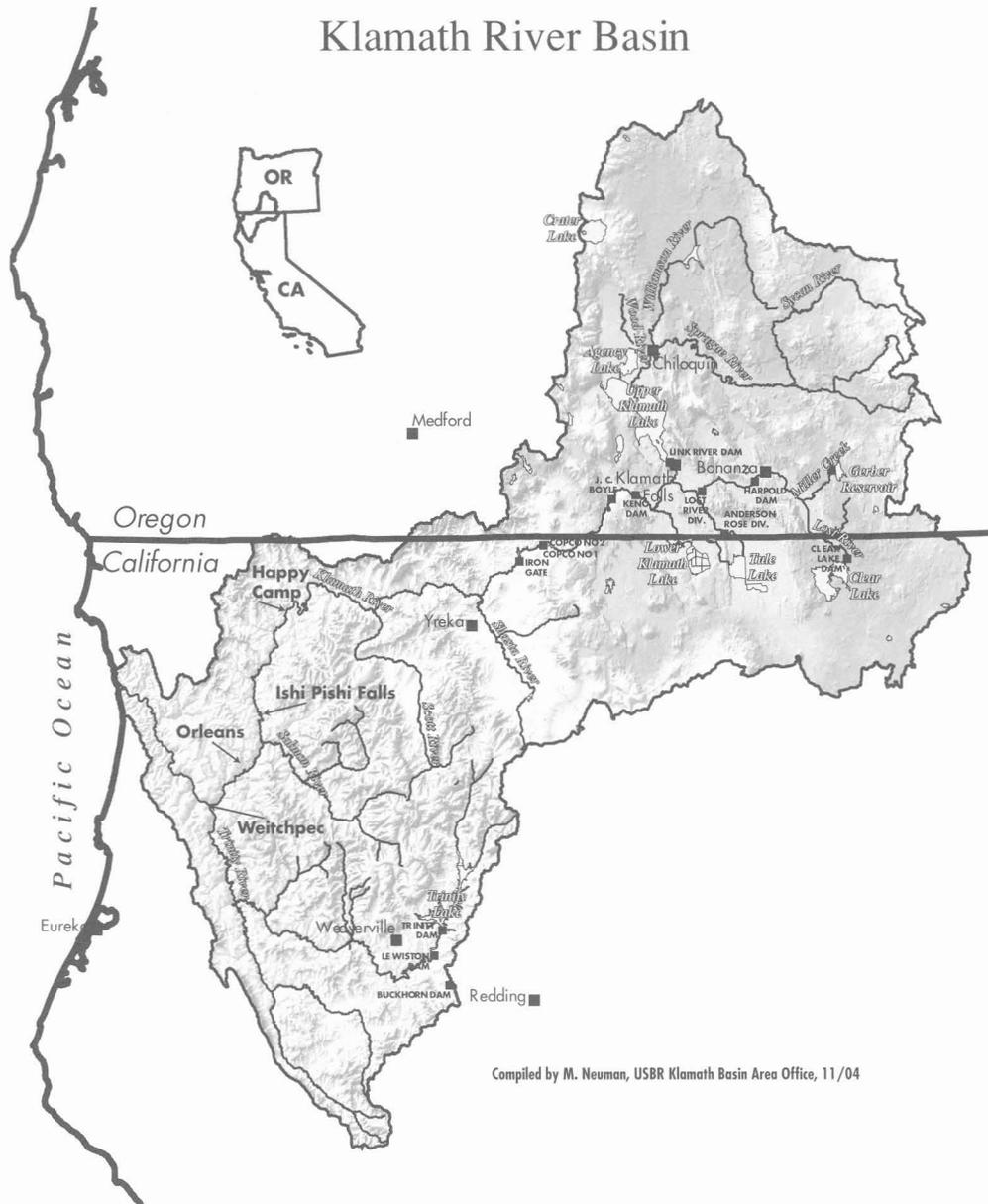
"We had 20 years of the Forest Service surveying for summer steelhead, spring chinook, fall chinook," Reis said. "And now there's no money to do those surveys. Their entire fisheries crew was let go. Now they have one person in charge of fisheries."

Some Amazing Calculations

DURING THE PAST few decades, some economists have begun talking about recreation and tourism—along with quality of life—as economic drivers.

In the old way of thinking, the Pacific Northwest's economy was bound to collapse if logging was stopped. To economist Ernie Niemi—who works with ECONorthwest, an economics consulting firm in Eugene, Ore-

Klamath River Basin



Compiled by M. Neuman, USBR Klamath Basin Area Office, 11/04

gon—that notion is just silly. When logging ceased, the region’s economy grew, he pointed out. Western Oregon effectively sold itself as the “Silicon Forest,” bringing in technology companies. Real estate boomed, and Californians moved north in droves. “What we did for the forests had benefits in addition to costs,” he said. “What we do with the water in the Klamath Basin also has benefits in addition to costs.”

A study of the economic benefits of in-river sport fishing on the Klamath done by the U.S. Geological Survey’s Aaron Douglas yielded surprising results. His December 2003 report calculated that restoring the Klamath’s water—including buying farmland and annual water rights, and purchasing forest land where erosion-causing activities

harm water quality—would cost \$1.7 billion, but that the potential benefits would be substantially greater.

Despite poor water quality and tiny catch limits, anglers spend \$372 million each year in the Klamath Basin alone. This increases to \$1.5 billion annually when combined with expenditures on the Trinity River, the Klamath’s biggest tributary. The Trinity’s fish would also benefit from watershed improvements.

Anglers forego \$1 billion in wages annually to go fishing on the Klamath. But comparing “present value”—the amount you need to pay now to have something return in perpetuity, like returns on a bond—the benefits of this sport fishery total a one-time, current amount of \$20 billion.

RON REED



Both sets of numbers—the “present value” of \$20 billion and the current annual expenditures—would increase by one third, Douglas projected, if water quality was improved by 45 percent and legal catch limits were doubled.

A War Dance for Peace

IT'S DARK AT Ti Bar Flat. The Big Dipper hangs bright above the knife-edged silhouette of the mountains. Eighty or so Karuk people and their non-tribal neighbors stand on one side of a fire, or sit on folding chairs, waiting for the war dance to begin. Just up the hill, 19 men and boys in regalia stand by their own fire, shouting and getting their blood pumping.

Behind the crowd, food is piled on tables as at any summer evening's picnic: beans, potato salad, and a whole lot of salmon—one of them the spring chinook Aubrey, Brink, and White caught the day before.

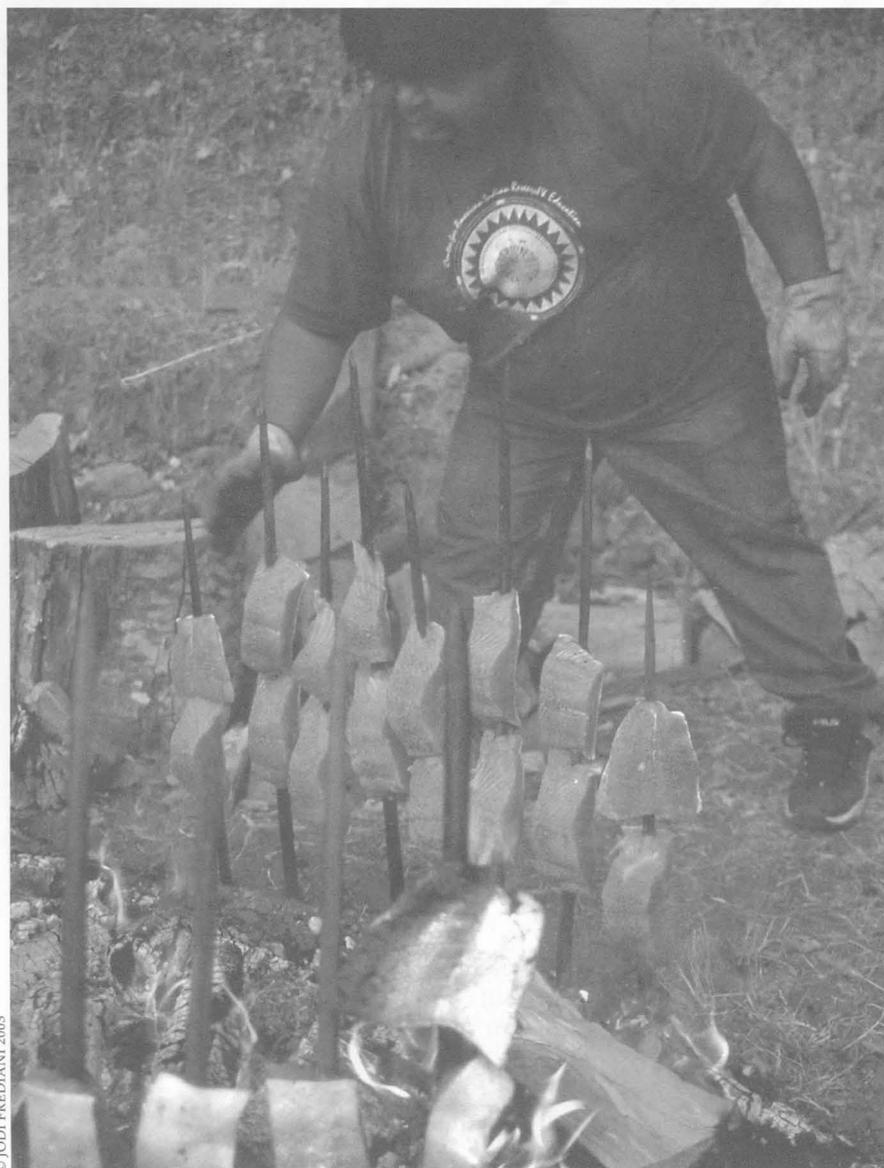
It's the sixth year Reed and his family have sponsored this war dance for the fish and the people who want them to return. Reed explains that real war dances have very little to do with the Hollywood stereotype of a tribe building up aggression and praying for the ability to murder their enemies. In fact, he says, they're about just the opposite: In war dances, the people dance and pray for a road to reconciliation, a way to avoid war.

Ron Reed's eldest brother leads the dancers single file to the fire, eagle feathers standing tall at the back of their red headbands. They line up facing the crowd on the fire's far side.

The chanting begins, songs without words, songs that are prayers, songs that ask for strength and wisdom and guidance.

In twos and threes and sometimes fives, men or boys step forward from the line, face the crowd, and dance. Reed's 50-year-old brother, the oldest in the line, leads the chanting; Reed and three of his sons dance.

© JODI FREDIANI 2003



Top: Karuk dipnet fishing at Ishi Pishi Falls

Bottom: David O'Neill, a Yurok, cooks salmon fillets the traditional way, on redwood skewers by a madrone fire.

Their dancing is squat and angular as they weave among each other. The men and boys bark and brandish weapons: quivers of arrows in one hand, miniature spears, deer horns, or single arrows in the other. Occasionally someone steers the youngest dancer, about three years old, away from the fire.

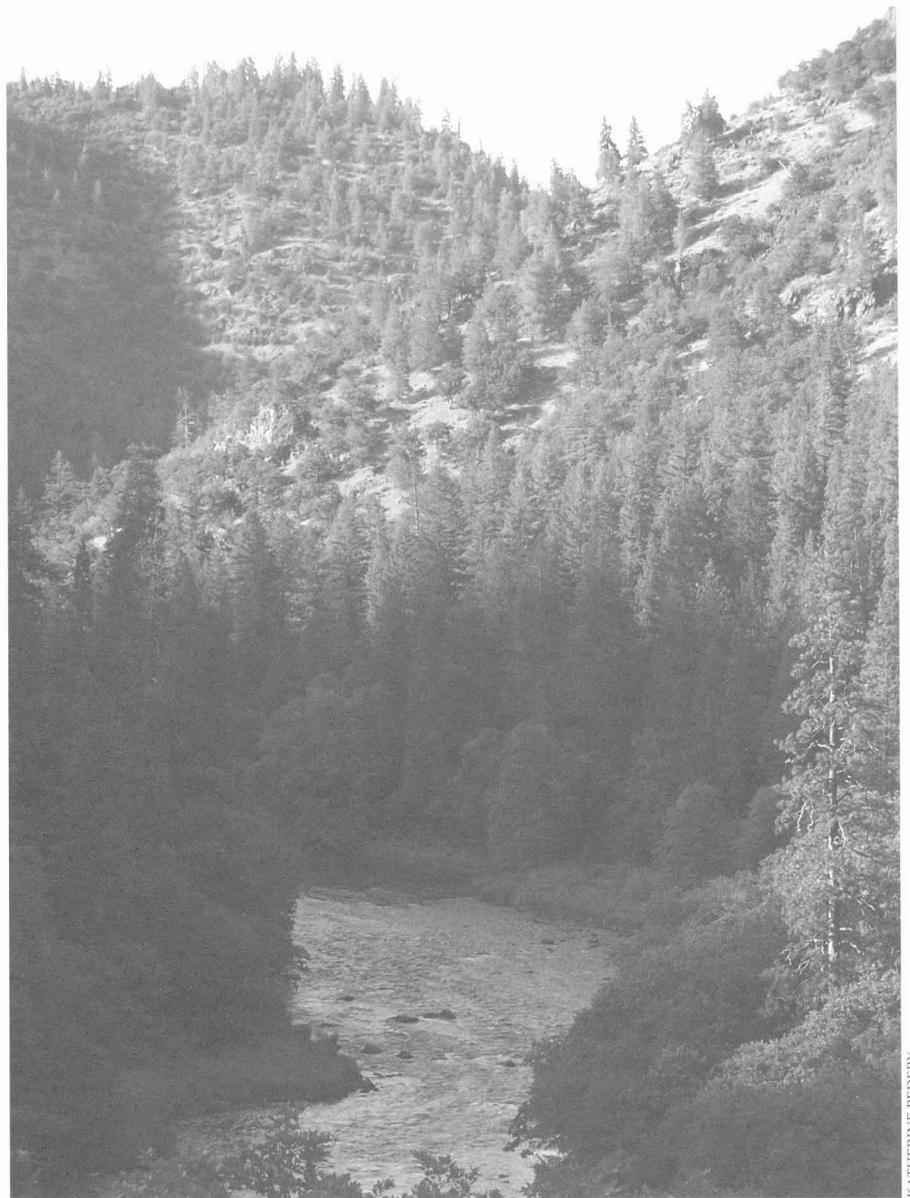
Traditionally, Reed explains, if two tribes or two groups within a tribe had a grievance against each other, the first step toward a peaceful solution was a war dance. At the dance, the two parties would take turns dancing, each trying to outdo the other. After both had danced, they would sit down to negotiate a way out of their problem. And so the events went: rounds of dancing, rounds of negotiation, over and over until a solution was found or the only option left was war.

This war dance differs from the tradition in that there isn't a single entity to dance and negotiate with. Ron describes the partner as an "imaginary foe."

