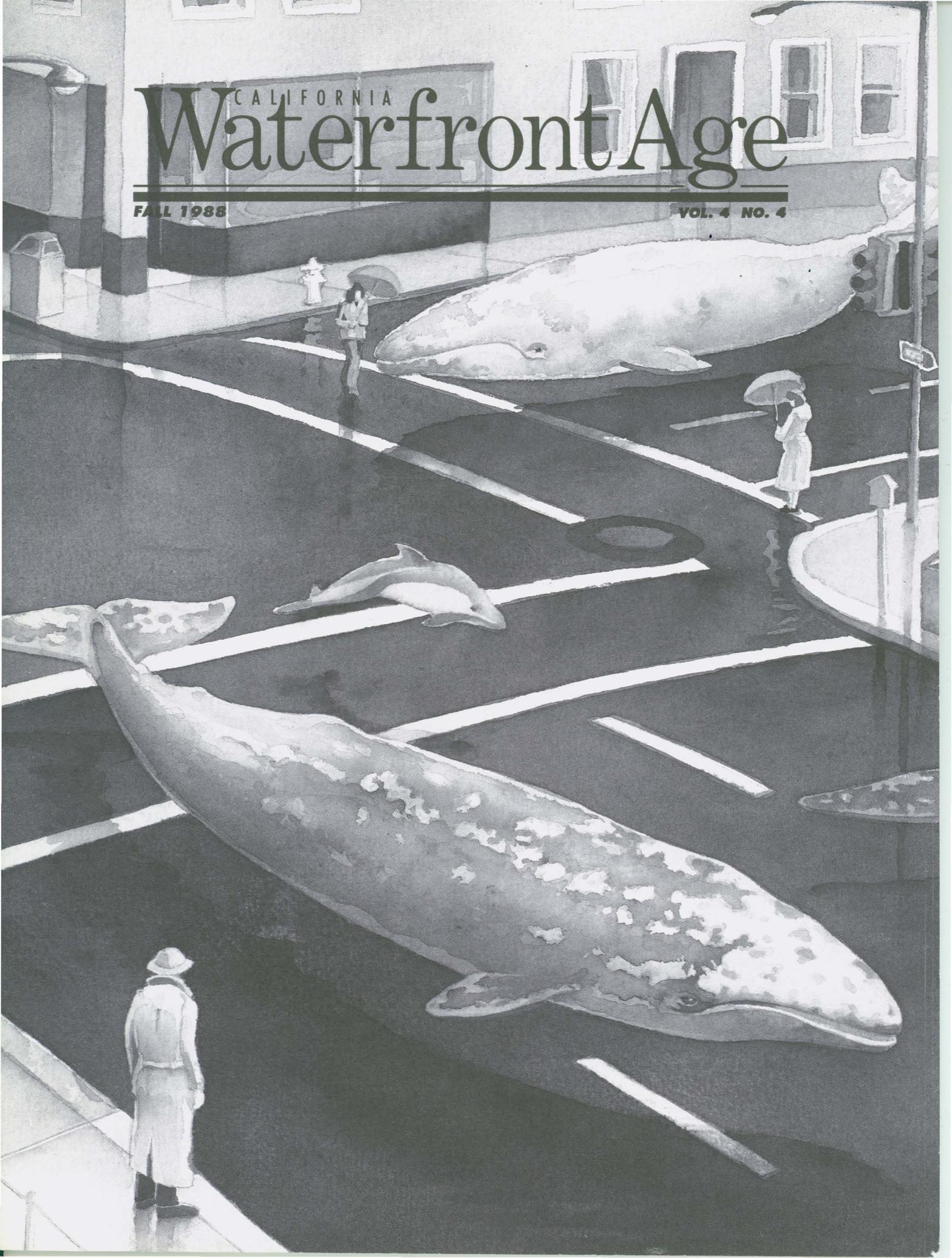


CALIFORNIA
Waterfront Age

FALL 1988

VOL. 4 NO. 4



Guidelines for Contributors

California Waterfront Age is glad to consider contributions of articles and shorter items related to the California coast, and especially to its waterfronts. We aim to provide a forum for the description and discussion of public programs and private initiatives relating to waterfront restoration and development, coastal resource management, and economic development.

We will consider articles of up to 3,000 words on the following subjects:

1. Economic development, project finance, waterfront restoration, the impact of changing uses.
2. Land-use conflict resolution.
3. Water quality, resource restoration, enhancement.
4. Maritime industries.
5. Tourism, waterfront parks, public access.
6. Environmental education and occupations.
7. Cultural and historical issues.

We will also consider the following shorter features:

Conferences: We publish announcements and summaries of waterfront-related conferences.

Book reviews: We seek relevant reviews, about 500 words long, of current books and other publications of interest to our readers.

Essays: Reflections on themes related to waterfronts are welcome. They can be verbal, photographic, graphic, or in cartoon form.

Interested contributors should call or write the editor. Send self-addressed stamped envelopes with submissions.

Are you on our mailing list?

To receive *California Waterfront Age*, or for information on the programs or projects of the State Coastal Conservancy, please send a note with your name, organization, address, and affiliation (civic group, government agency, consultant, development/financial, maritime industry, other) to:

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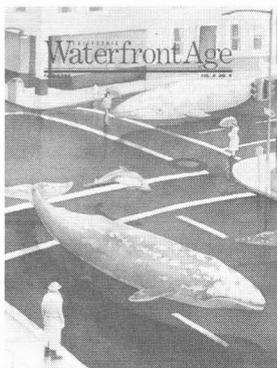
CALIFORNIA WATERFRONT AGE

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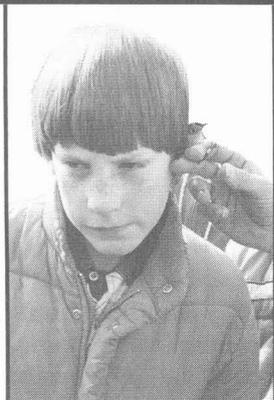


Cover by John Wehrle.

Focus on Environmental Education

SPECIAL COVERAGE BEGINS ON PAGE 10

POINT REYES BIRD OBSERVATORY



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This issue of *California Waterfront Age* is devoted to the subject of environmental education. More specifically, we consider whether we prepare our children to solve the problems we and our predecessors have created through our ignorance of or indifference to the ill effects of human actions on our surroundings.

We witness with increasing alarm the continuing parade of consequences: oil spills, blowouts, and disasters, including those at Santa Barbara, Martinez, off Puerto Rico, and in the Gulf of Mexico; nuclear-related catastrophes such as Chernobyl and Three Mile Island; floods in Bangladesh; desertification in the Sahel; chemical and hazardous waste disasters in Bhopal and Love Canal; the

Are we training our children to understand the nature of our existence on this planet?

life of tributyltin (TBT); and the now common sewage spills from municipal treatment plants resulting from human negligence or mechanical malfunctions.

The list is large and growing—increased air pollution in urban areas, acid rain and its effects, the rapid denuding of tropical rain forests, and most recently, awareness of possible massive global disturbances resulting from the greenhouse effect of climatic warming and the atmospheric effects of chlorofluorocarbons.

All this demonstrates ever more clearly that progress—achievement on a large scale of the good life born of 19th and 20th century industrialization—has its costs, and the bill is now coming due. Now we are beginning to see that we must reassess our criteria for deciding what the good life is and how we can attain it without suicidal results. We

must make some new choices and move as quickly as possible to replace technologies that are not environmentally cost-effective.

Yet the ill effects of past mistakes have also had an encouraging consequence—a growing awareness in our urbanized, concrete- and steel-bound population to the beauties, benefits, and sheer wonder of our natural surroundings. This has gone hand in hand with a new outlook. We have begun to see that our fate is inextricably tied to living harmoniously with nature. Terms like “recycling,” “environmental impact,” and “renewable resources” have become common, along with “smog alert,” “ozone depletion,” and “gridlock.”

Two related perceptions are also spreading more widely. First, it is rapidly becoming evident that environmental protection and socioeconomic improvement are not antagonistic but complementary. Long-term prosperity and job opportunities for the disadvantaged must be more closely tied to *environmentally sound* economic development. Second, job corps and similar youth-oriented community service programs are being recognized as effective pathways and are increasing in number. Usually focused on inner-city youth, they hold great promise for individual growth while channeling youthful energy in constructive ways. Many of the opportunities in the environmental field described elsewhere in this issue could be joined with such programs to great effect.