The foe is diffuse, but not entirely imaginary. What keep the salmon away are federal lawmakers who refuse to hold up their end of the Karuks' unratified treaty of 1851, overfishing in the ocean, land management practices that worsen water quality and impede water flows, upstream irrigation, dams that block fish passage, instream mining, and more. "Now we're praying to the Creator to show us the way, how to make this wrong right," Reed says. "It feels like you're drawing strength from the Creator and you're showing the people watching that you have a direct connection with the Creator at that point, and you're asking for wisdom, guidance, and direction to solve the problem that is at hand."

One common thread binds all who live in the Klamath Basin: The federal government made promises on which it subsequently reneged. There's not enough water to meet the promises to the tribes, to the farmers, to the fishermen, to the protected fish. Science does explain what imperiled species here need to survive, but the science is overrun by human politics.

Economics may provide firmer ground for rational decision making, especially if power subsidies to upper basin farmers are not renewed. Yet all resource struggles in the American West have a mythic quality. When confronted with the loss of such archetypes as the American farmer or the Northwestern logger, policymakers often



KATHERINE PEDERY

make choices based on emotion rather than logic.

Since 2001, farmers in the upper basin have benefited politically from their mythic status. Real fishermen, anglers, tribal members, resort owners, and threatened species may eventually become myths themselves—and nothing more. ■

Orna Izakson is a freelance natural resource reporter in Portland, Oregon, and associate editor of Tidepool.org.

The Klamath River below J.C. Boyle Dam

The Restoration Economy, continued

Buena Vista Lagoon, between Oceanside and Carlsbad, was once a tidal system. This 1972 photo shows houses built on the beach berm.



CALIFORNIA COASTAL RECORDS PROJECT

Buena Vista Lagoon, 2004. A concrete weir built in 1972 turned the lagoon into a freshwater lake. New and bigger houses are protected by riprap.



CALIFORNIA COASTAL RECORDS PROJECT

Such projects have created new models for addressing problems resulting from insensitive development. Restoration pioneers introduced approaches that work with rather than against nature. By so doing, they found they could resolve some intractable conflicts and get more value at less cost.

Dire necessity was a potent catalyst, as in the Sonoma Baylands restoration on San Francisco Bay. In the early 1990s, the Port of Oakland faced a crisis. It needed to dredge a

deeper ship channel, but could not do so without an acceptable site to put the dredged sediment. Proposals for dumping in the Bay met with fierce resistance from fishermen and others, as did proposals for ocean dumping. The dilemma was resolved by creative thinking and persistence. Laurel Marcus, who managed the Sonoma Baylands project for the Coastal Conservancy, made a connection between the Port's need and the value of clean bay sediment to a marsh restoration project in Sonoma County. Mud

clean enough to meet regulatory standards was barged from the port to the North Bay and poured on the site to build up subsided areas. This accelerated the recovery of the tidal salt marsh, and the Sonoma Baylands too became a model for others.

A restoration project may be as small and satisfying as the removal of a culvert to allow fish to travel to upstream spawning grounds. It can be frustrating and near-impossible, like the efforts to eradicate fast-growing invasive plants. Some projects are enormous multi-partner enterprises that require years of study, mathematical modeling, negotiation, scientific review, and work with local citizens and public agencies before the first bit of dirt is moved.

"I happen to be one of the people who likes every single aspect of [this kind of work]," said David Cannon, who recently completed a feasibility study for the restoration of Buena Vista Lagoon, one of San Diego County's six coastal lagoons. This lagoon's self-renewal system has been disabled. Homes have been built on its shores and the tide has been excluded, turning it into a freshwater lake. Now it is filling in with sediment, cattails are overgrowing it, and water quality is poor.

Cannon's firm evaluated the feasibility of several possible restoration alternatives, their costs, and probable outcomes. This study, funded primarily by the Coastal Conservancy, is only one step toward a job that could run to \$10–\$100 million, depending on which alternative is chosen.

That's not unusual for this kind of project. Estimated costs for restoring the Bolsa Chica wetlands are \$90 million, a little under those for the South San Francisco Bay Salt Ponds. If that sounds like a lot, some perspective may be useful: The cost of building the Highway 237–I 880 interchange near San Jose was \$70 million.

Restoration work has attracted talented, highly motivated, and energetic people, Cannon among them. In 1988, with a University of Delaware master's degree in civil engineering, he was about to take a job with an East Coast engineering firm that held military contracts. He changed his mind after he was asked for blood samples and learned these were needed to make sure he could tolerate low doses of radiation.

So Cannon went west to Long Beach instead, to Moffat and Nichol, a firm that specializes in shoreline preservation and protection. Acquainting himself with the Bolsa Chica wetlands led him to decide he needed to learn more biology. So he moved

to a biological consulting firm and then, in 1999, "after having mastered the italics—key to biology," he joined a small four-year-old structural engineering firm and led it into restoration work. Everest Consultants employs 20 people, providing the equivalent of 12 full-time jobs.

Because restoration is only beginning to be recognized as a significant industry, its economic impacts are hard to estimate. A pioneering study by researcher Mark Baker for Forest Community Research, published in March 2004, gives a sense of what it has meant to the North Coast. In *Socioeconomic Characteristics of the Natural Resources Restoration System in Humboldt County, California*, Baker reported that the restoration sector contributes significantly to the regional economy and generates significant local employment. "Between 1995 and 2002 it generated more than \$65 million for restoration work, almost all of that from restoration contracts and grants from state and federal agencies." In 2002, according to the study, about \$14.5 million and 300 jobs (210 full-time equivalents) were generated, about twice the value of commercial fishery landings in the county.

The study determined that natural resource restoration may be called an industry, although it has characteristics that distinguish it sharply from most industries. In Humboldt County it is a closely interrelated system, "rooted within an environmental stewardship ethic that prioritizes ecological health over revenue generation."

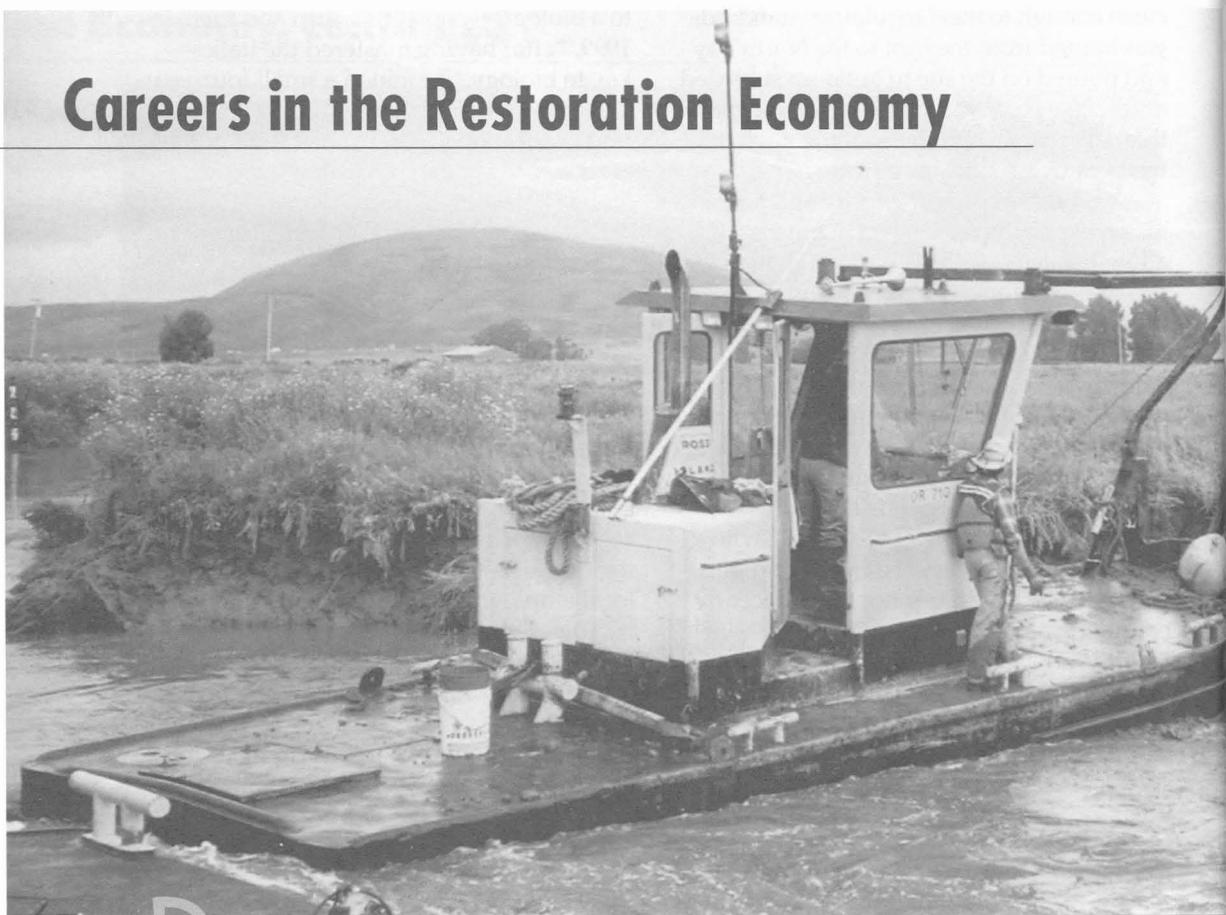
Farther south, too, collaborative restoration networks and systems are being developed. In central California, stream restoration is becoming a coordinated and cooperative endeavor. The Southern California Wetlands Recovery Project has inventoried potential restoration sites and is working to make the best use of available funds, including those required as mitigation for development projects.

Each project is an experiment in the art and science of restoration. Some will not work. Inappropriate land uses in upper watersheds may undermine the most careful efforts downstream. If public funding is diminished, this new economic sector could shrink. Yet the need for it, and the payoff, are so great that it is bound to resume growing. Like the gigantic public works of the first part of the 20th century, natural resource restoration is investment in the state's infrastructure, investment of a sustainable kind.

—Rasa Gustaitis

Careers in the Restoration Economy

We hear a lot about jobs being lost in industries that depend on natural resource extraction—timber and fishing, for example. Far too few people know of the new jobs that are being created by the restoration economy. Here we introduce you to a few people who have such jobs, and offer some clues to what it takes to find and qualify for them.



PHILIP WILLIAMS has been intrigued by the power of moving water since he was a child growing up in Portsmouth, England. He remembers building mud dams in a brook on his grandfather's farm, then tearing them down to watch the stream reclaim its natural course. Later, he says, in a boat his father gave him, he explored marshes and tidal channels near home, developing "an affinity for the estuary." So perhaps it is not surprising that he is now a hydrologist who specializes in bringing life back to degraded streams and wetlands while, at the same time, providing protection from floods.

PHILIP WILLIAMS

With Regard for the Nature of Water

Restoring tidal marsh at Tolay Creek, Sonoma County, 1999

His San Francisco-based consulting firm, Philip Williams & Associates (PWA), is known worldwide for its pioneering work. When he founded it in 1976, few people outside scientific circles knew much about wetlands. The prevailing practice was to undertake flood control, water supply, and other projects without considering the effects

on fish, wildlife, plants, and the landscape. Rivers and streams were routinely channeled in concrete, marshes were drained and filled. Now the environmental impacts of projects must be considered—in theory, if not always in practice. Williams was one of the first to show how that makes sense.

His formal education was British, culminating in 1970 with a Ph.D. in hydraulic engineering from London University. That same year he immigrated to the United States and, settling in San Francisco, found his first professional job, with Bechtel Corporation.

Assigned to design slurry pipelines for transporting coal from strip mines to power plants, he was soon sent to Arizona to work on a new mine at Black Mesa, on the Navajo Reservation. There he was deeply moved by Navajo and Hopi protests against the desecration of their ancestral lands. He found himself "disenchanted with the consequences of the work, which forced me to do some soul searching." After two and a half years, he quit and began to put his revised priorities into practice.

During the next several years he worked with the Environmental Defense Fund and



KATY ZAREMBA

Spartina Warrior

KATY ZAREMBA. This was a girl who spent her teenage years running with the young foxes of Washington, D.C. Her friends were the children of federal

bureaucrats and foreign diplomats, many of them speaking several languages and with futures staked out in international affairs. At Colorado College in Colorado Springs, as she

studied French, Italian, Spanish, and biology, Katy imagined travel, teaching languages, and life in a sophisticated world.

That was then. When I first met Katy last year, she was five months pregnant, dressed like a county lineman and knee-deep in mud. She was one of a crew slogging through a windy marsh at Point Reyes National Seashore on the way to a patch of alien cordgrass, to check if their effort to smother it a year ago had been successful. Katy today is a self-employed field biologist, an alien plant eradication specialist. She works for the San Francisco Estuary Invasive

Spartina Project to help rid San Francisco Bay and the nearby coast of several species of *Spartina*, a robust cordgrass that is rapidly invading salt-marsh habitat and threatening the native cordgrass, *Spartina foliosa*.

When I met Katy again last summer, it was in a brown-shingle home in Stinson Beach, Marin County, that she shares with her husband, a veterinarian. With one arm around four-month-old Zofie, she struggled to say why biology had won out over her other ambitions.

"There's always been two sides to me," she said, looking out toward the

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THE PLANET'S soil and water are increasingly polluted. Petroleum products leach into groundwater from old gas stations, toxic chemicals drain from mines, industrial sites, and military installations. Pesticides wash from farms, streets, and lawns into streams and the ocean. In the United States, 73 million people live

RULA DEEB & STEVE KOENIGSBERG

Helping Microbes Do the Cleanup

within four miles of a Superfund site and four million live within one mile, according to Terry Hazen of the Lawrence Berkeley National Laboratory's Center for Environmental Biotechnology.

Cleaning up contaminated sites is expensive, time consuming, and—when contaminated soils have to be dug up with backhoes, or toxic water has to be pumped to the surface for treatment—can lead to new health hazards. Such cleanups are, however, mandatory when contaminated lands are to be converted to new uses, and when public safety requires improvements.

Consequently, a heavy demand exists for cleanup techniques and services that can do the job with maximum efficiency at minimum cost. Among new methods now growing in popularity is bioremediation. As with many other promising restoration techniques, it works with nature.

Microbes, some fungi, and, to a lesser extent, the roots of plants, can break down into harmless metabolic leftovers many of the hazardous compounds cooked up by humans. Bioremediation gives that process a nudge by providing these organisms (bacteria, for instance) with more of what they need: oxygen,

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Friends of the River. Using his professional expertise, he critiqued proposed dam development in the Central Valley, in particular the controversial Auburn Dam on the American River, which was never built, and the New Melones Dam on the Stanislaus, which was. He also advised groups fighting to protect the Sacramento-San Joaquin River Delta, which was threatened by new water diversion proposals, and to save Mono Lake from water withdrawals by Los Angeles.

"That was my first introduction to California water politics and how resources were then being managed—or mismanaged," Williams said. "I began to see opportunities for my expertise as an engineer to be applied in a more positive way."

During that time, he also spent many hours rafting the state's quiet backwaters and turbulent rapids. "I got to know and love the rivers of California," he said. "I became much more interested in how sand moves in rivers." Gradually, he realized that problems such as the need for flood control could be managed by techniques that conform closely to the natural movements of water and sediment.

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AMY HUTZEL, 34, coordinates the two biggest wetland restoration projects on San Francisco Bay. Both the Napa-Sonoma Marsh and the South Bay Salt Ponds are multi-million-dollar, multi-agency efforts that will take many years to accomplish. As the Coastal Conservancy's project manager for the two projects, Amy says she's a "collaborative process coordinator," working to keep dozens of agencies, citizens groups, businesses, and individuals on course toward common goals.

AMY HUTZEL

Wetland Restoration Manager

That assignment calls on all the skills she has acquired since she first learned to love rivers and water during childhood boating trips with her family in Ohio.

Amy came to California in 1992, immediately after graduating from the University of Virginia, where she majored in urban and environmental planning. She came to work as an intern for the U.S. Fish and Wildlife Service at the San Francisco Bay National Wildlife Refuge. During her eight months at the refuge, in Fremont, she enjoyed getting to know the Bay Area and its wildlife. When another internship came up on the Hawaiian island of Kaua'i, however, she jumped at the chance. Then, after a year in Hawai'i, a "real" job came up at the San Francisco Bay refuge. She applied and was hired to work in public outreach and environmental education. "It was nice being out in the marshes," she said, "though dealing with groups of teenagers was sometimes a challenge."

Four years later she went to work for Save the Bay, where she got her first experience at project management running the environmental education program, Canoes in Sloughs, and managing staff. "I got to meet a lot of agency people, and to learn about how public and private groups can work together," she said, "as well as good experience in project management."

With each career move, Amy added to her qualifications to work on important restoration and conservation projects. In 2000, the Coastal Conservancy hired her and assigned her to the Napa-Sonoma Marsh Restoration Project. That project had been under way for six years, moving slowly. It involves restoration of 10,000 acres of salt ponds along the lower Napa River to a mix of tidal habitat and managed wetlands. Construction is expected to begin in 2005. "I learned a lot about working

JENNIFER JENKINS knew she wanted to work with rivers for years before she found her job as a watershed specialist at Land-Paths, a nonprofit group in Sonoma County. She had been enthralled by North Coast rivers and the salmon and steelhead they supported from the moment she first saw them as an AmeriCorps volunteer in 1997. "I fell in love

JENNIFER JENKINS

Watershed Specialist

with those fish," she said. "I wanted to see what I could do to help them." Her passion didn't lead directly to a fulfilling career, but she persisted, refusing to settle for less.

Growing up in Georgia, she had hiked in the Appalachians and rafted on nearby rivers. At the University of Georgia, she started to major in biology, but found that "it was oriented toward kids who were doing premed." So, "because I liked being in the woods," she switched to forestry—only to find that the curriculum was geared toward the needs of the paper industry in the Southeast.

That wasn't the direction Jennifer wanted to take either, so she made another move: she signed up for a year as an exchange student at Humboldt State University (HSU) in Arcata. This "shot in the dark" turned out to be lucky. The program at HSU offered more of its curriculum on-site in the woods and allowed her to add an emphasis in watershed management to her forestry major. She decided to stay, but because tuition is far higher at California's state universities for nonresidents than for residents, and establishing residency takes two years, she signed up for a stint with the AmeriCorps Watershed Stewards Project. That experience opened her eyes to new possibilities. "I did two years of spawning surveys, habitat surveys, and restoration projects," she said. "The AmeriCorps program made me realize the potential for careers in the field."

With practical experience, plus her degree,

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LANDPATHS



Jennifer Jenkins

(continued on page 22)

WORKING IN HABITAT restoration may sound like a dream job to a lot of people. You help damaged natural systems recover, coax streams, wetlands, and forests back to health, remove obstacles that keep salmon from reaching ancient spawning beds. You get to spend some—perhaps even a large part—of your time in habitat you seek to restore.

Preparing for a Career in Restoration

There is, of course, a fly in the ointment: No clearly defined avenues of entry exist—in other words, there's no simple way to qualify yourself for a job. The field is still relatively new, and people in it now got where they are in a variety of ways. "The pathways are informal. Restoration is still as much an art as a science," said Marc Beyeler, program manager at the Coastal Conservancy, who has worked on many and varied restoration efforts. "One way to get a start is by volunteering."

Some projects begun by volunteers can lead to gainful employment. Mark Abramson was a volunteer when he started the Stream Team for the nonprofit Heal the Bay in

WHEN HE WAS growing up on his family's small farm in northern California, Zeno Acton would stand beneath a grove of black oak trees in his front yard and look up at three jagged ravines scarring the red earth of the grassy hill beyond the orchard.

"They told us that this was just about the worst gully erosion in Nevada County," says the 24-year-old graduate of the program in restoration of biodiversity at the University of California, Davis. Although engineers initially estimated it would take thousands of dollars to stabilize the slopes, Acton says his father came up with his own low-tech solution, hammering

together boards for check dams, and planting hundreds of seedlings to hold soil in place. Those gullies and the work it took to restore the hillside had a strong impact on Acton. "I've always had an internal struggle with my own ecological footprint," he says. "I really wanted a career that I could feel good about."

Like Acton, many graduates of restoration biology programs are motivated by a desire to make a positive impact on the environment. But in this emerging field, there's no clear path to finding the right job to launch the perfect career.

"It requires a little more initiative to find those jobs," says Truman Young, chair of the restoration area of emphasis for the graduate group in ecology at UC Davis. "Finding a job in this field is much more amorphous than, for example, getting a job as a schoolteacher. Most people I know in restoration knocked on the right door on the right day, or they volunteered someplace and made themselves indispensable. Several of our students have gone straight from their internships into jobs."

Even though jobs may be hard to find, they are definitely out there, Young asserts. "Restoration is growing by leaps and bounds. It's a strong job market, and all indications are that it is likely to remain strong," he says.

Acton, who graduated with a Bachelor of Science degree in June, has chosen to use his skills in his older brother's tree care and landscaping firm, developing a branch of the business that will specialize in revegetation projects using native perennials. One of his first priorities is to start propagating stock himself, and he hopes eventually to establish his own native plant nursery.

In carving out his own business, Acton is more the exception

(continued on page 22)

Santa Monica. Now, not only is he paid to manage the Malibu Creek monitoring program, he has also been able to hire two of his best volunteers. Many others have found work with resource agencies. "The kind of sampling we [at the Stream Team] do for water quality is exactly the kind of work that gets done at government agencies," Abramson said.

The trick is to prove yourself while volunteering, he has found. "The people who get the jobs always seem to be the ones who are willing to work the hardest or sacrifice the most."

Steve Ritchie, executive project manager for the South Bay Salt Pond Restoration Project, sees two ways to get into restoration work: a degree or practical experience. "Most people who do this generally have some sort of technical background, something to do with planning, design, or development," he said. "Either a degree in a biological science—biology or botany—or the engineering sciences, hydrology, or geomorphology."

The other way into the field, Ritchie has observed, is to join "the practical side—the contractor types, the people who like to do stuff in the field and understand how to do it." Some specialize until they become experts. "People become adept at moving dirt around so that water will move around it in a specific way," for example, and will therefore get more work in streambed restoration.

Ritchie's route to his current position was the state civil service. For 18 years, starting shortly after he graduated from Stanford University in 1977 with a BS/MS degree in civil engineering, he worked for the San Francisco Regional

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THREE NEW GRADS

Starting Out in the Restoration Job Market

(Williams, continued from p. 15)

Guided by both what he had learned and what he loved, Williams started his own consulting firm. A few forward-thinking clients sustained it through its early years. "Because we had this new perspective, we were able to fill a niche in the market," he said. "Northern California had a strong environmental movement whose ideas had begun to penetrate public policy. It was a great opportunity for us to be located there at that particular time."

Early clients included the Bay Conservation and Development Commission (BCDC) and the Coastal Conservancy. BCDC hired PWA to review development plans around San Francisco Bay, with the goal of reducing impacts on tidal marshes and creeks. The Conservancy was engaged in controversial restoration projects in the Bolsa Chica wetlands in Orange County and the Tijuana Estuary in San Diego County. The agency hired PWA to develop conceptual restoration plans for those two projects and a restoration plan for the Tomales Bay watershed in Marin County.

PWA has grown to 45 employees but continues to work primarily with federal, state, and local government agencies. The firm has, however, added private clients to its list. Some developers really "want to do the right thing," Williams said.

Among recent major challenges was the Napa River Flood Management Project. The Napa River had been flooding frequently for years and it had been proposed that a trapezoidal flood-control channel be built to contain the water and rush it out into San Francisco Bay. A local alliance, the nonprofit Friends of the Napa River, turned to PWA in hopes of a more river-friendly solution.

"The channel would have provided no benefit to the environment and would have been an eyesore in the community," Williams said. "We suggested an alternative—a multi-objective project that would provide economic benefits." He proposed to restore some of the natural character of the river so as to minimize flooding, help to revitalize Napa's downtown, improve the ambience of riverside neighborhoods, and raise property values. "A house on a beautiful river channel is going to be a lot more valuable than a

house along a concrete channel," he pointed out.

The concept proved so popular with the community that a local bond measure was passed to fund it. It is now being constructed by the Corps, with additional assistance from the Coastal Conservancy and the Napa County Flood Control District. The Corps now points proudly to this project as a model for community involvement.

A Global Perspective

TODAY, MORE AND MORE river projects in the United States and Europe are being designed with the understanding that hard structures built without considering natural systems bring on a cascade of troubles. No large dams are in the works in this country. Elsewhere, however, projects that would never find acceptance here are moving ahead, with much human displacement and devastating effects on land and natural water systems. In 1985, Williams founded the nonprofit International Rivers Network (IRN) to enable grassroots activists in affected countries to share information and join forces.

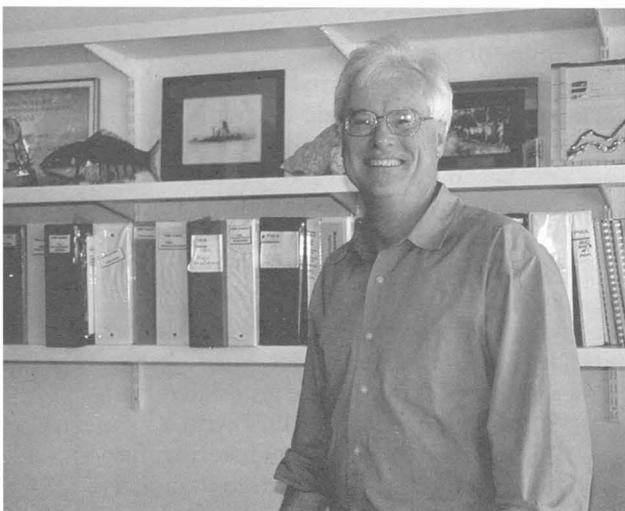
Over the next 16 years, he traveled extensively on behalf of the IRN, working mainly behind the scenes to help local groups challenge dams in China, India, Brazil, and other countries, especially in Asia and Latin America. "Both human and ecological resource needs must be taken into account," he said. "As consultants, we find ourselves in the middle."

To young people who want to build careers in the field of natural resource restoration and management, Williams has this to say: "As an employer, what I value is not only logical, rigorous, scientific minds, but people who have good communication skills, who are diplomatic. You can have the most brilliant idea in the world, but you must explain it clearly, listen to people, and understand what underlies their concerns."

It is clear that Williams loves what he's doing. On his journey from the marshes and estuaries of Portsmouth to the Napa River Flood Management Project and struggles over dams in developing countries, he has come to believe that it is possible to repair damaged natural systems and benefit future generations.

Since she retired as program manager for the Coastal Conservancy's Central Coast Region in 2000, Carol Arnold has been traveling, photographing, and writing.

Philip Williams



CAROL ARNOLD

(Zaremba, continued from p. 15)

slope of Mount Tamalpais. "I like to have access to San Francisco and all the culture. But I chose to live here, just over the hill."

Maybe it was the thrill of childhood field trips, or the breathtaking views on an Alaskan holiday, but the clincher may have been the Marine Mammal Center bumper sticker she happened to see while she was staying with her mother in Berkeley after her graduation from college in 1986. She remembered visiting the center in Marin County when she was a child and, on impulse, signed up as a volunteer. Within a few months, she had a full-time job in the education department. She stayed on for ten years.

While running a program with Oakland's Castlemont High School students, she became intrigued by the problem of invasive plants. "We went out to sites such as the Martin Luther King, Jr., Shoreline, where we studied the marsh, including *Spartina alterniflora*," she said. This tough Atlantic cordgrass was spreading rapidly, outcompeting native cordgrass, turning mudflats to saltmarshes, threatening the habitat of native plants and animals, and slowing creek water flow. It had been planted along the Bay in the 1970s by the U.S. Army Corps of Engineers in a well intentioned but ill-fated attempt to restore local marshlands.

"We discussed how we, as individuals, could help prevent some of the human impacts on the ocean, coast, and the Bay," Katy continued. "I decided I wanted to learn more about invasive species, and to work with an expert. So I sought out Don Strong," professor in the Department of Evolution and Ecology at the University of California, Davis, who was researching *S. alternifolia*. Strong hired her to help him at the Bodega Marine Laboratory, and encouraged her to pursue a graduate degree.

In 1998, at age 30, Katy earned her master's degree in biology at San Francisco State University. She worked with the East Bay Regional Park District examining the *Spartina* invasion at Cogswell Marsh, and the district used the results of her studies to help make management decisions for that site. This led to her joining the multi-agency Invasive *Spartina* Project. Alien *Spartina* has spread at a relentless rate on the Bay and now covers an estimated 2,000 acres. "It's becoming the monster in the closet," Katy says.

She puts in eight-hour days trekking, boating, and kayaking, collecting grass



SHIRLEY SKEEL

Katy Zaremba

samples, snapping photographs, taking GPS readings, compiling data, and explaining the *Spartina* threat to park officials, businesses, and curious passersby. Yet so far, despite the use of herbicides, spades, and tarpaulins, she says that the battle has just begun. Smothering the plants has been slow work, and there is only a small window, a few weeks each autumn, when spraying with herbicides is possible, because Bay marshes are home to the endangered California clapper rail, which breeds in cordgrass. Yet Katy remains hopeful. She believes in the work, saying there's "nothing I don't like" about it. I delicately note that biologists are hardly paid a princely sum. True, she says. "We can't really afford to buy a home in this area. But, then, . . ."

She stops and looks around. Outside the porch door, Mount Tamalpais rises golden against a blue sky. Across the road, Bolinas Lagoon is still. I pause and take in the quiet, then shake hands and leave. No doubt about it, this is one fox that's found its lair.

Shirley Skeel, an independent radio and print journalist based in Berkeley, is a regular contributor to Coast & Ocean.

(Deeb & Koenigsberg, continued from p. 15)

hydrogen, moisture, and other nutrients.

"We try to stimulate microbes that are already present," says Rula Deeb, a consultant with Malcolm Pirnie, Inc., an environmental engineering firm. "When conditions are right, bioremediation is cheaper, used in situ, and it requires no exposure to the wastes. It wouldn't work as well in Alaska, for instance, where the ground is too cold for microorganisms to survive, or where it's too dry. They need water. Bioremediation is one of many techniques available."