Species indeed may come and go, and we still do not know for sure what the real impacts of decreasing diversity will be. Yet it seems foolhardy to proceed down a road that now appears to be leading toward ever more serious problems without taking reasonable precautions. The words “conservative” and “conservation” have the same root; the real radical pursues a policy of resource exploitation without considering that such a

course truly will “mortgage our children’s future.”

These thoughts lead us right to the theme of this issue. Are we training our children to understand the nature of our existence on this planet, and how things work? Are we imbuing them with a sensitivity to and appreciation of the wonders around us, and the importance of preserving our natural habitat? Are we stimulating the older ones to think about the implications of how they live and of the public policies that will shape their own future environmental security? Are we creating avenues for them to employ their skills, imagination, and energy in the service of a more enlightened approach to our surroundings—cleaning up the mess we’ve made, preserving what we have, and building a new, more ecologically sound life for the future?

It is not enough to succumb to the edifice complex of building museum-like “interpretive centers” that display what once was, even as we continue destroying adjacent remnants of natural splendor. The very fabric of education, vocational training, and popular entertainment, especially television, must incorporate the essence of this concern in their courses, methods, and programming.

Most importantly, college preparatory examinations and other standard measures of judging academic proficiency must include environmental matters explicitly and must also contain more material relating to the interdisciplinary thought that underlies an ecological outlook. Our children are not

fools; they will quickly realize what they need to know to move ahead.

In this issue *Waterfront Age* launches a new concern with these issues. We ask whether our schools are producing environmentally literate graduates. We look at the



BRANT WARD, SAN FRANCISCO CHRONICLE

new and growing job opportunities within the environmental field. We focus on some successful environmental education and job-training programs. And we offer an unusual reading list. From now on we will regularly present articles about resources, people, and programs that can help educators, parents, and young people to provide the most basic education of all—a sense of our place within the natural world and of what we must do to maintain our mutual well-being. □

Ebb and Flow

Increased Conservancy activity in the San Francisco Bay area is reflected in several projects approved for implementation and start-up funding during the past few months. These included:

Hudeman Slough Enhancement

Wetlands will be created and enhanced on 120 acres of diked historic San Pablo Bay lands south of Highway 12 between Sonoma Creek and the Napa River, with Coastal Conservancy funds up to \$804,774 to the Sonoma Valley County Sanitation District. The funds, authorized in July, will be used to implement the Hudeman Slough Enhancement Plan.

The project is one component of a multimillion dollar upgrade of Sonoma Valley's wastewater disposal program, which recommends the beneficial use of treated wastewater between May and October, when discharges into the Bay are prohibited. The water will be used to restore wetland habitat and to irrigate vineyards and pastures. Only the wetland restoration component will be funded by the Conservancy grant.

Ultimately, the Department of Fish and Game will manage the project site as part of a large system of wetlands and transitional uplands that it and the Conservancy are trying to acquire and establish along the north San Francisco Bay shoreline. This wetland system will provide valuable habitat for the thousands of migratory birds that nest and feed on the Bay during their yearly journey along the Pacific Flyway.

Wildcat Marsh Plan

The 300-acre Wildcat Marsh at the mouth of Wildcat Creek in Richmond on San Pablo Bay is habitat for the Saltmarsh Harvest mouse and the California Clapper Rail, both

endangered species. It is a remnant of a much larger salt marsh that has been filled by flood deposition from Wildcat Creek, bisected by a levee and drainage channel, and isolated by development from previously contiguous marshes. In June, the Coastal Conservancy authorized up to \$314,870 to Contra Costa County for Phase I of the revised Wildcat Marsh Enhancement Plan.

The plan provides for control improvements on the creek to prevent further flood deposition and for removal of previously deposited flood sediment.

It was designed by a team of county consultants; staff of wildlife, regulatory, and local agencies; and interested citizens. It replaces an earlier, less ambitious plan, for which the Conservancy granted the county implementation funds, but which could not be built after a flood control levee was located within the original enhancement area. The Conservancy has been instrumental in bringing together diverse interests to agree on plans for the marsh, and to sustain commitment through the long planning process.

Richmond Shoreline Trail

About one mile of shoreline trail will be developed by the city of Richmond with up to \$315,000 approved by the Conservancy in July. In addition to the trail from Marina Bay to Point Isabel, the project will include two park areas and facilities needed to make this part of San Francisco Bay a prime recreational fishing spot. The city is contributing \$609,000 to this first phase of the project, which will ultimately cost an estimated \$1.2 million. Like other Conservancy access projects, the shoreline trail and park areas will be accessible to people with disabilities. This link will also become part of the Ring-Around-the-Bay system.



Fog Annex: Open and Accessible

The Foghorn Annex of the Montara Lighthouse Hostel in San Mateo County, opened this year with State Coastal Conservancy funding, is accessible to wheelchair riders and others of limited mobility.

Richmond Shore Enhancement

Conservancy funds of up to \$100,000 awarded in July to the city of Richmond will fund preparation of a combined natural resource enhancement and urban waterfront restoration plan for a 780-acre area along the San Pablo Bay shoreline in North Richmond between Wildcat Marsh on the south and Point Pinole Regional Park on the north. Richmond and Contra Costa County requested the Conservancy grant in response to the increase in private development interest that has been spurred in the area by the prospect of completion of the Wildcat and San Pablo Creeks Flood Control Project and construction of the proposed Richmond Bypass (Route 93). The city and county are now seeking to refine plans for the North Richmond shoreline and adjacent areas and to provide for compatible development in advance of reviewing individual development applications.

The plan is intended to address significant urban design issues including definition of the boundary and transition between natural resource areas and development, identification of appropriate uses for shoreline property, and location of a segment of the

Ring-Around-the-Bay trail and other public recreation facilities. It will also address natural resource issues including restoration of a two-mile band of salt marsh and seasonal wetlands that has been extensively disturbed by filling, diking, stream channelization, and other development; protection of wetlands and other natural resources; and integration of wildlife habitat with public access facilities and development.

East Fort Baker Trail

A crucial trail systems connection will be constructed with \$70,000 authorized by the Conservancy in July to the Golden Gate National Park Association. The new trail segment will link the East Fort Baker trail system along San Francisco Bay to the Coastal Trail network of the Golden Gate National Recreation Area, one of the most-visited spots in the nation. These trail links will form part of the Ring-Around-the-Bay trail.

Funding for the project is being provided by the Coastal Conservancy, Marina Community Foundation, and the park association. The Marin Conservation Corps is providing labor, and the National Park Service



Stairway and connecting bridge at Walk-on Beach, part of the State Coastal Conservancy's recently completed Sea Ranch access project, which includes two other stairways, plus a parking lot and disabled-accessible restroom at Stengel Beach.

will fund project design and trail signing. The trail link will traverse steep terrain above the Waldo Grade tunnels of U.S. 101 and offer spectacular views of the Bay area and Golden Gate. About three miles of trails are also being constructed at East Fort Baker, with one mile accessible to disabled persons. All construction is scheduled for completion in December.

Coyote Hills Park Enhancement

Also in July, the Conservancy authorized up to \$25,000 to the East Bay Regional Park District for the preparation of a resource en-

hancement plan for Coyote Hills Regional Park. The park is located on Patterson Ranch Road, in the city of Fremont, north of Highway 84. The authorization will be used to prepare a wetland enhancement plan for Coyote Hills Park to increase habitat for resident and migrating waterfowl and for shorebirds. The park district has committed \$5,000 toward the plan's development. All wetland portions of the park will be considered in the plan, which will include the design of a water distribution system to enhance and create wetlands, a definition of management objectives, and a monitoring program.

Mendocino Botanical Gardens

The Conservancy authorized up to \$50,000 to the Mendocino Coast Recreation and Park District to prepare a master plan for operation and development of the Mendocino Botanical Gardens. The grant, approved in June, will enable the district to study existing conditions in the gardens, establish long-term goals and objectives, and recommend means to enhance garden resources and improve visitor services. A variety of physical improvements may be desirable, including improvements to parking and circulation, trails, restrooms and sewage disposal, irrigation systems, stream enhancement, and public shoreline access. The plan will also focus on the need to expand the current area of public ownership, relative to potential development proposals on private lands surrounding the gardens.