Deeb became intrigued by the potential of this technique when, at the University of California, Berkeley, she encountered the work of Professor Lisa Alvarez-Cohen in using microbes to dispose of a major

groundwater pollutant, MTBE. This compound, ironically, was made mandatory in gasoline in California for the purpose of reducing air pollution. Its effect on water apparently was not considered. Deeb chose to do her doctoral thesis in civil and environmental engineering on bioremediation as applied to substances including gasoline.

Her academic work complete, she weighed her choices: the academic life or work as consultant. She had taught a course at Stanford and worked with a nongovernmental organization at the United Nations Conference on Environment and Development (the Earth Summit), held in Rio de Janeiro in June, 1992. What would be most interesting and useful?

In the end, because she "just wanted to see what's out there," and also was "geographically limited," (her husband, also an engineer, is working on the design of the new Bay Bridge), she signed on with Malcolm Pirnie, Inc. This private company provides environmental services, with about seventy percent of the firm's business related to wastewater treatment, the rest to other services, including groundwater cleanup. She likes the firm because it's "owned by the people who work there," because "people pride themselves on their independence," and because the work is useful.

Her wide variety of clients has included the U.S. Army Corps of Engineers, the National Water Research Institute, and a California carwash operator. "I'm on the

technical side," she says, providing scientific review for projects, doing research, reviewing data, and also attending and speaking at conferences and meetings.

Rula Deeb does all this while raising twin girls, 15 months old in November. Whenever possible, she works from home. "It's a juggling act," she says. "One week I get behind at work, the other week I get behind at home. I would never do it without my mom, dad, husband, or aunt and uncle there, supervising the nanny."

Businesses providing bioremediation services have grown in number. In 1992, the Environmental Protection Agency listed only 30 vendors; by 2002 there were 175, offering 344 different services. The use of bioremediation at Superfund sites also grew. In 1997 it was applied at eight percent of the sites, in 2002, at 36 percent.

Whether it takes place in situ—in underground aquifers or deep within the soil—or ex situ, in wetlands or composting piles above ground, bioremediation can break down pollutants, from chlorinated compounds to petroleum products and metals. It is not a cure-all, of course. In the case of a major underground oil spill, for example, the technique may be cheaper than other methods, but be considered too slow.

At Avila Beach, a tiny resort town in San Luis Obispo County, some 400,000 gallons of gasoline, diesel, and crude oil had leached into the soil and water. It seeped from the network of underground pipes that carried petroleum products from hill-top tanks to ships docked at the pier. Unocal, formerly the Union Oil Company, was held responsible for the contamination, which took place over 90 years. When discussions about what to do began in 1996, Unocal pushed for bioremediation.

Gerhardt Hubner, however, who was the engineering geologist assigned by the California Regional Water Quality Control Board (RWQCB) to manage the Avila project, said that bioremediation proved too slow to restore groundwater to safe levels. Unocal projected a 10,000 parts per million (ppm) reduction in the soil's total petroleum hydrocarbon (tph) load after eight years of bioremediation. The board was looking to get levels down to 100 ppm within a shorter time, to reduce chances that the pollution would leach back into the groundwater. Hubner said bioremediation works best on gasoline, and is least effective on crude oil, Avila's main problem.

COURTESY RULA DEEB



Mixing concentrate for bioremediation

In the end, the RWQCB voted to dig up the contaminated soil and replace it with clean earth. That project demolished much of the downtown and closed off part of the beach, but it reduced the pollution to 67 ppm even better and faster than predicted.

Steve Koenigsberg, vice president of research and development for Regenesis, a San Clemente-based firm that produces tools for bioremediation, says the issue comes down to the ratio of surface area to volume. With a large, concentrated source of pollution, microbes can only eat around the edges. On the other hand, using mechanical methods for small, diffuse contamination problems is "like doing surgery with a shovel," he says. Microbes do a good job moving through soils and groundwater.

Koenigsberg has watched the market for bioremediation mushroom over the last ten years. His firm got into it almost by accident, with a honey-like slurry it had developed to enhance fertilizers. "We realized

that microbes need oxygen too, and the rest is history," he says. The slurry keeps microbes in aquifers flush with oxygen.

Regenesis also makes products that work in anaerobic conditions, and some that help microbes to remove metals and chlorinated solvents from solutions. There's a lot of competition now, Koenigsberg says, and that pushes his company to stay on the cutting edge. Right now, Regenesis is working with researchers in search of new ways to test and monitor underground microbial communities, so better treatments can be designed and the remediation process can be observed more closely.

Koenigsberg, who has a doctorate in biotechnology, says that people are beginning to realize the benefits of working with nature—economic as well as personal. "I'm very excited to be in this business," he says. "I come to work every day and I'm glad to be doing what I'm doing."

—Megan Mansell Williams

COURTESY RULA DEEB



Rula Deeb

(Jenkins, continued from p. 16)

Jennifer had credentials when she set out to look for employment. She got a job at an environmental consulting firm in Eureka, where she evaluated fish habitat in the Pit River as part of a dam relicensing project, then did some "timber cruising"—appraising the market value of trees on a plot of land. But "my heart just wasn't in it," she said. She quit and went next to Simpson Timber's "tree improvement" department to work on genetic research. "It was interesting to learn about what characteristics trees pass on," she said. "It was also interesting to be behind the scenes at an industrial timber company." For six months she stayed interested.

In spring of 2002, however, Jennifer made a decision that paralleled her earlier move from Georgia to Humboldt: She wanted to get out of industrial forestry, and was willing to go to great lengths to do so. "I interviewed for anything: fish biologist in Sonoma, watershed restoration in Hopland for the Department of Fish and Game, anything." But it was an old AmeriCorps connection that paid off. One of her former co-workers tipped her off that LandPaths, an organization that works in habitat restoration, environmental education, and managed public access, was looking for watershed specialists—people who could supervise work on restoration projects and

ensure their funding. Jennifer had the right mix of qualifications and was hired.

"My first day on the job was a kayak paddle on the Estero Americano," an estuary on the Sonoma-Marin border, as part of a field trip to show the public the value of open space. Since then, Jennifer has overseen several watershed restoration projects, primarily the decommissioning of old ranch and logging roads to stop them from bleeding sediment into creeks and rivers. She's currently also assessing the options for dealing with an abandoned homemade dam on Santa Rosa Creek that threatens to fail and spill the massive load of sediment that has accumulated behind it.

At age 29, Jennifer's happy to have found exactly the kind of job she wanted. Her advice to others? "Volunteer," she said. "That's the best avenue to get in touch with people focused on restoring habitat." Those joining AmeriCorps are volunteers—almost. They get paid a very small stipend, but are richly rewarded with practical experience.

Jennifer's story demonstrates that to find your dream job you must have the courage to keep trying until you find fulfilling work. It may not pay that well, but when she looks back on her past and then at the life she leads today, she knows: "I really don't feel like I'm sacrificing anything at all."

—Arno Holschuh

(Hutzel, continued from p. 16)

with the U.S. Army Corps of Engineers and technical consultants on the project," she says. "Also about restoration modeling and

preparing Environmental Impact Reports and Statements—all of that was good preparation for the South Bay Salt Ponds project."

In February 2003, the California Wildlife Conservancy Board approved \$100 million for the purchase of 25 square miles of salt ponds, using federal, state, and private foundation funds. A month later, title to the lands

was transferred to the Department of Fish and Game and the U.S. Fish and Wildlife Service. Planning is now under way for what will be the largest tidal wetland restoration project on the Pacific Coast.

The salt pond restoration project takes most of Amy's time now, and it allows her finally to make full use of her education in planning. "Restoring the South Bay's ecosystem will take decades, and probably hundreds of millions of dollars," Amy says. "We plan to manage the work adaptively, and involve scientists, land managers, and the public throughout the project." She enjoys working with scientists, and explaining their work on the project to the public. "I love all the wetland restoration issues—the scientific components and their complexities." She coordinates the technical side of the work with policy and regulatory agencies; handles permits, contracts, agreements, and invoices; secures funding and drums up public support for the project.

Sure, she'd like to be in the field more, she says, and she has not entirely let that go. "I do still take part in the annual clapper rail surveys. I go out in air boats with Fish and Wildlife Service staff and count the birds. It's so interesting to be in these wetlands that are surrounded by millions of people, and see that such fragile species can survive there." One of the exciting things about restoration work is that nature responds so vigorously to even small efforts, says Amy.

Huge projects like the South Bay Salt Ponds also need lots of people sitting at their desks—especially a "collaborative process coordinator."

—HMH

(Acton, continued from p. 17)

than the rule. The main engine driving the restoration job market, says Steven E. Greco, a landscape and restoration ecologist at UC Davis, is legislation that requires environmental mitigation for development projects. "As more and more land is consumed by development, less and less natural land is preserved, so the need for restoration increases over time," he explains.

While it's government that mandates mitigation, the actual work is usually contracted out to private firms. Alyssa McLean started working for such a firm two months before graduating last spring from UC Davis in landscape architecture with a minor in landscape restoration. A tip from a Davis alumna alerted her to a job opening at Wildlands, Inc., a habitat development and management company in Rocklin, near Sacramento. Now she is using computer-assisted design to transform restoration concepts into working drawings for construction crews. Sometimes she helps with surveying or to stake out a site for the earthmovers.

"So often you see things destroyed and bulldozed," she says. "Creating habitats that have been taken away in other places makes a positive difference. It makes you feel good about what you're doing."

Private firms are not the only option for restoration graduates, says Truman Young. Other jobs fall into three broad categories: work with private nonprofit organizations such as the Nature Conservancy and Ducks Unlimited; jobs with federal, state, and local agencies; and a quirky category that includes research and restoration work generated by such large-scale programs as restoration of the Florida Everglades and the ambitious CALFED program to restore ecological health and improve water management in the San Francisco Bay and Delta.

Unfortunately, Young says, in the past year and a half, plummeting state and federal budgets have eroded one of the most coveted sources of restoration jobs, those offered by government agencies such as the National Park Service and California's Department of Fish and Game. So Brianna Collins, a 2003 graduate of the UC Davis restoration of biodiversity program, considers herself lucky to have landed a job with the U.S. Forest Service. Since March, Collins has been mapping wildfires on Forest Service land using GIS technology, and managing a four-person crew that monitors the

STEVE RITCHIE



Amy Hutzel, center, presents a Coastal Conservancy grant for a Ridge Trail project to Susan Leal, left, general manager of the San Francisco Public Utilities District.

effects of fire on vegetation. The project's ambitious goal is to promote restoration of a natural fire regime in California's National Forests.

The ticket to Collins's current job was a summer internship with the Tahoe National Forest between her junior and senior years. Several months after she graduated, her Forest Service boss called her to offer a paying job. "She wanted someone to work on her project who already knew all the nuances of it," Collins explains. It's her ideal job, she says, but like many other agency jobs right now, it's only temporary.

"It's hard starting out," says Young. "What I tell graduates is to take a part of the country you like, or take an ecosystem or an approach you like, and that's the door you knock on. It might take a while, but when you do that, things start happening."

—Liese Greensfelder



Zeno Acton

(Career, continued from p. 17)

Water Quality Control Board, rising through the ranks to become executive director. In 1995 he moved on to become acting director of CALFED, a giant federal-state water management project in the Sacramento-San Joaquin River Delta. Since April 2004, he has been a consultant to the Coastal Conservancy on the giant South Bay Salt Pond Restoration Project.

Habitat restoration work is diverse, and it requires a combination of knowledge and skills ranging from botany, hydrology, and engineering to management, conflict resolution, community organizing, fundraising, and public outreach.

David Magney, an environmental consultant in Ojai who has worked extensively on wetland restoration in Ventura County, advises those aspiring to professional work in habitat restoration to study more than one discipline and acquire on-the-ground practical skills. Magney himself has degrees in botany and landscape horticulture.

"You have to be well-rounded," he said. "Soil, landscape, water, plants, these are all key components. There's a lot of detail there, and if you mess up even one component, the whole thing fails." Lack of practical experience has often doomed beautiful plans, he has found.

The AmeriCorps Watershed Stewards Project is a good place for college graduates to pick up such experience. "Most of the people who work with us have degrees and come to us for experience with the field-work," said Sunshine Stone, the Project's member development coordinator. Partnering with Indian tribes, government agencies, and nonprofit organizations, AmeriCorps members monitor and restore watersheds on the North Coast. Almost as

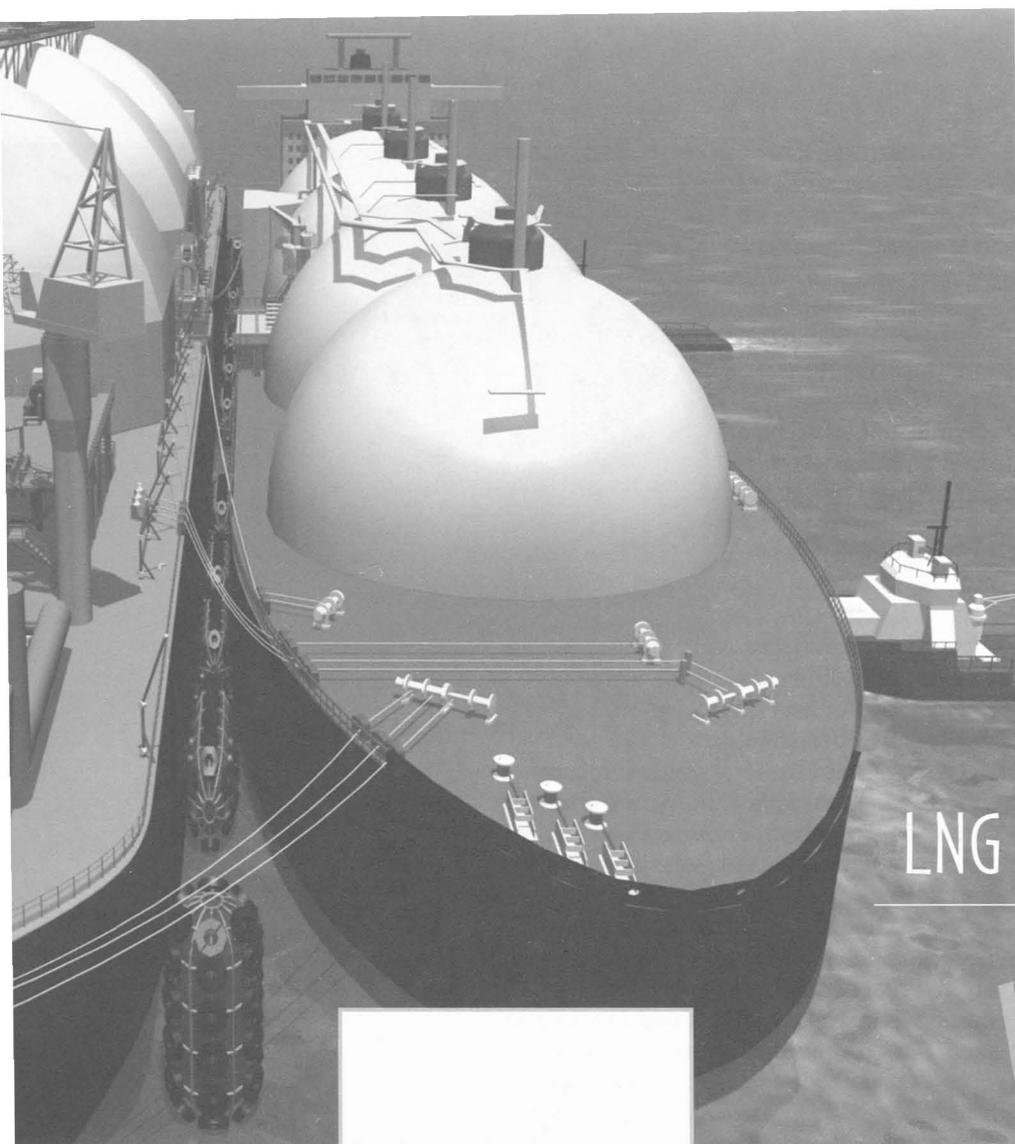
important as the field skills they gain are the people they meet—those partners may be potential future employers.

The Salmonid Restoration Federation, based in Redway, also offers some opportunities. This nonprofit organization runs field schools all year to teach skills needed for restoration work. Once a year, it invites everyone in the North Coast watershed restoration community to a conference. "It's a great opportunity to find out who is doing what kind of work," said Dana Stolzman, the Federation's executive director. "That's as true for a backhoe operator as for a biologist. So much of getting hired is word of mouth."

People who don't mind a desk job are also very much needed in the restoration economy. Jay Lund, professor of civil and environmental engineering at the University of California, Davis, is developing a master's program in environmental policy and management "meant for people with backgrounds in the biological or engineering sciences who want develop skills on the management side," he said. Right now, he explained, managerial positions in environmental organizations tend to be filled by scientists who slide into the bureaucracy without any real management training. "What we want to do is develop managerial expertise in scientists and engineers who are interested in restoration; that way we will have environmental managers who know science."

Undergraduate study in habitat restoration, as well as short courses in various aspects of the field, are available in a few universities, including the University of California, Davis. ■

—Arno Holschuh



LNG in California?

TRISH BEALL

Volatility is the key word when it comes to describing the controversy swirling around the several current proposals to build liquefied natural gas (LNG) terminals on or along the California coast.

"Price volatility" of natural gas and its impact on America's economic stability was the reason Federal Reserve Bank chairman Alan Greenspan gave to the U.S. House Committee on Energy and Commerce in June 2003 when he recommended an increase in imports of foreign natural gas shipped in liquid form, and soon.

The volatility of natural gas vapors also makes people nervous. In communities where LNG terminals have been proposed, residents ask: What if that compressed gas were to escape into the atmosphere—by accident or through sabotage? It could form a cloud of vapor that any spark could ignite. LNG companies insist that all safety aspects of transporting and processing the gas are continually monitored and improved, and that terminals are secure against terrorist acts. "No serious LNG accident has occurred at an LNG facility in the U.S. in 25 years," the American Petroleum Institute states on its web site. "These robust structures, combined with new

Top: In this artist's rendering, tugboats hold an LNG tanker in place as it is moored to the floating terminal at the proposed Cabrillo Port project, 14 miles off Oxnard.

Left: This offshore oil platform would be converted to an LNG terminal for the Clearwater Port project.



CRYSTAL ENERGY

security protections companies are implementing, make them safe as well as a secure and very difficult target for terrorists." Such reassurances, however, can pale against news of the January 2004 explosion that killed at least 27 people and injured more than 70 at an Algerian plant that converts gas to LNG.

The risk to people and structures would be greatly lowered if the terminals were to be built far offshore, or in a rural area, but that concept raises volatile habitat conservation issues. In fact, during an earlier cry for gas imports to supplement dwindling U.S. supplies, California's LNG Terminal Siting Act of 1977 had restricted the location of terminals to sparsely populated areas. However, coastal preservationists were able to sink a terminal proposed in 1978 for rural Point Conception. The legislature rescinded the Siting Act in 1987, as new domestic gas discoveries diminished the need for foreign imports.

To date, no LNG terminals have been built on the Pacific Coast of North America. (The United States has a total of five, four of them built in the 1970s: at Boston Harbor, in Maryland, Georgia, and Louisiana, plus another in Puerto Rico, built later. They handle about one percent of the natural gas consumed in this country.)

Whether LNG is truly needed is a matter of debate. Ratepayers for Affordable Clean Energy (RACE), an anti-LNG coalition of several major environmental organizations in California, contends that future fuel needs can be met by encouraging alternative power source development. "An LNG terminal will not provide a 'relief' valve on U.S. natural gas prices, but instead will subsidize new gas-fired power plant construction, locking ratepayers into volatile future gas prices," according to an analysis posted on the RACE web site. "No one has done a reality-based assessment of the need for LNG," says Mark Massara, the Sierra Club's coastal representative.

Racing for Permits

THERE IS, however, a reality-based acknowledgement that today's political and regulatory climate favors importing LNG to the United States, especially to fuel more power plants. "Recently, since electricity deregulation, we've built an awful lot of very efficient natural gas-fired power plants that are much cleaner burning," says Bill Ahern, who recently resigned as execu-



tive director of the California Public Utilities Commission (CPUC). "The horse is out of the barn."

In the past two years, several U.S.-based and foreign companies have submitted more than 30 permit applications to build terminals from Maine to the Caribbean, in and off Louisiana and Texas, and at various land and offshore sites from Washington state to Baja California, Mexico. Six on or in the Gulf of Mexico have already received permits, and one is due to begin handling small loads of LNG by January.

In California and Baja California, five proposals are very much alive, with major support from the administrations of President Bush and Mexico's President Vicente Fox. Three of them are for California: one by Mitsubishi for Terminal Island within the Port of Long Beach, and two out in the ocean—one by BHP Billiton 14 miles off the Ventura coast at Oxnard, the other by Crystal Energy 12.6 miles offshore, between Ventura and Port Hueneme. In addition, ChevronTexaco has also cast an eye on offshore waters 2.5 miles out from the U.S. Marine Corps' Camp Pendleton, in San Diego County. Two LNG projects, including one by ChevronTexaco for Mexico's Coronado Islands, are moving ahead south of the border (see story on p. 30).

No one claims that the United States will need 30 more LNG terminals or will run out of natural gas without them. The Energy

This floating terminal would be permanently moored, but free to rotate around the pylon at left. It would store and regasify LNG before piping it ashore.

Information Administration (EIA) in the U.S. Department of Energy, which tracks the nation's energy supplies and use, predicts a 26 percent increase in natural gas consumption from 2001 to 2025. The agency assumes that much of the need will be met by exploiting domestic sources in the Rocky Mountains, and that LNG imports would contribute six percent to the supply. Several gas industry and government analyses, including research reports to Congress, cite EIA's conclusion that the supply for the continental U.S. would be ample enough to keep prices low if the four LNG terminals now operating were expanded and up to 10 new ones added. Federal policy, according to Tamara Young-Allen, a spokesperson for the Federal Energy Regulatory Commission (FERC) is that "it will be the market that decides what gets built."

Dave Maul, manager of natural gas and special projects for the California Energy Commission, says that one LNG terminal could provide one-sixth to one-eighth of California's gas needs. Bill Ahern said, "In my mind, we need two of these terminals. One ought to be in Mexico because there's a lot of gas use in Mexico. Then California ought to have one so that we aren't just relying on the one in Mexico. Probably offshore makes the most sense from the public safety standpoint."

Three Proposals are Hot

CALIFORNIANS can expect to see some major volatile struggles in the coming months over the three projects now on the table. Here's a rundown of where those proposals stand now and the controversies involved in each.

■ LONG BEACH HARBOR:

Sound Energy Solutions (SES), a company owned by Mitsubishi, has applied to lease a 27-acre tract for a two-tank LNG terminal on the former Navy shipyard site on Terminal Island within the Port of Long Beach. The Port, which shares San Pablo Bay with the Port of Los Angeles, has accepted SES's letter of intent. "We have a piece of property right now which is available, and SES has expressed an interest," explained Stacy Crouch, the Port's senior environmental specialist and the state's regulatory project manager for this project. "When our tenants make money, we make money." Long Beach City Council mem-

bers and staff also met with SES to discuss potential gas deals for the city-run municipal gas service and other economic advantages for the city.

The company expects to receive 146 LNG tanker shipments per year, would transfer the loads to the 160,000-cubic-meter-capacity tanks, process it back to gas form through a vaporizer plant, add the odor that makes natural gas detectable to the human nose, and pipe it out to existing gas pipelines.

The Ports of Long Beach and Los Angeles comprise the fourth-largest port in the country, handling more than 119 million tons of cargo annually, including major oil shipments that supply gasoline for the western U.S. Fears of a possible LNG spill and explosion, whether by accident, a major earthquake, or a terrorist act are a major factor in opposition to this project.

Other LNG plants in urban areas are in Boston Harbor and the Port of Savannah. Immediately after the 2001 attack on the World Trade Center, Boston harbor was closed to LNG tankers for a month, and now Coast Guard vessels still escort the tankers through. Retired MIT professor James Fay, in a 2003 paper on spills and fires in Boston Harbor that is cited by both federal government researchers and anti-LNG groups, warned that a terrorist bomb attack on an LNG tanker would cause a fire of "unprecedented size and intensity." His calculations showed possible harm to people and buildings within 1.8 miles of a fire from an LNG spill.

In Long Beach, damage is unlikely to reach beyond the port itself, but 25,000 people work within the port. In the 1970s the CPUC rejected on public-safety grounds an LNG terminal site proposed at the Port of Los Angeles by Western LNG, a utility-owned company created to build an LNG terminal at that time, because of two significant earthquake faults in the area.

LNG proponents argue that many LNG terminals in Japan are situated near earthquake faults and have not been damaged by earthquakes. Industry literature tends to attribute the few life-taking accidents of the last 20 years to peculiar chains of events, and those, as well as some near misses, such as a leak of LNG when a tanker broke away from its pier, have prompted new safeguards.

Jurisdictional questions are at issue in this proposal. The Federal Energy Regulatory

Commission (FERC), a major proponent of expanding LNG imports, has claimed overall licensing authority for the project, shunting aside the CPUC's claim that it has the final word on where LNG terminals can be built on California's shores. That dispute is now before a federal appellate court.

In September, Crouch predicted that the draft EIR/EIS (a combined federal and state Environmental Impact Report and Environmental Impact Study paid for by SES, but contracted for by the FERC) could be issued a month or two earlier than its scheduled January 2005 release.

It is part of Crouch's job to ensure that construction and activity meet the Port's hazard standards and the safety standards of the California Environmental Quality Act (CEQA). The California Coastal Act and CEQA both require that safety studies include worst-case scenarios, but the federal EIR assesses risk differently. "FERC uses a 'credible versus incredible' criterion," Crouch explained. "So if a scenario is deemed incredible, they don't pursue it or analyze it any further. Regardless of whether a scenario is incredible or not, the Port has to still study it." According to CEQA rules, the Port must issue its hazard analysis before FERC can release the EIR.

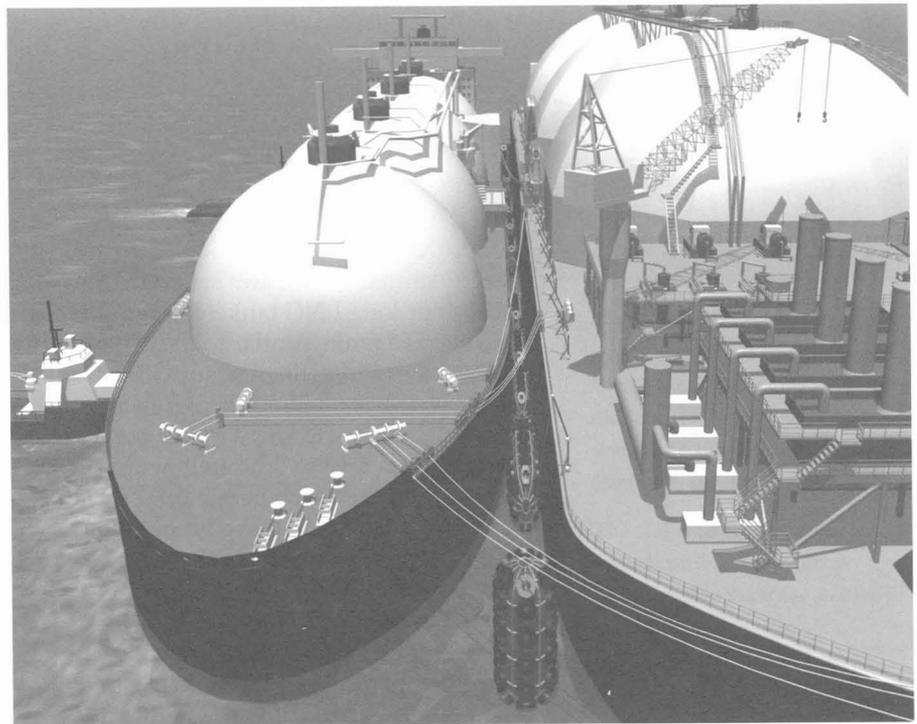
The EIR/EIS is subject to scrutiny by various state and federal agencies, including the Coastal Commission and the Coast Guard, and public hearings are required before it becomes final. Although Crouch says that so far other port tenants have not shown much concern, this would be the time that she would expect to hear from them.

Among those speaking up will be Bry Myown of Long Beach Citizens for Utility Reform. A walking, talking Port of Long Beach encyclopedia, Myown has studied all of the potential problems, from the potential hazards to poor, immigrant populations who live close to the port, to the air-quality impact in an already heavily polluted area, to the nature of landfill and seismic liquefaction factors, to toxic contents of other tankers and holding tanks within the port. She can count on help from Ratepayers for Affordable Clean Energy, but for now she doubts there will be much groundswell from the nearby residents.

Crouch said that in her experience at Long Beach, "Projects aren't often turned down. That's because that's the way CEQA works: You keep working until you alter the project enough that it is acceptable or there



ILLUSTRATION THIS PAGE: BHP BILLITON



Tugboats maneuver an LNG tanker into position to unload its cargo to the floating terminal.

are no more impacts. Sometimes people give up. We rarely do."

■ **CABRILLO PORT, 14 MILES FROM OXNARD:** The draft EIR/EIS for the project proposed by BHP Billiton, an Australian firm with sizeable oil and gas experience, was released October 29, with hearings scheduled for November 29–December 1. This project needs authorization from both the Maritime Administration—represented by the Coast Guard, which has authority over design and activities of deepwater ports beyond the state limits—and the State Lands Commission (SLC), which has jurisdiction over state tidelands. The regasified fuel would be piped 21 miles from a platform to be built 14 miles offshore from Port Hueneme to Ormond Beach, near Oxnard, in Ventura County, then on through existing gas pipelines to power plants for distribution. Approval is required from the Coastal Commission and the Coastal Conservancy, which manages Ormond Beach and runs the wetlands restoration effort there, the State Lands Commission and the governor.