The Mendocino Botanical Gardens are a 17-acre public preserve and park located along the ocean shoreline two miles south of the city of Fort Bragg. The land was acquired in 1981 by the Mendocino Coast Rec-

Continued on Page 47

North America

At Superstition mountain in the Sonoran desert
A beer-bellied man is shooting
At a fifty foot Saguaro cactus with a rifle.
A couple of minutes later the giant cactus falls to the ground
And kills the man—April 1984.

April 1986.
In a ravine at Big mountain in Hopi and Navajo land
A coyote is reading "The Wall Street Journal."
—How many mice can I steal next year
From the American economy?

Off the coast of northern California
Sea lions are listening
To the long-term weather forecast on the radio
—They want to freeze-dry the redwood forest
For the coming ice age.

On a rocky ledge
Somewhere in the century of nuclear power
A family of California condors is watching
"Wild Kingdom" on T.V.
—They ponder how many more years
Homo sapiens, one of the most endangered species
can survive?

—Nanao Sakaki



from *Break the Mirror* (Northpoint Press, 1987).
Reprinted by permission of the author.

Conference Log

Jobs Conference

The CEIP Fund will hold its fifth annual national environmental careers conference at Golden Gate University in San Francisco November 5. Nearly 50 speakers and discussion leaders will focus on environmental careers in a wide variety of fields, including solid waste reduction, recycling, and disposal; surface and groundwater management; toxic chemical management; urban land-use planning; waste minimization in industry; international environmental management; and managing natural resources. For more information, contact CEIP/California, 512 Second St., 4th floor, San Francisco, CA 94107. (415) 543-4400.

BAEER Fair

The 12th Annual BAEER (Bay Area Environmental Education Resource Fair) will take place Saturday, January 28, 1989, from 10 a.m. to 5 p.m. at the Marin Civic Center. The fair will offer workshops and more than 100 exhibits promoting interest in the environment. Admission is \$5 for entry to all workshops and the exhibit hall. For more information, call (415) 657-4847.

Conservative Landscapes

The Northern California '88 Xeriscape Conference, focusing on water conservation through creative landscaping, will be held November 3 at the Red Lion Inn in Rohnert Park. Speakers will discuss profitable water conservation techniques, from small-scale planting design to large-scale turfgrass management. The keynote speaker will be Anne Whiston Spirn, author of *The Granite Garden*.

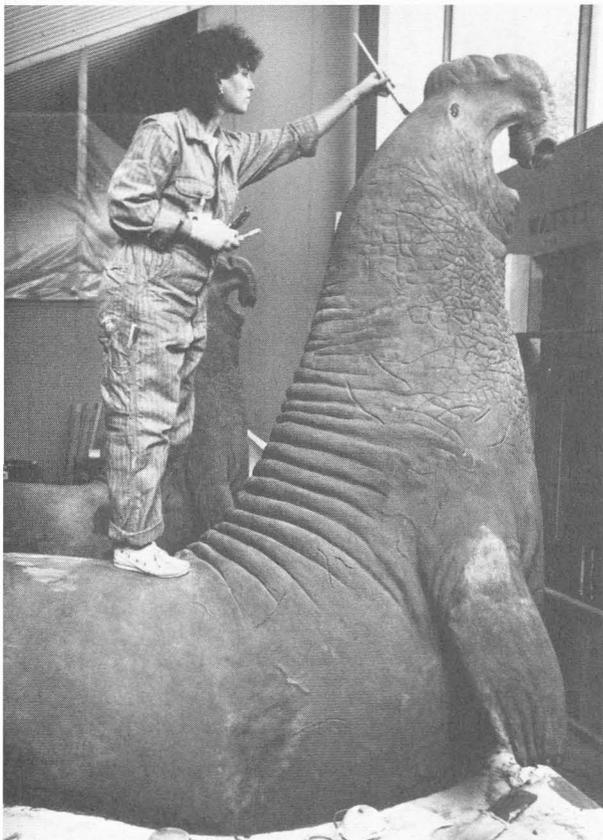
Some topics to be covered: irrigation and planting design for architects as well as homeowners; turfgrass irrigation, management, and control; the electronic green thumb (software and xeriscape); landscape water audits; and xeriscape implementation for public agencies. Co-sponsors are the Sonoma County Water Agency; the cities of Santa Rosa, Petaluma, Sonoma, Cotati, and Rohnert Park; and local water districts. For more information, contact the 1988 Northern California Xeriscape Conference, Attention: Ali Davidson, 2150 W. College Ave., Santa Rosa, CA 95401. (415) 897-4133 or (707) 526-5370.

Wild California

"Wild California: A State of Diversity," is the title of a series of dramatic new exhibits at the California Academy of Sciences in San Francisco's Golden Gate Park. With videos, life-size animal models, and 13 detailed dioramas, the academy's oldest hall has been transformed into a display of the state's landscapes, from a southern desert to wave-hammered islands.

Three exhibits feature the Farallon Islands, 26 miles off the Golden Gate. "Farallon Rookery" and "Oceanic Spring" center around a 14,000-gallon living aquarium stocked with fish and invertebrates that live around these seven tiny islands. Rocky cliffs are populated with mounted specimens of seabirds that breed on the islands. "Farallon Winter," an open diorama, invites the visitor into the middle of a confrontation between two battling male elephant seals.

In another exhibit, a handful of seaweed and sand has been enlarged 50 times to show a thriving ecosystem that lives in and around decaying kelp. In still another, a cup of seawater has been enlarged 200 times life size for



A life-size elephant seal receives a few finishing touches before the debut of "Wild California" at San Francisco's California Academy of Sciences.

a close-up view of microscopic organisms that form the base of the food chain. The academy is open daily from 10 a.m. to 5 p.m.

Urban Open Space

In celebration of its 75th birthday, the department of landscape architecture at the University of California, Berkeley, will sponsor a symposium on "The Future of Urban Open Space" on October 28-29.

Topics will include Public Life in the City; Urban Parks; Urban Plazas and Street Markets; The Street as Public Place; Reclaiming Lost Land in the City; Special Groups in Urban Public Spaces: Children and Women; Aesthetics and Ecology; and Urban Open Space: The Designer's Role. For more information, contact Jane Stahlhut, (415) 642-2962.

Urban Wetlands

Wetland advocates from around the nation gathered in Oakland June 26-29 for an unprecedented symposium on urban wetlands and riparian habitats. WETLANDS88, sponsored by the Association of State Wetland Managers, included plenary session and workshop presentations with scientific, policy, and legal papers as well as case studies with "how to" recommendations. The 125 conference participants included leaders in the field from academia, government, the consulting and scientific research communities, environmental law, and nonprofit sectors.

Wetlands in urban and urbanizing areas are under intense pressures and share a variety of special characteristics and management and restoration needs. Regional variations are as diverse as the nation itself, yet common threads are binding. These include social, economic, regulatory, and environmental influences which have near uniform applicability from the mangrove forests of South Florida to the tidal marshes of Long Island Sound and San Francisco Bay. As the first symposium of its kind, the conference helped define these characteristics and offered approaches for resolving a host of conflicts.

Conference proceedings containing 80 to 100 papers will be published by the Association of State Wetland Managers. Meanwhile, the association has issued a call for papers for "International Symposium: Wetland and River Corridor Management Reconciling Economic Development and Environmental Protection," to be held in Charleston, South Carolina, July 6-9, 1989. For further information, contact Jon Kusler, Association of State Wetland Managers, P.O. Box 2463, Berne, NY 12023. (518) 872-1804. □