BHP Billiton and federal and state representatives called public meetings last spring to solicit safety, environmental impact, and security questions that the community wanted answered and addressed in the EIR/EIS.

BHP Billiton representative Dave Shelton described the project as "like a floating barge" similar in size and shape to the 1,000-foot-long LNG tankers. It would have two storage tanks similar to those on tankers. On shore, Shelton says, BHP will sink a pipe back behind the beach and drill through bedrock to run it under the beach, emerging on the sea bottom beyond surfing areas. From the beach he says, "You won't see very much at all. Just a bit of a shack and a pipe rising out of a concrete pad."

■ **CLEARWATER PORT OFF THE VENTURA COAST:** Crystal Energy, a Texas company, would take an existing fixed oil platform, known as Platform Grace, in the Santa Barbara Channel, rename it Clearwater Port and turn it into an LNG terminal to hold one storage tank and four vaporizers. It would add a floating pier where tankers would dock, and run a new pipeline to the Mandalay power plant near Oxnard. Reusing the oil platform could save substantial capital investment and

construction time, giving the company a competitive edge over others, says Lisa Palmer, Crystal Energy's spokesperson. "The economics will bear out who sees the light of day."

Hearings will be scheduled after Crystal Energy signs a contract with a firm that will create the EIR/EIS.

Crystal Energy is also working to resolve two other regulatory problems that do not apply to the other projects. Because Platform Grace is part of the pipeline relay system for an oil platform farther out (Platform Gale), it is not truly idle, and the federal Minerals Management Service, which oversees that activity, must sign off on the company's plans. On top of that, Crystal Energy says that its main source of gas will be Alaska, which brings in the federal Jones Act, which requires that exports and imports from one U.S. state to another U.S. state be on American-built ships owned by American companies. Of the 160 or so LNG tankers on the oceans today, only two, belonging to Marathon Oil, are American-owned and very few others are American-made, according to the *Petroleum News*. Palmer says this hurdle "is surmountable."

■ **CAMP PENDLETON, OR WHERE?**

Although ChevronTexaco representatives have met with Cy Oggins of the State Lands Commission to discuss the company's proposed survey of the ocean floor off Camp Pendleton, spokeswoman Nicole Hodgson declined to discuss it. She said that the company's Port Pelican project in the Gulf of Mexico, which recently received a permit to build, and the one off the Coronado Islands in Baja California represent their only projects. The company is seeking a third site, she said, but many locations are being considered in California (north and south), the East Coast of North America and the Gulf of Mexico.

Nonetheless, the San Clemente City Council in early September voted to oppose any LNG facility nearby and in the vicinity of the San Onofre nuclear power plant, and the mayor has solicited support from state government and congressional representatives.

In June, Camp Pendleton's commander expressed his and the Marine Corps' unequivocal opposition to such a project. A week later the head of Marine Corps installations, Lt. Gen. Richard Kelly, in a letter to the *Los Angeles Times*, issued what remains the Marines' official position. Kelly

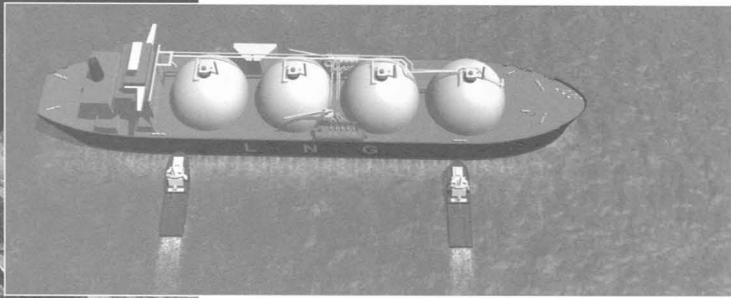
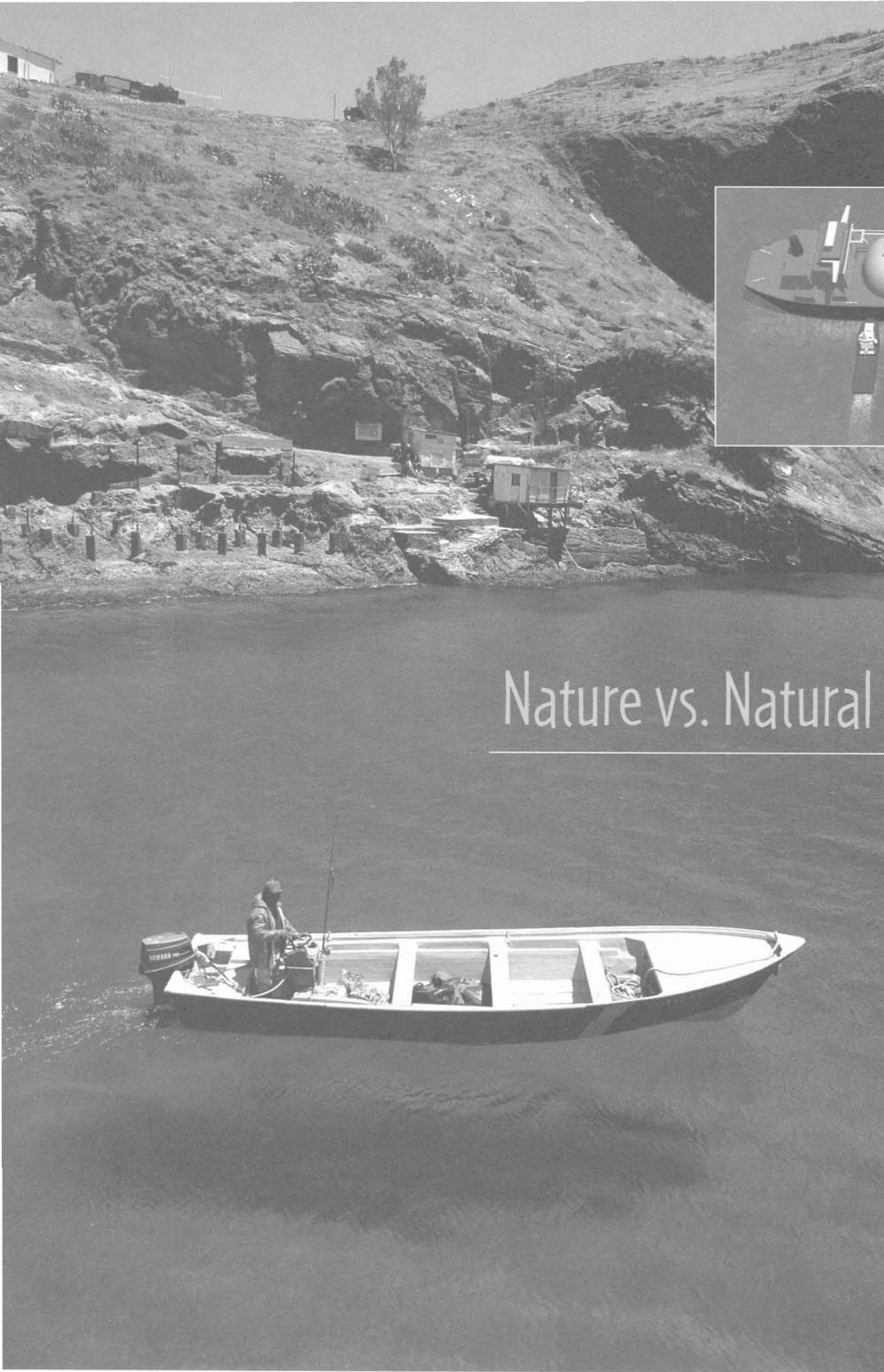


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stated that the Marines would not object to an LNG importer assessing camp regions when looking for a site—a statement that some view as a reversal of positions. His letter, however, also could be read as a diplomatic rephrasing of the Marines' intent to keep their ship-to-shore operations and exercises clear of any interference. He wrote, "Camp Pendleton's many miles of coastline offer an ideal, realistic environment for our forces to conduct critical ship-to-objective maneuvers necessary to maintain our role as the nation's 911 force in readiness. We take any infringement on our ability to maintain that posture with the utmost seriousness." In other words, any LNG company had better be prepared to take on the Marines. ■

Trish Beall is a freelance editor and writer based in Berkeley.

- [1] The Clearwater Port project would convert the oil platform Grace into a fixed LNG terminal that would regasify LNG and pump it ashore near the Mandalay power plant.
- [2] The Cabrillo Port pipeline would come ashore at the Ormond Beach power plant.



BHP BILLITON

Nature vs. Natural Gas in Baja California

A Mexican fisherman motors into a cove at Isla Sur in the Coronado Islands. A lighthouse keeper and six Mexican Navy men live on the island. On the shore are ruins of a casino.

DIANE LINDQUIST

PHOTOGRAPHS BY
DAVID MAUNG

The Coronado Islands sit eight miles off the coast of the teeming cross-border metropolis of San Diego and Tijuana. Though they are clearly visible from San Diego high-rises and Rosarito beaches, few people know much about these four rocky outcroppings.

These “Sentinels of San Diego Harbor,” are geologically tilted fault blocks of volcanic rock rising from a submarine shelf. All four have treacherous coastlines, lined with jagged rocks and steep cliffs. Early in Southern California’s settlement, Russians and Americans landed there to slaughter fur seals, elephant seals, and sea otters until they all but wiped them out. In the late 1800s, people went there to picnic, fish, and scramble up steep slopes for sea bird eggs. During Prohibition, high rollers and Hollywood stars gambled in a luxurious casino on the shore of Isla Sur, the largest and southernmost of the island group.

Nowadays the Republic of Mexico maintains a small navy garrison and a solar-powered lighthouse near the site of the casino, which was destroyed by fire decades ago. Nobody else may set foot on any of the Coronados without special permission. Consequently, a multitude of plant, bird, reptile, marine mammal, and other species thrives on and around the islands. East of Isla Sur, several offshore

reefs provide rich invertebrate habitat, attracting snorkelers, divers, and fishermen.

Lately, the peaceful Coronados have become the focus of fierce controversy. ChevronTexaco is moving ahead with plans for a \$650-million liquefied natural gas (LNG) terminal on a platform about the size of three football fields, just east of Isla Sur. It has already won an environmental permit from Mexico's Secretaria de Medio Ambiente y Recursos Naturales (Secretariat of Environment and Natural Resources), known by its Spanish acronym, Semarnap. The project will require no construction on the island and the company will not have access to the island itself. The permit requires limits on noise and lights, and ongoing monitoring of sea mammals. But if the firm, based in San Ramon in Contra Costa County, wins approval for a 25-year concession (renewable for 50 years) it will use the island as a de facto breakwater to shelter activities at the terminal, activities that will include the offloading of LNG tankers arriving every few days from across the Pacific. The liquid fuel is to be regasified on the platform, then piped to the mainland for distribution. ChevronTexaco has said it plans initially to sell 20 percent of the gas in Baja California and 80 percent in the United States, shipping it by pipeline across the border.

This project has prompted an outcry on both sides of the U.S.-Mexico border. Area residents, politicians, and nongovernmental organizations claim the terminal would endanger both a rare ocean resource and nearby communities. "They're not just rocks," said Amy Berger, a director of Sea-Camp, which takes thousands of youngsters from across the United States on snorkeling trips to the island each year. "Our big concerns are how much they're going to limit access to the islands and what it'll do to the islands." The global watchdog Greenpeace and other groups have sent boats filled with protesters out to the islands.

Opposition to prior LNG projects has prompted at least five corporate energy groups to drop plans to build similar terminals along North America's west coast in recent years. Five others remain in the running, proposed for both onshore and offshore sites along the ocean between Ensenada in Mexico and Oxnard in Ventura County, California. All are competing to be first to sell LNG to one of the most energy-hungry regions in the world (see story on p. 24). "Baja California and California have a

real need for an energy supply," says Carlos Atallah, director of ChevronTexaco's project. "There is an energy shortage coming to the whole region."

In Baja California, ChevronTexaco's only current rivals are Sempra Energy Corp. and Shell Oil Co. They first proposed building separate terminals on Costa Azul, a seaside plateau a dozen miles north of Ensenada, but later formed a joint venture to erect one \$600 million project at the proposed Sempra site, less than a quarter mile south of the Bajamar golf resort and vacation community. Bajamar's developer, Roberto Valdes, who plans to extend his popular, upscale residential golf community southward, is fighting the Sempra-Shell project with numerous lawsuits. He claims preliminary injunctions have put the venture's environmental permit on hold, but Sempra officials insist the project has survived all court challenges. Since the public does not have access to Mexican federal court proceedings, the matter is uncertain.

The bulk of the LNG, which would be imported from Indonesia, West Australia, Russia, and possibly South America, would be used to fire electric power plants, though some might eventually also power cars, buses, and other vehicles, according to the California Energy Commission. Energy company executives contend that use of natural gas, a relatively clean-burning fuel, in new and converted power plants will improve the region's air quality. Critics

Jon Nelson, left, of San Diego's Sea Camp, and Colorado junior high school student Tiffany Reef hold sea stars found on a snorkeling trip off Isla Sur.





Manuel Murrieta of Rosarito joins a protest of the Sempra-Shell LNG project at Costa Azul. His sign says "Tijuana says no to gas works in Salsipuedes. Danger!"

argue that the introduction of LNG commits the region to ongoing use of fossil fuel when it should be turning to renewable energy sources such as solar and wind power. With both the George Bush and Vicente Fox administrations favoring LNG development, many energy experts have predicted that construction on at least one or two receiving terminals along the Baja California and California coasts will start taking shape by early next year.

Environmental and community opposition groups contend that companies gain an edge by locating south of the border because Mexico's approval requirements are more lax than those in the United States. In Mexico, three key permits are required—a development permit from the Comisión Reguladora de Energía (CRE), an environmental permit from Semarnap, and a landuse permit from local authorities. For projects involving federal waters, as in the Coronados, the Secretaría de Comunicaciones y Transportes (SCT) (Communication and Transportation Secretariat) is also involved.

As of early November, CRE was completing final revisions of its norms and standards for gas storage for both onshore and offshore installations. Shell and Sempra were awarded CRE development permits under special emergency provisions. Public hearings held by Semarnap officials last year in Ensenada to consider granting environmental permits to Sempra's and Shell's projects were the first ever.

Opponents in Mexico are crying foul over the way the SCT is selling the concession at the Coronado Islands, for which Chevron-Texaco was the only bidder. Mexico's federal officials announced the solicitation December 8, 2003, but did not publish it until December 29, when many were celebrating the holidays. Members of Mexican opposition parties, including three-time presidential candidate Cuauhtemoc Cardenas, charge that the Fox administration is selling sovereign territory to a foreign oil company in a secret deal. Government officials counter that there was nothing wrong with the way the bidding process was handled, and they insist the nation's LNG regulations are similar to those north of the border and as stringent as anywhere else in the world. ChevronTexaco's Atallah agrees. "We started this in 2001. If it's that easy, why haven't we gotten all the permits? . . . There is a process in Mexico and it is a very strict process . . . with tremendous scrutiny of the project."