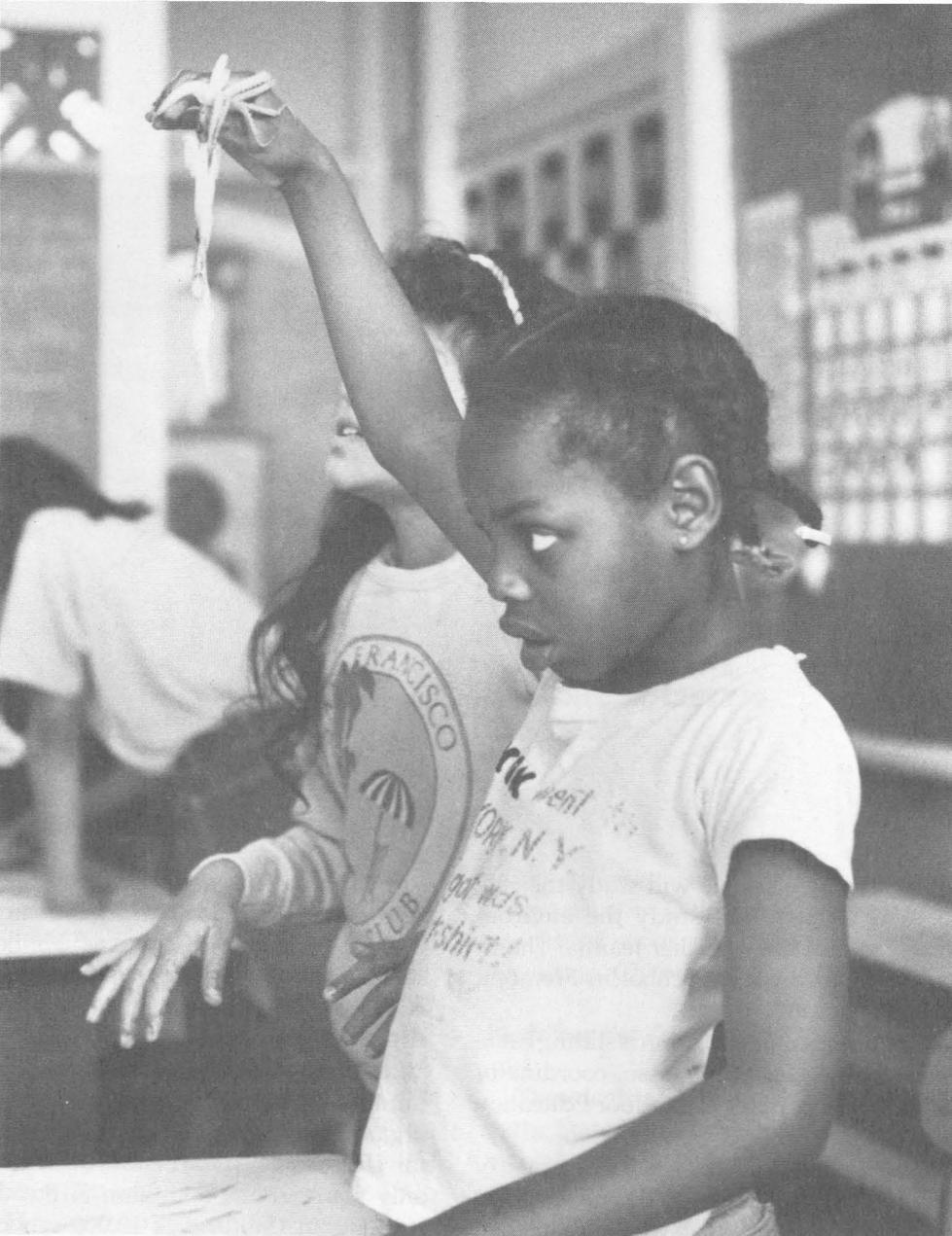
BY JOHN RICHARDSON AND ROZ LORENZATO

Are Our Schools Teaching

Environmental Literacy?

Schools have lately gone “back to basics,” stressing language, science, mathematics, and increasingly, computer literacy. But with serious environmental and resource use problems on the increase, what about the most basic education of all—a fundamental understanding of how the natural world sustains life and what must be done to maintain a healthy environment? Do California’s schools demand that their graduates be environmentally literate?

“No,” responded Diane Brouhard, science department chair at Hamilton High School in western Los Angeles. “With the curriculum we have to teach, we don’t have much time to do much with ecology. It’s there in the text, but not everyone gets to it. The attitude is that it’s common sense. But it isn’t if you’re not exposed to it. There is much emphasis now on cell studies and comparisons, far less on how systems fit together.”



THROUGH THE OCEANIC SOCIETY'S PROJECT OCEAN, STUDENTS IN SAN FRANCISCO'S ELEMENTARY SCHOOLS COME FACE TO FACE WITH CREATURES OF THE DEEP.



"In biology class we will study the cell, but may or may not study the environment," said biology teacher Jeannie Thomson at American High School in Fremont, Alameda County.

"Environmental education is sliding backwards," observed Ed Chiosso, coordinator for San Mateo County's Outdoor Education Program.

Many students do emerge with a grasp of what John Muir perceived: "When we try to pick out anything by itself we find it hitched to everything in the universe." Many teachers strive to lead students to this fundamental understanding, according to Richard Thall, coordinator of the unique Water Environment Studies Program in Contra Costa County. "But if students don't have a teacher to whom it's important, they may never get it," he added.

The same appears to be true in universities, where business, computer engineering, law, and biomedical sciences are favored majors, overshadowing the natural sciences. Even at the University of California, Berkeley, where only the top graduates of the state's schools are admitted, "too large a population—even on our campus—has not been exposed to a general course in environmental studies and does not have the basis to

sort out what's in the press and the news," according to Wilford Gardner, dean of the College of Natural Resources. He believes such a course should be required.

To be sure, some excellent environmental education programs exist within the schools, and even more have mushroomed in communities. Public agencies and nonprofit organizations provide many opportunities for children and teachers. But these reach only some of the 5 million K through 12 students in California's 13,000 schools. To use such resources with a crowded curriculum, teachers and administrators must invest extra time, energy, and imagination.

By and large, environmental education is now viewed as a "soft" area in the schools, as something that's nice if you have time for it, but not as vital as "solid" material that appears on tests that measure student achievement, determine college admissions, and build reputations of institutions and staff.

Assessing Literacy

To gauge what young people learn in this area, however, is not easy. Environmental literacy is not assessed as is progress in verbal skills, reading comprehension, and mathematics. Moreover, it is more difficult



**WHAT CAN YOU DO
WITH A STRING OF
SEAWEED? ASK THE
CHILDREN AT THE
OCEANIC SOCIETY'S
SEA CAMP.**

to assess because it is not a subject but an understanding developed through many disciplines. It encompasses "the knowledge, skills, and attitudes needed to make wise decisions with regard to the environment," explains Rudy Schafer, who was the environmental education specialist in the California Department of Education for the past 19 years. Carolee Sly, author of the "California State Environmental Education Guide," points out that what's involved is "closer to a world view than something you teach."

That schools prepare young people to be decision-makers on environmental issues was mandated in 1970 by the Legislature when it found that

... an educational program is needed which is designed to build necessary attitudes of stewardship toward the maintenance of the quality of our common environment and to enable all citizens to use wisely, and not destructively, the resources at their disposal.

The Legislature articulated the concept of environmental literacy in directing that

... in all grade levels, environmental facts should be taught as they relate to each other, rather than as isolated bits of information, and that students should become aware of the interrelated nature of living processes, gain understanding of ecological relationships and of the effect of

human activities upon these relationships, and become sensitive to the interdependence of man and natural resources. (California State Code, Education, Chapter 4.)

Molding the Curriculum

These legislative statements, incorporated in the State Education Code, are the fundamental guidelines for shaping the state's curriculum in grades K through 12. They are used by the Department of Education to develop curriculum frameworks, which map the terrain of required study in broad strokes. These frameworks are passed to school districts, where curriculum committees develop specific curricula for classroom teachers to use in preparing lesson plans. The system is designed to afford maximum flexibility and local option.

Tracing anything through the maze of curriculum development can be difficult, but it is especially so with environmental education. The system is designed for subject areas. But environmental literacy comes through study of many subject areas, especially ecology, economics, politics, and culture. Fitting such broad-based multi-subject study into a slotted system requires a higher degree of coordination than exists today.

A shift away from an ecological perspective within this decade can be seen, however, by comparing the Science Framework, published in 1978, and the Science Framework Addendum, published in 1984. The first focuses on ideas and values, the second is a compilation of facts and definitions.

of personal responsibility toward it. The addendum first separates grade levels into four categories, then separates the sciences into biological, earth, and physical, and finally divides these into subcategories. Within these, specific concepts are listed along with thinking processes and skills to be learned

That young Americans do not know enough about how they fit into the world puzzle was shockingly indicated in the recent survey of geographical literacy conducted by the Gallup Organization Inc. for the National Geographic Foundation. U.S. residents ranked among the bottom third among nine countries, and those aged 18 to 24 came in last—after Canada, France, Italy, Japan, Mexico, Sweden, and West Germany. Today's young Americans scored lower than their World War II counterparts. Americans did better on environmental questions. Almost 95 percent knew that damage to the ozone layer would have global effects, 68 percent knew acid rain was a problem in North America. Only 33 percent recognized deforestation in Brazil as critical.

through a related activity. Under "Biological Science—Eco-systems" in grade category 3 to 6, is "An ecosystem consists of a community of living things interacting with each other and with the physical environment." The student, using "observing, communicating, comparing [and] organizing" skills, is expected to "prepare and label a

chart illustrating the living things in a particular ecosystem."