The strong public resistance to the projects caught their proponents unawares. According to Bill Powers, a San Diego environmental engineer who has emerged as a leader of a cross-border alliance of LNG critics, public protest is new to Baja California but the state's residents are among the most determined anywhere. "The Baja [California] community has little faith in government to protect their interests. If aroused, they will take street action," he said.

Already, two LNG project proposals for Baja California have foundered on public opposition. El Paso Corp. and Phillips/Conoco pulled out when Rosarito residents objected to a site next to a power complex and aging oil storage tanks in a populated neighborhood in a city whose economy depends on tourism. Marathon Oil Corp. had proposed a \$1.7-billion energy complex near the upscale Tijuana neighborhood of Las Playas. It would also have included two power plants, a wastewater treatment plant, and a desalination facility. The company abandoned its plans when the Baja California government seized the property, claiming there were problems with the land titles. The government acted after objections from local residents, including influential attorneys, accountants, and university professors.

Objections to LNG projects in both Baja California and California are wide-ranging. The issue of safety assumed greater prominence after the 9/11 attacks, and became a top priority after an explosion at an Alger-

Mexican navy men wait to greet a boat load of visitors to Isla Sur. The sign reads "Species unique in the world live here. Don't bring plants or animals. Report what you see to Semarnap."





ian LNG complex killed 30 people and injured more than 70. Last November, the U.S. Department of Homeland Security warned that LNG facilities might be targets of al-Qaeda terrorist attacks because the terminals and tankers are highly visible and easily identified.

"For nearly 50 years now, all discussions of risk and probability . . . have focused on how to account for human errors," said Jerry A. Havens, director of the Chemical Hazards Research Center at the University of Arkansas. "The new reality is that we must now consider malicious acts as well."

The U.S. Department of Energy subsequently announced it is greatly expanding a new LNG safety study "to err on the side of inclusion rather than speed" in permitting projects. And the Federal Regulatory Energy Commission, which, along with the Coast Guard and Office of Pipeline Safety, issues permits for LNG projects in the United States, is studying the Algerian incident to learn lessons it can apply. The Mexican government says it is continuing to upgrade its safety standards.

Environmental concerns are also strong. The projects are in the migration paths of California gray whales, and some scientists argue that the whales' mating and birthing might be disrupted. The Coronado Islands and Costa Azul are among the few remaining areas along the coast with natural coastal scrub habitat. The Sempra-Shell site is considered archeologically significant, with evidence of human habitation going back thousands of years. Environmental groups' chief concern with ChevronTexaco's project is its impact on fish, birds, plants, and mammals.

The waters around the Coronados teem with underwater life: yellowtail, bonita, barracuda, black sea bass, ling cod, dolphins,

and the bright orange garibaldi, California's state marine fish. Pelicans, cormorants, herons, oystercatchers, gulls, ospreys, phalaropes, terns, and other seabirds are permanent or part-time residents. Harbor seals and sea lions haul out on the rocks. A colony of elephant seals uses the islands to mate, rest, and give birth. There are eight species of endangered fish, reptiles, plants, and birds, including the region's largest breeding colony of the Xantus' murrelet, listed as threatened in California.

The livelihoods and recreation of many boat owners, divers, commercial and sport fishermen, sailors, and naturalists depend on the Coronados.

Sempra, Shell, and ChevronTexaco executives say they will take extraordinary efforts to protect natural resources, and will restore any species disturbed by the construction and operation of the LNG facilities. "This area has been selected very carefully after a study of the coastline from San Francisco to Ensenada," Atallah said. "It's the best possible project. . . . We can be a facilitator in making the island a preserve. . . . We are doing everything in our power to accommodate concerns."

While Mexico might once have seemed an easier siting location than alternatives in California, the LNG projects planned there are vulnerable, from politics if not from commercial and regulatory issues. "When you talk about the importance of these projects, it's not so bad that they have taken longer than expected," said Jeremy Martin, energy specialist at the Institute of the Americas in San Diego. ■

Diane Lindquist is a business reporter at the San Diego Union-Tribune who covers U.S.-Mexico economic, financial, and business issues.

Sport fishing boats cruise between the Coronado Islands.

Grazing near
Hearst Castle

The Hearst Deal: How Good a Bargain?

CAROL ARNOLD

GAZING AT THE RUGGED mountains, craggy headlands, and unspoiled beaches of California's central coast, few travelers on Highway 1 are aware of the battles that have been fought to preserve these spectacular landscapes. As they pull off the road to stroll on a quiet beach or along a bluff-top trail, many are amazed that, despite unrelenting population growth and rising real estate prices, nothing much seems to have changed here for at least a century.

The latest, and the biggest, among the many conservation struggles in this region is focused on an unspoiled coastal property that extends from the mountains to the shore in northern San Luis Obispo County. Known as the Hearst Ranch, this is an open 82,000-acre landscape with rolling hills, living streams, and 18 miles of shoreline. There are rocky coves, scenic promontories, and white sand beaches. The views from Highway 1 are unobstructed between Ragged Point, the gateway to Big Sur, and San Simeon State Beach.

Hearst Ranch is owned by the Hearst Corporation, the media giant, and has been used mostly for cattle grazing and farming for nearly 150 years. Its future has long been hotly debated. In sheer size and diver-

sity of life forms, the property is extraordinary. Nearly a thousand plant and animal species have been observed there. Seven streams shaded by willows, sycamores, and cottonwoods flow from the mountains to the sea, sheltering steelhead and California red-legged frogs, both listed as threatened on the federal endangered species list. A large colony of elephant seals breeds along the shore.

About 60 percent of the Hearst Ranch is within the Coastal Zone established in 1976 by the California Coastal Act. Any development within this zone is limited by the Act's requirements. In 1998, the Hearst Corporation proposed a development plan that included a 650-unit resort, commercial development, and a shoreline golf course on San Simeon Point. It foundered before the Coastal Commission after impassioned testimony by hundreds of people. That defeat diminished the landowner's expectations for development and opened the way to one of the largest conservation projects in recent years.

On June 3, 2004, Secretary of Resources Mike Chrisman announced a tentative agreement with the Hearst Corporation on terms of a conservation transaction. State agencies and the American Land Conser-



DENNIS KOHN

vancy had been working with the landowner for two years to shape a \$95-million project that would protect most of about 80,000 acres east of the highway for agriculture and habitat by means of an easement and, on the coast side, preserve scenic and natural resources while securing public access. The Wildlife Conservation Board agreed to contribute \$34.5 million. On September 15, the Coastal Conservancy approved another \$34.5 million, taking one of the final steps necessary to seal the deal.

The Coastal Conservancy acted after hearing testimony for six hours from more than 70 people who expressed various points of view, often with strong emotion. Among those who urged the agency to accept the deal without asking for changes were dozens of political and civic leaders, ranchers, and other citizens from San Luis Obispo County. "This is the most significant conservation project in the history of California," declared State Senator Bruce McPherson of San Luis Obispo County. County Supervisor Shirley Bianchi attributed her recent reelection to her support of this project. She pointed out that by being placed under easement, the Hearst property "will stay on the tax rolls," and also that "the easement does not grant development rights; it [only] enables the owner to apply for a permit."

Among those pleading that the Conservancy seek revisions to the agreement were Coastal Commission staff. "We urge you to postpone action to remove unwarranted restrictions to public access to the sea," said the Commission's deputy director, Charles Lester. "Current agreements fall short of the vision and values of the Coastal Act." Anne Nothoff of Environmental Defense agreed, saying "the easement needs more enforceable provisions and more State oversight."

Gary Giacomini, a rancher and former Marin County supervisor, expressed a view shared by many at the meeting: "I plead with you not to postpone action. It's fragile." But State Senator Wesley Chesbro of Humboldt County, the sponsor of legislation establishing the Coastal Trail, said that although "I agree that it's a unique opportunity, questions need to be raised."

What, then, was the deal approved by the Conservancy? What was won and what, if anything, was lost?



THE KEY ELEMENTS:

- Hearst will sell an easement on the 80,000 acres east of Highway 1 to the American Land Conservancy, which will immediately transfer it to the California Rangeland Trust, a private nonprofit organization governed by ranchers and dedicated to the improvement of the environmental quality and economic stability of ranches. The purpose of the easement is to preserve agricultural, natural, scenic, and open space resources. Hearst will continue to own this land, and there will be no public access to it other than community events that Hearst may sponsor.
- By selling the easement, the landowner will forego the option to seek permits to build up to 400 homes on the Ranch. The easement will allow the landowner to apply for permits for 27 new homes, plus additional employee homes. Each of the 27 home sites may have a five-acre building envelope surrounded by a 20-acre "buffer" on which private agricultural and recreational facilities and uses would be allowed. None of this development may impair the view from Highway 1 or Hearst Castle, or impact sensitive habitat areas.

Looking north across Point San Simeon

- Of the 1,656 acres that Hearst owns west of Highway 1, about 950, including 13 miles of shoreline, are to be transferred to State Parks, which will also manage the Coastal Trail. Public access will be limited to daylight hours.
- Hearst will retain ownership of 700 acres, including San Simeon and Ragged Points and Pico Cove, a small inlet. An easement to protect scenic views will be placed on the properties and held by Caltrans. The landowner will also deed to Caltrans the land under portions of Highway 1 currently threatened by erosion, and an easement to realign those portions of the highway to the east. Once realignment is completed, the land now covered by Highway 1 is to be transferred to State Parks. Public access to San Simeon Point will be limited to 100 people per day. At Ragged Point, guided walks for up to 20 people will be offered once a month.
- Development west of the highway will be restricted to a new 100-room hotel in Old San Simeon Village, on the southern side of San Simeon Point. It is to be built in keeping with a sketch by architect Julia Morgan, who designed Hearst Castle, which is now a State Parks property, attracting about a million people a year.

now. Those lands west of the highway, however, are currently fenced and posted with signs reading: "Private Property—Public access is granted by permission only." The landowner could revoke that permission at any time.

Linda Hanes, board president of Coastwalk, and others, took issue with the route of the Coastal Trail, which is to run along the highway for four miles past scenic places the landowner is keeping. Along 15 miles, the Trail will be close to the shore if State Parks finds that feasible.

Several critics of measures approved for natural resource protection sought a stronger State role to ensure compliance with conditions of the conservation easement that will be held by the Rangeland Trust. Coastal Conservancy board member Mike Reilly, who is also chairman of the Coastal Commission, said it was a matter of "fiduciary responsibility" that the State do more to monitor the public's investment. Under the approved deal, monitoring will be conducted yearly by the Rangeland Trust and will be subject to review by the Wildlife Conservation Board. Resource agencies will have access to the land east of Highway 1 for monitoring purposes only, in their capacity as members of an audit committee that will review compliance at least every five years.

The American Land Conservancy insists that the deal reaches as far as the Hearst Corporation would go, and represents an unparalleled opportunity to protect a glorious piece of the California coast. Most of those testifying at the Conservancy's meeting agreed.

The Hearst Ranch conservation project guarantees permanent public access to the shoreline—although less than what some desire—and it secures for this unique landscape a degree of protection that could not be achieved by regulation alone. This conservation effort, as all others, is a process, not a single occurrence. The real test of the Hearst deal will come within the next ten or so years, as plans are completed, permits granted, and public facilities opened. Only then will it be possible to judge whether the concerns expressed before and during the Conservancy's meeting have been fully addressed, and only then will the scope of what was accomplished be apparent to the public. ■

Carol Arnold, a retired Coastal Conservancy program manager, worked on the negotiations for the Hearst deal in 2003.

JULIA MORGAN,
COURTESY AMERICAN LAND CONSERVANCY



One of Julia Morgan's preliminary plans for Old San Simeon Village

The deal, to be funded by State general obligation bonds and federal transportation funds, includes a \$15 million state tax credit to Hearst. Funding for the acquisition has now been secured from the Coastal Conservancy, the Wildlife Conservation Board, and Caltrans. State-approved appraisals of the property have placed the value at significantly higher than the \$95-million deal.

Does this agreement fulfill the promises of the California Coastal Act, and is it the best possible deal Californians could get for their money?

Some critics of the deal urged the Conservancy to strengthen public access and easement monitoring provisions. Sierra Club representatives contended that accepting the limits of 100 visitors a day at San Simeon Point and 20 a month at Ragged Point would diminish public access rather than adding to it. They believe that more people than that visit these scenic spots



COASTAL CONSERVANCY NEWS

THE CONSERVANCY spent the bulk of its time at the September 15 meeting in Windsor, Sonoma County, discussing the proposed Hearst Ranch Conservation Project. Among other projects approved at the meeting are the following:

NAPA RIVER RESTORATION

STREAMBANK EROSION is sweeping some of the most valuable farmland in the world down the Napa River, degrading instream habitat for steelhead, salmon, and the endangered California freshwater shrimp. To reduce the erosion, the Conservancy granted \$279,000 to the Napa Resource Conservation District to prepare engineering designs and permit applications for the restoration of a four-and-a-half-mile-long section of the river east of the town of Rutherford.

The Napa River has been confined to a single channel along much of its length and during winter storms water in the channel runs so quickly that it carves away the streambank. The goal of the restoration effort is to recreate floodplains that can dissipate the river's energy during high flows. In addition, invasive plants will be removed from the stream banks and replaced with native vegetation. Nearby vineyards will benefit from this aspect of the project because invasive plants can harbor disease-carrying insects.

Local landowners have been trying to control erosion along this stretch of the river. The Rutherford Dust Society, a nonprofit organization of vintners and growers, has been working to keep the soil where it belongs—on the banks, and out of the stream. The Society has contributed \$60,000 for preliminary plans for the restoration. Once the plans are complete, the District will use \$260,000 in county funds to shape the floodplain.



STEPHEN JOSEPH

There are bears on Bear Mountain.

BEAR MOUNTAIN SAVED

A CHUNK OF wilderness rising just northeast of Santa Rosa is being protected through an acquisition funded partly by the Conservancy. The Bear Mountain property is 960 acres of rolling meadows and forest, with vernal pools, creeks, and wildlife, including bobcats, mule deer, a mountain lion, and, yes, black bear.

The Conservancy approved \$1 million to the Sonoma County Agricultural Preservation and Open Space District to acquire 242 acres of the property and \$200,000 for planning. Purchase of the remaining 718 acres will be paid for by a county sales tax.

The acquisition was given high priority by the Conservancy because of the property's rich natural resources and because up to 30 homes could have been built on the land; after the acquisition, just two will be allowed.

Bear Mountain is not only important wildlife habitat, it's also a great place to relax. From the higher elevations, one gets a view stretching from the coastal hills to the Mayacamas Mountains.

LOS ANGELES RIVER PARK FUNDS

THE MONUMENTAL effort to create a string of public parks along the Los Angeles River is a step closer to realization. The Conservancy will disburse \$1.9 million to California State Parks for planning the Taylor Yard and Cornfield State Parks along the river near downtown Los Angeles. The two abandoned industrial sites will be transformed into large parks, with active recreational facilities and habitat for plants, birds, and other wildlife.