The style of the 1978 framework is pyramidal: a broad goal at the top, followed by a number of objectives used to reach the goal, and, for each objective, a few "examples of learner behaviors" to indicate whether the objective has been met. The first goal is "to develop values, aspirations, and attitudes that promote the individual's personal involvement with the environment and society." An objective is: "... learner takes an active role in solving social problems related to science and technology." An expected learner behavior: "Practices conservation in use of food, energy, and materials; e.g., avoids wasting paper." The goals apply to all grade levels.

The 1984 document has shifted away from this kind of personal relationship to information and away from the cultivation

A further, more hopeful, change of direction can be seen in the newly published 1988 History/Social Science Framework, which shows some synthesis of the prior two approaches. It encompasses 13 courses covering ancient, medieval, and modern worlds, and it is fashioned around three broad goals: "knowledge and cultural understanding," "democratic understanding and civic values," and "skill attainment and social participation." The course "Contemporary Issues in the World Today," includes some lessons specific to environmental concerns. Among discussion topics: "the global consequences of destruction of natural resources," and "the historical perspective of the environmental movement of the 1960s." Other

concerns are addressed in lessons on physical geography and economics. What should be taught is not specifically defined, as it is in the Science Framework Addendum.

Some educators see further promise in the recent emphasis on critical thinking in the schools, and also in current efforts to internationalize education, moving toward a global perspective in all fields.

Critical thinking is "looking at information and determining its validity and value; examining theories as large as evolution and as small as the function of a thumbtack," explained Jim O'Connor, assistant professor in the Department of Teacher Education, California State University, Bakersfield. He teaches preservice science teachers, those who will enter middle school and high school classrooms next year. "There will be a shift," he said, "but it will be slow and encounter much resistance."

In the future, he believes, "there will be more emphasis on students as decision-makers rather than as scientists."

The movement toward internationalizing education, likewise, inevitably will require that natural resource issues be considered in a global framework, simply because these issues are so enormous. At Cal State Bakersfield, a Center of International Education has been newly established. It will work toward internationalizing the curriculum on that campus and hopes later to work with community colleges and lower schools, according to its director, chemistry professor Fabian Fang. He said science faculty will be included in orientation workshops next year.

Whence the Water?

How shifts in official curricula affect what actually is taught within classrooms is impossible to say with any precision in light of the absence of any efforts to assess environmental literacy. As part of our research, we asked some seniors in two large urban high schools, chosen at random, if in

the midst of the current drought they knew where their water came from. Of 12 students who were about to graduate from McAteer High School in San Francisco last May, 10 did not know. One said "Hetch Hetchy" (then much in the news), but did not know what or where that was. Only one knew it was water from the Sierra Nevada, captured in the Hetch Hetchy Reservoir and brought down the Tuolumne River.

The same question posed to ten seniors at Los Angeles' Hamilton High School last month yielded slightly better results. One who volunteered that he was especially interested in environmental issues knew the diverse sources. Two named the Sierras and Owens Valley, one said "the mountains along Route 395," one guessed "mountains and springs," one thought the source was the ocean. Four did not know, one adding: "I drink bottled water. Tap water will damage your brain nerve, it has some chemical stuff." Two of the students said they had never wondered about the source of their water, though one had wondered why it

STUDENTS LEARN ABOUT POND ECOLOGY IN A WORKSHOP AT BERKELEY'S LAWRENCE HALL OF SCIENCE.



JACK FISHLER, COURTESY LAWRENCE HALL OF SCIENCE

tasted of chlorine.

At our request, science teacher Brouhard asked our question in two classes. Together, the 57 tenth graders and gifted ninth graders had the picture: 17 named the Colorado River, 11 snow melt from mountains, 10 reservoirs and rainfall, 6 Northern California, 6 other rivers, 2 natural springs, and 1 Mono Lake. Four said the ocean.

Classroom Constraints

What the curriculum mandates the teacher must convey under severe constraints of time, training, social values, and resources.

The curriculum is overcrowded. Accord-

"The biggest obstacle I've found," said Carolee Sly, "is that teachers lack a knowledge of fundamental environmental concepts and lack self-confidence. Most have had very little background in science." Even science teachers who are just completing training are "not very" prepared, O'Connor of Cal State Bakersfield has observed.

Teachers can compensate for an inadequate background in the natural sciences and environmental studies by taking advantage of training opportunities and classroom materials offered by a variety of resource agencies and organizations. Two of the largest teacher training programs are Project Learning Tree (PLT) and Project

WILD. One of the latest is the CLASS Project, developed in 1982 by the National Wildlife Federation under a grant supported by the National Science Foundation and currently being

All-terrain vehicles are reported to have ruined more than a million acres of wilderness, causing erosion, loss of wildlife habitat, and destruction of grass and flower meadows.

"The problem is not that these machines make people go crazy," said Mike Bishop of the California All-Terrain Vehicle Commission. "But you've got a whole lot of people using the outdoors who aren't educated in any kind of land ethic."

New York Times, August 22, 1988

ing to Paul Bonaccorsi, vice principal of Fremont's American High School, "more and more is being mandated by the state, but nothing is being taken out." He said there has been an increase in requirements from 95 required (and 105 elective) units to 150 required (and 80 elective) units within the past ten years. Teachers have to cover more ground in less time. To be sure, since environmental literacy is not so much a matter of learning subject matter as one of developing a perspective, it can be cultivated within any course. "There need not be any change, even in course content," commented Bonaccorsi. "You can teach anything, even English. But perspective isn't there with too many people."

adapted for use in California's middle schools.

Note that these programs have not come directly out of the education system. Project WILD was co-sponsored by the American Forest Council and the Western Region Environmental Education Council (WREEC). PLT was developed by WREEC and the Western Association of Fish and Wildlife Agencies.

WILD has trained more than 140,000 people, mostly educators, nationally since 1983. A new project, Aquatic WILD, was started two years ago and will soon begin public workshops.

There are many regional and local pro-

grams. The Cabrillo Marine Museum, for instance, guides more than 90,000 schoolchildren a year through exhibits and tidepools. It also offers Sea Search, a field and laboratory program for grades K through 12, and the Outdoor Classroom and the Fall Tour ocean environment programs (preschool through 12th grade) on the beach near the museum, and sends a traveling instructor with hands-on demonstrations to classrooms K through 8. It also offers whale-watching boat trips.

To take advantage of such resources, a teacher must have time and motivation. This leads to consideration of another—often overlooked—constraint: the effect of changing social values. In the 1970s there was wide support for teaching environmental issues, stewardship, and alternatives to the predominant lifestyle. Also, as Mike Roa, a science teacher at Montgomery High School in Santa Rosa, Sonoma County, remembers, “there was a lot of media coverage, and money was available to schools” for environmental programs. “Today, at some level, there is a knowledge about environmental problems. But now people aren’t trying to save the world anymore, they’re trying to make a buck. And that’s filtered down to the kids.” Adds a former classroom teacher who is now a state ranger running a work-study program: “Something happened when regular jeans changed to designer jeans.”

Finally, not to be omitted is the effect of funding cutbacks, which not only mean a direct loss of resources for K through 12, but also create anxiety about college, which tends to translate into lock-step competition at the expense of broader education. Throughout the educational system, schools are affected by increasingly fierce competition for a place in the best of California’s public universities, and for college scholarships.

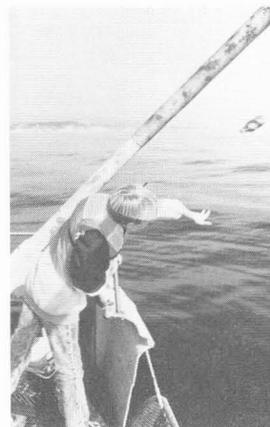
Thus, the decline of environmental literacy in the schools must be understood by considering multiple factors, especially the changes in state mandated curriculum, cut-



ASHTON GRAHAM

backs in educational funding from preschool to graduate school level, inadequate teacher training, and a shift in social values toward a “make a buck” mentality and toward getting the best of what’s left for oneself and one’s own.

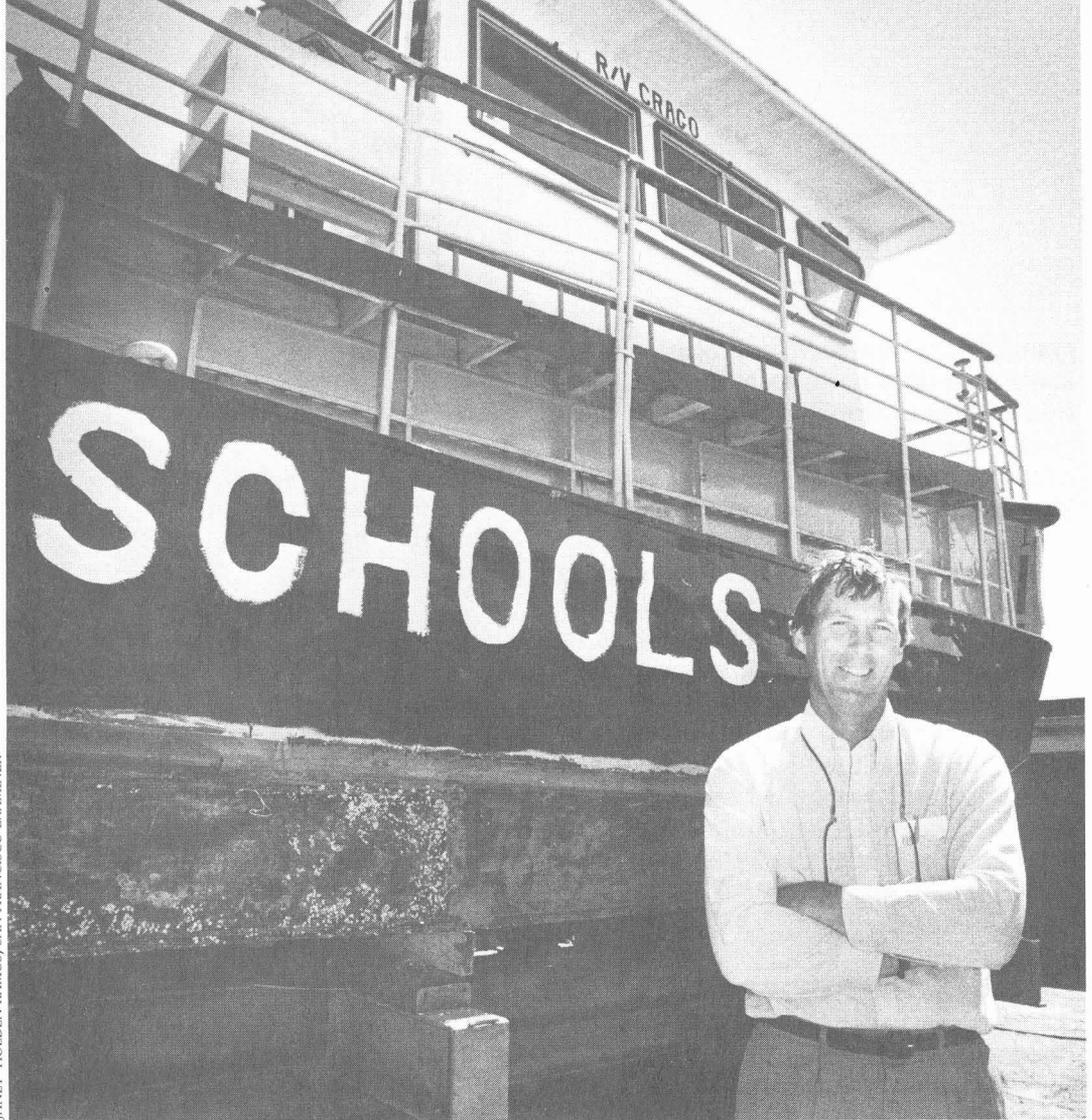
SANTA BARBARA'S SEA CENTER LAUNCHED A FLOATING LAB PROGRAM WITH LOCAL PUBLIC SCHOOLS LAST YEAR. IN AN OCEAN CURRENT EXPERIMENT, STUDENTS CAST BOTTLES IN HOPES OF RECOVERY.



ASHTON GRAHAM

Outdoor Study

Nevertheless, some excellent programs continue. Though field trips to natural areas have become rare at the high school level, especially if they involve camping overnight, at least 45 percent of all students camp out three to five days during their fifth or sixth year, to learn environmental concepts and social skills through the Outdoor Education program. San Mateo County’s Ed Chiosso believes that this is “the strongest form of environmental education in the state.” Nathaniel Lamm, administrator of the Orange



THOUSANDS OF CONTRA COSTA COUNTY FIFTH GRADERS STUDY THE BAY ABOARD THIS CONVERTED WORLD WAR II LANDING CRAFT UNDER THE GUIDANCE OF TEACHER RICHARD THALL.

County Outdoor Science School, has found that 97 percent of participants' parents are "very positive" about it.

Some teachers make the class camping trip the high point of the year. At Horace Mann Middle School in San Francisco, an inner-city school with a largely minority group enrollment and many immigrants, science chair Dacotah Swett and two other teachers are determined to take every student camping, if at all possible, during either the fifth or the sixth year. "It's one of the most rewarding things we do," said Swett.

"The week school started, kids were coming up to ask: 'When are we going?'" Many of the children at the school are not used to being outdoors, except on asphalt. Night hikes, campfires, and other adventures are new to them. So is the idea that you take care of your environment, which includes taking away what you bring in. The camping trip is now almost schoolwide. "Last year we could not get the support of every teacher," Swett said. "This year I think we have."

When parents refuse permission, the teachers call and explain that the trip is part of the science program. Most who refuse do so out of fear. Many are newcomers to the United States. "We get the teacher who speaks Chinese to speak to the Chinese parents—who are most hesitant and then most supporting. I speak to the Spanish-speaking parents. We probably get an 80 percent turn-around," said Swett.

The "Directory of Residential Outdoor/ Environmental Education Programs in California" currently lists 60 programs. Some are privately sponsored, but most are run by a city school district or county office of education. They are funded by parents, fund-raising events, school district (including Lotto) money, and by county, state, federal, and private donations or grants, usually in some combination.

Within school districts, other programs continue because fierce support has defended them against the financial ax. The Mount Diablo Unified School District owns and operates a 56-foot World War II landing craft as a floating classroom to teach about water. Last year, 5,400 children from Contra Costa County schools went aboard under the guidance of Richard Thall. During the half-day trip they studied plankton and current analysis, oxygen determination, carbon dioxide, pH, alkalinity, turbidity, nitrates, phosphates, and other biological and chemical environmental factors of the Delta waters.

A science teacher for 22 years, Thall has found that though students may soon forget what they learned in a classroom, they remember for years the research they did on the boat. Before a trip, Thall or an associate visits each class to discuss what science is and introduce the scientific method and the carbon/oxygen cycle. Each student is asked to form a hypothesis and to test it by a weeklong experiment. The results are reported after the trip.

When the program ends, students are expected to understand the workings of the Delta and its importance. To Thall's knowledge, this program is unique in the state. The Contra Costa County Water District covers half the budget, on condition that the Mount Diablo School District offer the program to schools countywide.

Many programs for schools are cooperatively sponsored. The Marine Ecological Institute in Redwood City takes groups of

schoolchildren out into San Francisco Bay aboard its 65-foot boat for hands-on sampling and analysis of the bay's fish, plankton, bottom mud, and water. Half of the budget comes from grants, half is met by schools or students. At the University of Southern California, the Sea Grant Institutional Program offers "Wet and Wild," a bilingual (Spanish and English) marine education curriculum guide for primary school teachers, and also provides marine studies books up to the 12th grade level. Sea Grant sets up teacher training seminars to help integrate the material. The Channel Islands National Marine Sanctuary offers a bilingual program called Los Marineros to fifth and sixth graders at three Santa Barbara schools. It holds teacher training workshops on the use of the Channel Islands marine resources to teach science and, in partnership with the Santa Barbara Museum of Natural History, offers docent led tours to school groups.

There are many other excellent programs. In the final analysis, however, it is the teacher who matters. Uncounted teachers make the most of opportunities both within and outside their schools.

Nonprofit organizations and others could help by seeking out teachers and school administrators, recognizing their needs and the limits they must work within, and finding ways to cooperate.