MALIBU STEELHEAD HABITAT TO GROW

STEELHEAD TROUT in Malibu Creek will get another two miles of spawning and rearing habitat. The Malibu Coastal Land Conservancy will replace an at-grade road crossing with a 130-foot bridge, effectively removing the only barrier to steelhead passage on Lower Malibu Creek. The Coastal Conservancy approved \$900,000 for the project. The Malibu group will contribute \$375,000.

FILLING GAPS IN THE BAY TRAIL

THE 400-MILE Bay Trail will be several steps closer to completion thanks to a \$3.8 million block grant from the Conservancy to the Association of Bay Area Governments and the nonprofit Bay Trail Project. The funds will be used to build sections of the trail where preliminary studies and planning has already been done, and to proceed with planning other sections of the trail. Since 2000, over 12 miles of trail have built with Conservancy funding and are now being used by hikers, bikers, wheelchair riders, and joggers.

PROTECTING THE VENTURA HILLS

THE CONSERVANCY approved \$200,000 to the Ventura Hillside Conservancy to plan for the acquisition and management of open space in the Ventura Hills, which links the upper Ventura River watershed and the Santa Clara River. Development pressures are strong on this land, which is currently used for cattle grazing and oil extraction.

The Ventura Hillside Conservancy formed in 2003 to protect 50,000 acres of undeveloped ranchland north of the City of Ventura. It will use the money to appraise key properties in the area and assess their biological values, then to put together acquisition and stewardship plans. The land is home to a variety of native plants and wildlife, including lemonade berry, wild cucumber, songbirds, and raptors.

POINT CABRILLO LIGHTHOUSE FIX-UP

THE POINT CABRILLO Light Keepers Association will be using just over \$2.1 million in Conservancy funds to continue the restoration of the historic light station near the town of Mendocino. The next tasks on the association's to-do list include restoring existing buildings for use as an inn and a museum. The Conservancy has been involved in Point Cabrillo since 1988, and has spent \$7.2 million to acquire the property.



BAY TRAIL PROJECT

This segment of the San Tomas Aquino Bay Trail in Santa Clara is part of a planned 12-mile multi-use trail.



RICH REID, COLORS OF NATURE

The Ventura Hills

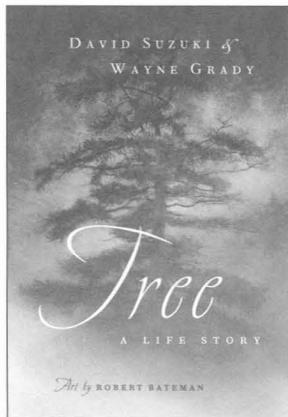
New Guides to Seafood

How shall we choose seafood that is both healthful and harvested in ways that do not damage ocean life? Two organizations offer on-line resources that may help. Environmental Defense has a printable pocket-size Seafood Selector with best and worst eco-choices, plus shopping tips, recipes, and information on health hazards, aquaculture, and fishing methods (www.environmentaldefense.org/go/seafood). Habitat Media has a web site that explores issues related to aquaculture worldwide, based on their documentary film, *Farming the Seas*, including interviews with experts from a wide range of related fields (www.habitatmedia.org). —HMH



TREE!

Tree: A Life Story, by David Suzuki and Wayne Grady, with art by Robert Bateman. Greystone Books, Vancouver, B.C., 2004. 192 pp., \$20 (hard cover).



THE STORY of a single tree connects us to other times and to all parts of the world. This book tells that story," David Suzuki writes in the introduction to this elegant little book. "But it is also the story of all trees—and all life—throughout this place called Earth."

That summary statement explains abstractly what the book is about. More concretely, it is about a Douglas fir that grows near Suzuki's cottage outside Vancouver, British Columbia. But this book is much more than a single tree's story. Reading it is somewhat like stumbling on a trunk hidden in the attic: you discover a wealth of information, and are invited to ponder connections you might never have dreamed of. From salamanders to seed-eating songbirds and squirrels, from snags and spotted owls to sex, salmon, and soil, the world surrounding a single Douglas fir keeps expanding until, indeed, it embraces all life on Earth.

In five chapters (Birth, Taking Root, Growth, Maturity, and Death), Suzuki, a geneticist and Canada's preeminent science broadcaster, and co-author Wayne Grady take us into the history of scientific inquiry, exploring how taxonomy has developed, how chlorophyll was discovered, how phenolics, terpenes, tannins, and alkaloids protect a tree. Just what *is* a stem, a seed, a cluster of needles? We learn the answers, and how they were arrived at. The essentials of life itself, such as nutrition, respiration, and reproduction, all come under scrutiny. Fungi, ferns, and fire are in the cast of charac-

ters, along with Theophrastus, Linnaeus, and Darwin, Mark Twain, Washington Irving, and P. T. Barnum. And that is just the beginning.

This is an utterly pleasing natural history for readers who enjoy discovering the odd and interesting fact, as well as for those who want a more thorough understanding of life processes and interconnections.

—Anne Canright

NEW NATURE GUIDES FROM UC PRESS

Introduction to California Spring Wildflowers of the Foothills, Valleys, and Coast, revised edition, by Philip A. Munz, edited by Dianne Lake and Phyllis M. Faber. *California Natural History Guides 75*, University of California Press, Berkeley, 2004. 302 pp., \$39.95 (hard cover), \$16.95 (soft cover).

SEVERAL GENERATIONS of California botanists honed their field skills with the classic University of California Press "wildflower books" of the 1960s: *Shore Wildflowers of California, Oregon, and Washington*; and *California Spring Wildflowers* by Philip Munz, and companion guides for the San Francisco Bay region by Helen Sharsmith and Point Reyes by Roxanne Ferris. Their virtues as superbly illustrated, non-technical introductory field guides have kept them in contemporary use, reprinted and perennially recycled at used book sales, even as their botanical nomenclature grew ever more obsolete.

As U.C. Press continues to revise and reissue its California Natural History Guides, Dianne Lake and Phyllis Faber have given new life to Munz's *California Spring Wildflowers* (1961). As they did with the recent revision of *Shore*

Wildflowers (2003) and *Desert Wildflowers* (2004), Lake and Faber have reshaped both the form and content of *Spring Wildflowers* to meet expectations for contemporary introductory field guides.

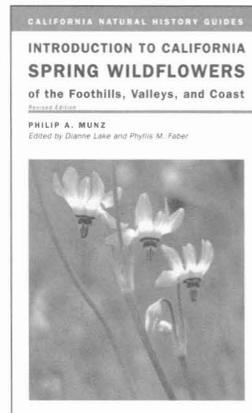
Physically, the book has been made compact enough to carry in a pocket. The original 96 muddy-hued and often amateurish Kodachrome photographs have been replaced by 244 crisp, attractive, and accurate color photographs on high-quality paper, representing most of the 400 species covered.

The new edition provides a comfortable orientation tour of the daunting botanical diversity of the state's wild-

flowers. It carries on Munz's original intention: "... to bring before the public in compact and useful form something by which wildflowers can be identified." It is neither a comprehensive field identification guide nor a layman's version of the exhaustive Jepson Manual reduced to non-woody plants. The geographic coverage, expanded somewhat from the 1961 edition, provides a selective overview of the

foothills, valleys, and coastal regions of California. In part, it overlaps the coverage of the later *Shore Wildflowers*, *Desert Wildflowers*, and *Mountain Wildflowers*.

The updated botanical nomenclature matches the 1993 Jepson Manual, so archaic plant genera and combinations will no longer impede graduation from *California Spring Wildflowers* to more advanced modern botanical inquiry. English names of plants range from truly common names (folk names in actual traditional use, like yerba buena, Ithuriel's spear, and tidy-tips) to artificial, "official" English names, partial translations, and combinations such as "dense-flowered Platycarpus," "notable penstemon," and "few-flowered blue-



eyed Mary," when no widely used folk names exist. Of course, a new edition of *California Spring Wildflowers* will again be needed as the Jepson Manual's taxonomy undergoes further expected revolutions.

This new edition also includes a welcome and valuable new chapter, "Introduction to the Plant Communities of California in Spring," by the late Robert Ornduff. A briefer and less technical overview of the state's plant communities than Ornduff's *California Plant Life* (UC Press, 1974), this chapter provides some geographic and ecological context to the litany of plant species—missing from the original edition of *California Spring Wildflowers*. Also missing, however, is Munz's brief but essential illustrated introduction on "how to identify a wildflower"—floral morphology in a nutshell. The new glossary does not quite match its utility for non-botanists.

The reduced page size, unfortunately, has decreased the number of the original exquisite and precise botanical line drawings by Stephen Tillett, which were highly instructive for recognition and identification of species and genera. Only a small selection is retained in the new edition. Some new line drawings are added, but color photographs are now the primary means of plant identification. Some new color photographs, emphasizing flowers alone, provide less informative representations of plants than the original line drawings of whole plants that featured diagnostic structures and key recognition features. This accommodation of modern publishing taste is a loss for aspiring young botanists, but it is compensated by the accurate revised and updated information on plant species.

For many non-biologists who seek a visual initiation into contemporary California field botany, the new field guide-formatted edition of *California Spring Wildflowers* is a much-needed update of a classic wildflower book. For botanists nostalgically bound to their original Munz editions, the expanded coverage of species and superior photographs make this an attractive supplement to its predecessor.

—Peter Baye

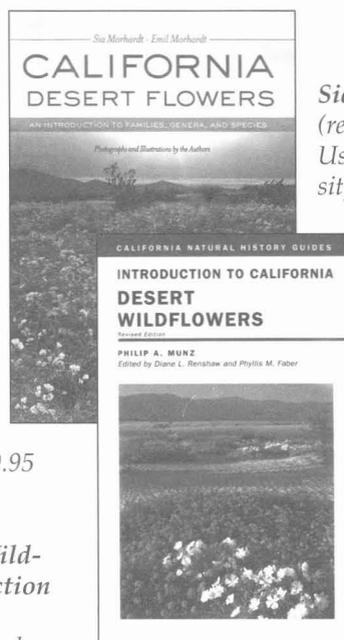
Introduction to California Desert Wildflowers, revised edition, by Philip A. Munz, edited by Diane L. Renshaw and Phyllis M. Faber. *California Natural History Guides 74*, University of California Press, Berkeley, 2004. 248 pp., \$39.95 (hard cover), \$16.95 (soft cover).

California Desert Wildflowers: An Introduction to Families, Genera, and Species, by Sia and Emil Morhardt. University of California Press, Berkeley, 2004. 295 pp., \$65 (hard cover), \$29.95 (paper).

Introduction to *California Desert Wildflowers* is another much revised and updated edition of a Philip Munz book, first published in 1962, now in the handy pocket-sized uniform format of the California Natural History Guides, available with soft, durable covers. Like *Introduction to California Spring Wildflowers of the Foothills, Valleys, and Coast*, it has new color photos and line drawings, and describes over 240 wildflowers using contemporary nomenclature. It *does* include Munz's "How to Identify a Wildflower." Plant species are organized by color of blossoms—a common field guide system.

The Morhardts' volume is in a larger format, with lovely photos and illustrations by the authors. It is both more comprehensive and more scientifically oriented than the Munz guides. More than 350 plants are organized by family, genus, and species, accompanied by detailed descriptive keys and explanatory drawings of flower structure to help with identification. Plant and habitat descriptions are more thorough than in Munz, and include explanations of Latin botanical names. This is a handsome and substantial complement to the revised Munz field guide.

—HMH



Sierra Nevada Natural History, (revised) by Tracy I. Storer, Robert L. Usinger, and David Lukas. University of California Press, Berkeley, 2004. 438 pp., \$24.95 (soft cover).

100 Hikes in California's Central Sierra & Coast Range, (second edition) by Vicky Spring. Mountaineers Books, Seattle, 2004. 269 pp., \$16.95 (paper).

Backpackers and hikers interested in natural history often have to search far and wide for the right book, or combination of books, to take as a guide on their trips.

Those venturing into what John Muir called California's "Range of Light" need look no further than the newly revised *Sierra Nevada Natural History*. This California Natural History Guide introduces the Sierra and its common plants and animals, grouped in taxonomic sections, with color pictures and illustrations. The book's only drawback is its one and a half pounds of pack weight.

If you're unsure of where to go on foot in search of the Sierra Nevada's natural history, *100 Hikes in California's Central Sierra & Coast Range* may help. Focusing predominantly on the Sierra, this guide lays out day hikes and backpack trips in Yosemite, Kings Canyon, and Sequoia National Parks, and the Mokelumne, John Muir, Ansel Adams, and Hoover Wilderness areas. Along the coast, it offers hikes and a few backpack trips in the Santa Cruz Mountains, Pinnacles National Monument, and the Ventana Wilderness in Big Sur. The hikes are organized in relation to major highways. Wilderness permits are covered in detail, including phone numbers and websites for reservations. Each hike description has a nice photo, a small relief map, and an elevational profile. The suggestions on hiking season are a bit conservative, but the detail in this book is more than enough to inspire you to plan a trip and then light out.

—Brett Wilkison

IN 1931, PHILANTHROPIST Ellen Browning Scripps paid for a breakwater to be built along a stretch of La Jolla beach, creating a safe, sheltered swimming area for children: Children's Pool.



Now, 70 years later, that act of charity is the source of a lot of arguments in the neighborhood. No one swims at the beach because, since 1997, harbor seals have been spending time there. Bacterial contamination from their fecal matter prompted the beach's closure.

Seven years ago, the San Diego City Council considered trying to get the seals to leave by dredging most of the sand from the beach. At that time, wildlife advocates won the Council's agreement for a different plan: cede the beach to the seals and make them an attraction. A rope barrier was erected so that people could watch the animals in safety. When a pup was born this January, it made news in La Jolla, bringing crowds, including many children. Tens of thousands of people a month come out to see the seals.

But at its September 14th meeting, the City Council approved a controversial plan for "joint use" on the beach. Seals would get the beach for the first half of the year but would have to share it with humans for the second half. Even more controversial is a return to the idea of dredging the beach. Supporters say removing sand would make the beach less attractive to seals and improve tidal flow, flushing bacteria out to sea.

"It's just absurd," said Bruce Reznik, director of San Diego Baykeeper. "The City is broke, they've cut \$3 million from the Parks and Recreation Department, they're cutting down the hours at swimming pools, but we're going to spend \$500,000 so that a few La Jolla residents can swim."

That's if the plan even works. It's not clear that the seals will abide by the council's decision and leave the beach for half the year; and if humans and seals use the beach at the same time, there's potential for conflict. Under the Marine Mammal Protection Act, humans are forbidden to harass marine mammals, and even touching them would constitute harassment. Seals, on the other hand, could attack swimmers if they felt threatened—as happened in March 2003, when a member of the La Jolla Cove Swim Club was clawed during a "swim-in" to protest the beach's closure.

For Reznik, the whole issue needs to be framed differently. "When you have an educational tool that's drawing 100,000 people a month, plus two beaches in very close proximity where people can swim all they want, that's real 'joint use'."

—Arno Holschuh

Seals to Be Shooed Away?

An Inter-Species Conflict

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