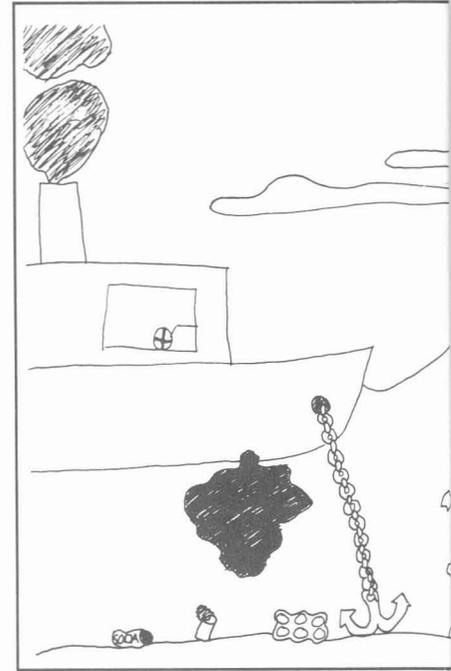
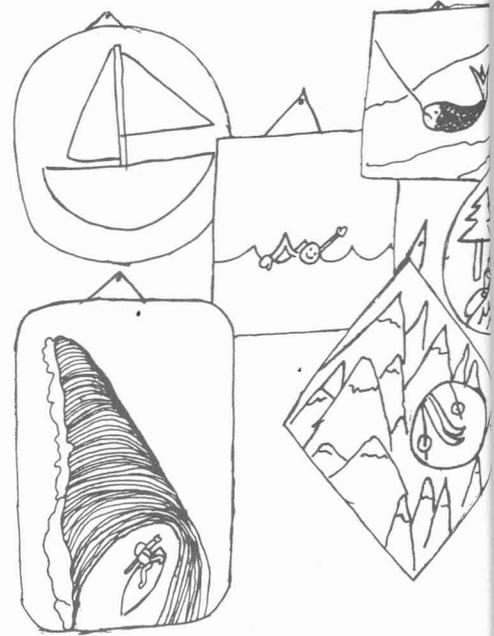
As problems caused by destructive use of the planet's natural wealth assume ever more calamitous proportions, the need for an informed citizenry becomes ever more urgent. California's schools must sharpen their focus on the question: are our graduates environmentally literate? □

John Richardson is a journalist who has covered international development and refugee issues for UNICEF and other publications. Roz Lorenzato is an intern with the State Coastal Conservancy who previously worked in environmental education.

Through the Eyes of Children

We gave a deceptively simple assignment to Kathy Golden's Nature Drawing class at the Junior Academy of the California Academy of Sciences in San Francisco: draw a picture of the world. Not the world as defined, described and quantified by textbooks, but the world as you see it.

The results—and their comments—show a love of nature and a concern for the environment of our fragile planet, as well as plenty of imagination.



EMMA BLAND, AGE 14

**I tried to draw the things
that are important.**

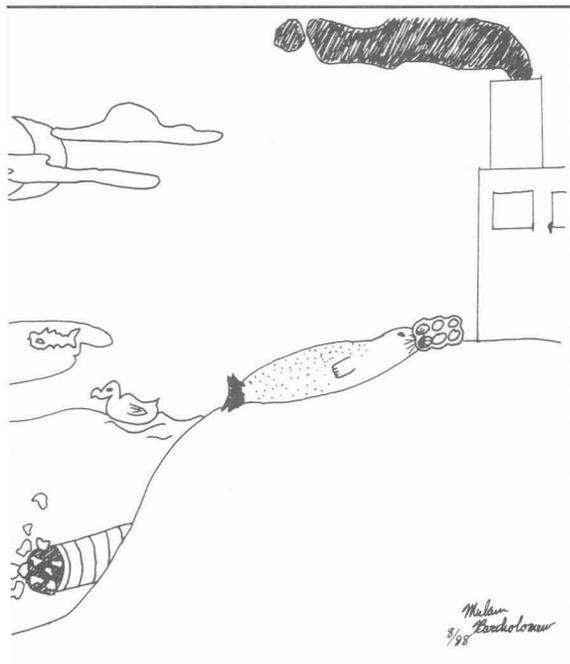
JAMES CLING, AGE 11

I drew things I like to do.



GRETCHEN PUTZ, AGE 11

Cities are built over the country. The rabbit is looking at the city, wondering if it's going to go over his home or not.

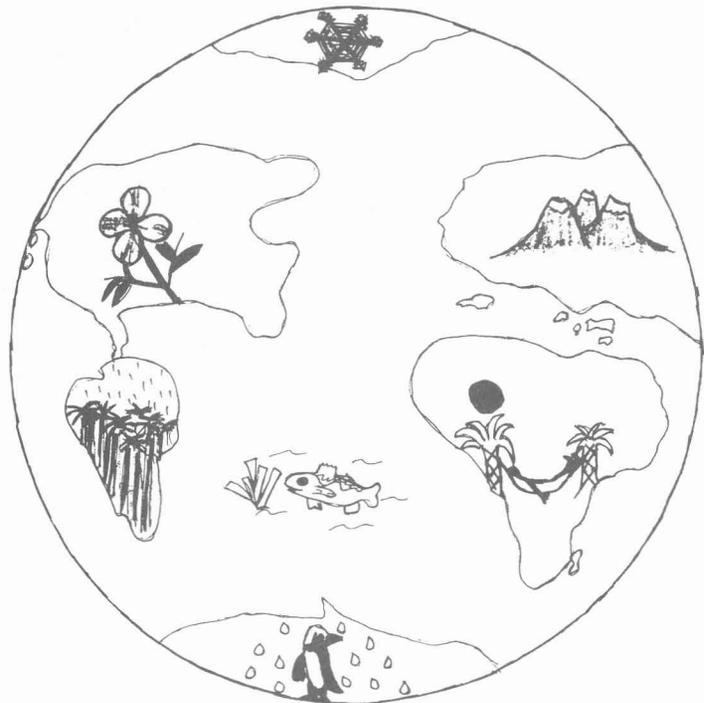


MULAN BARTHOLOMEW, AGE 13

These are things you sometimes see at the beach. Everything is becoming slowly polluted.

MOLLY CLING, AGE 14

I drew something for every continent that, to me, suggested that continent.



Tracing Water from Tap to Spring

Most Californians take their water system for granted and have little appreciation for the wonder of engineering that it is. That cannot be said, however, about the 12 high school students who last spring took the California Studies class at the Urban School of San Francisco. For five weeks they followed the trail of the water back to its source. They walked along and under it, swam in it, rafted on it, biked along it, and camped beside it. When they returned, they had entirely new questions to ask.

"Everyone seemed familiar with water from the faucet to the drain, but they really didn't know where it came

RICHARD LAUTZE



Meeting wildlife on the Hetch Hetchy Reservoir.

from or where it went," said biology teacher Allan Ridley, who designed and taught the class with mathematics teacher Richard Lautze for the past two years. One student, who had just taken physics, knew the elements of the water cycle but few particulars about his water supply; a few knew that their water came from the Sierras, but little beyond that. One on her way to one of the country's most prestigious universities guessed it was drawn from the ocean and somehow filtered to get rid of the salt.

"So we thought we'd go through the San Francisco water system, starting with the water at the tap, and follow it back to its source," said Ridley. "We took two weeks. For the water it takes about five days to get to the faucet. So we were actually able to get back in time to drink some of the water we had been playing with at the source, where it seeps through the ground amid wildflowers."

Starting at the main office of the city's water department, the group moved out to the system's components within the city—Lake Merced Pump Station, Sunset Reservoir—then, in a school van, out further to the reservoirs and to a filtration plant on the Peninsula. They viewed the pipelines crossing San Francisco Bay near the Dumbarton Bridge, drove out to the San Antonio Reservoir, the Sunol Valley Filter Plant, and Calaveras Dam.

"Personnel from the San Francisco Water Department and Hetch Hetchy Division both gave us many hours of their time, leading us through the system," said Ridley. "We went to springs above Hetch Hetchy Reservoir. We went to every point where water goes from one pipeline or reservoir to another—we were there."

During the second week the class traveled across the San Joaquin Valley following the pipelines and continued camping and backpacking, to Hetch Hetchy Reservoir, into the Tuolumne watershed, and to O'Shaughnessy Dam.

Along the way there were adventures. Their guide from the East Bay Division took them to an old diversion dam sending water to Calaveras Reservoir. She told them of the bat colony inhabiting the hollow dam. Allan, an enthusiastic member of Bat Conservation International, proposed they go in to see the bats. Some of the students were scared, but all climbed down the ladder into the tunnel that ran through

the dam.

The atmosphere inside the old structure was dank and dark. The floor underfoot felt soft and spongy from years of accumulating bat guano. What at first appeared in the flashlight beams to be dark patches on the walls turned out to be clusters of 20 to 50 small bats each. As the class walked from chamber to chamber, the bats were disturbed and took flight, brushing by the students as they passed through narrow doorways. The air was filled with the barely audible high-pitched echo-location calls of the bats.

"Had I been there without Allan, I probably would not have gone in," said Lautze. "But because he was so enthusiastic and not frightened, and he had been talking a lot about bats and the need for bat conservation, we went in and stayed maybe ten minutes, bats completely surrounding us. It stimulated a great conversation on the way home."

Later, at Hetch Hetchy, a bear repeatedly had to be scared away with the clatter of spoons against tin cups. But "one of the most exciting places was inside the O'Shaughnessy Dam," said Ridley. "We went inside, way down, into a wonderful labyrinth of tunnels and stairways and ladderways, and the water was flowing through the dam in places where it was being released to keep the 'fish release flow' of 80 cubic feet per second down the Tuolumne River. Inside the dam you're below water level, and it's kind of spooky—you're aware of the pressures on the dam."

"The dam leaks," said Lautze. "So inside it's alive with water. They monitor the leaks, and as long as they don't change, it's not a problem. You find out that you can't control water completely."

After completing their tour of the San Francisco water system, the class

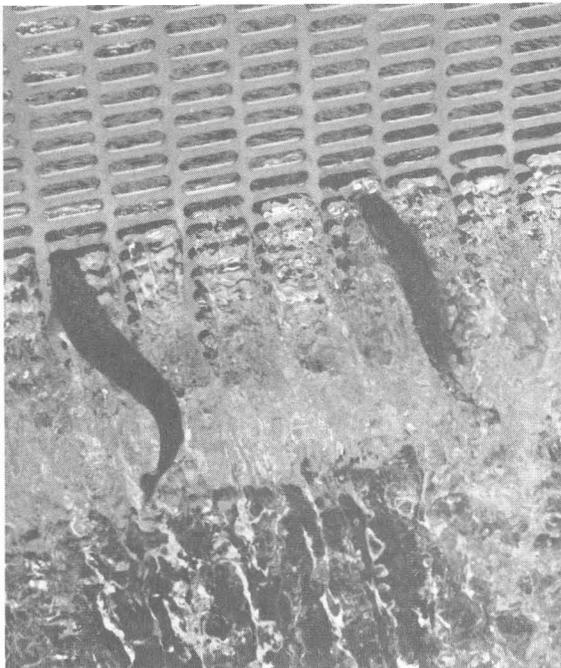
went on to explore San Francisco Bay, the Sacramento San Joaquin Delta region, and the Central Valley Project. After an introduction to the magnitude and complexity of this massive agricultural water delivery system, the class biked along the California Aqueduct for four days, from the Henry Banks Delta Pumping Plant to the San Luis Reservoir. Along the way the students talked with farmers who depend on the water and with conservationists concerned with the ecological effects of such massive water diversions.

The class also visited the Kesterson National Wildlife Refuge along the San Luis Drain and learned of problems associated with disposal of irrigation water after it drains from the impermeable fields of the Westlands district.

It was spring, their last month of high school for most of the students, a time when it is almost impossible to concentrate in a classroom. They carried books with them on this journey and read some of them. But most of what they learned was from watching, listening, and discussing what they were experiencing. The students carried responsibility for all the shopping, choice of menu, packing, and cooking.

The teachers were the most enthusiastic students. "Part of what makes this class work well is that Allan and I are both learning a lot," said Lautze. "This is a wonderful thing for us to do, and the fact that we can take kids with us just adds to the excitement. Every year we teach it we do something new.

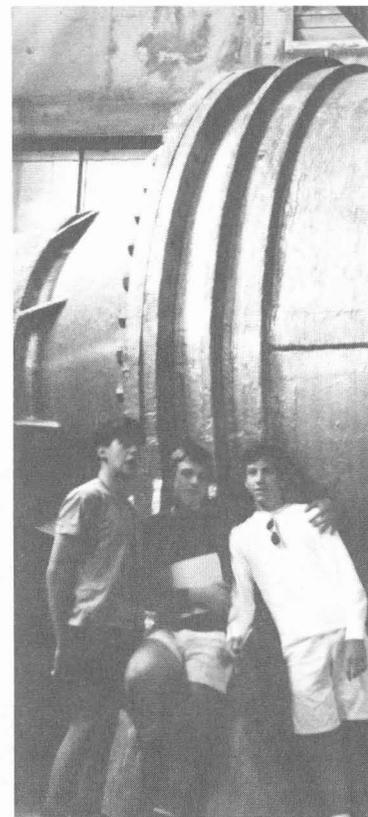
"A lot of things from high school don't stay with you until you get back to them again," he continued. "This class stays with you. You can't help but remember being in a hailstorm along a canal while biking in the Central Valley. You'll remember riding a raft down the Tuolumne River and discussing where the water comes from. The academics can come later. When interest is perked you won't



PHOTOS BY RICHARD LAUTZE



(Left) Trout trying to swim upstream at fish hatchery below Moccasin powerhouse. (Lower left) Above Lake Eleanor Dam. (Below) Inside Hetch Hetchy's O'Shaughnessy Dam.



have to study as long and it won't be as hard to teach you. It's necessary for high school administrators to realize how kids learn. And this is one of the best ways: to put them into what they are to learn, have them experience it. Then they can also teach others."

At the end of the school year, the California Studies class presented a dramatization of the San Francisco water system to their whole school. They had come away from the experience with a high respect and appreciation for the San Francisco water delivery system, for the people with the vision and skills to design and build it, and

for the people who maintain and operate the system today.

"Citizens in an area should know where their water comes from and how they get it," commented Ridley. "Unfortunately that's quite exceptional. But these students go off to college and they may be brushing their teeth and have this compulsion to know: 'Where does the water come from?' Quite a few have come back and told us about water systems elsewhere."

Rasa Gustaitis

Many young people now believe that to make a decent living you almost have to go into law, business, computer science, or bioengineering. One-fifth of this year's entering freshmen at one University of California campus have declared a major in business administration. The next largest cluster hopes to enter biomedical sciences. Environmental studies are very low on the popularity list.

Are the young indifferent to the future of the planet? Not so, though some have despaired, seeing our current course as hopeless. Many, however, are convinced that they cannot afford to choose specialties that might help steer us away from self-destruction, that if they do they won't be able to repay college loans and live comfortably. Yet in fact the demand for well-prepared environmental professionals is diverse and growing. For example:

A botanist in Sarasota, Florida, who reclaims mined land, reports that "people in industry are raiding each other's botanists" because there is such a shortage. The glamorous and well-funded fields of molecular biology and genetic engineering have superseded botany in many universities, and now it is hard to find enough people who can recognize actual plants.

Environmental consulting firms have mushroomed as government agencies and corporations find they need experts to navigate the shoals of environmental laws and regulations. New and profitable opportunities appear as the nation confronts the limits of throwaway consumption.

Careers in natural resource areas require imagination and a strong background that includes mathematics, the sciences, and political economics. "I can predict someone's success very accurately based on the number of math, chemistry, and physics courses taken," says Wilford Gardner, dean of the College of Natural Resources at the University of California, Berkeley. "Those with a stronger background always do better."

We here present opportunities in environmental professions—some of which may surprise. These are likely to change and keep changing. Energy conservation and alternative energy production have suffered setbacks, for instance, because of the drop in oil prices and withdrawal of state and federal incentives. But those who make plans in anticipation of a turnaround are not likely to go amiss.

"You don't have to take a vow of poverty" to go into an environmental profession, says Dean Gardner, "People don't realize that you can make a nice living and feel good about it."

HEIDI BRETT



EIP associate Tamara Adams collects a water sample on Puget Sound. She works for a Seattle sewage treatment plant, doing lab analysis.

Promising Outlook for Environmental Professionals

Young people are often discouraged from seeking careers as environmental professionals by the widely held belief that there are no decent job prospects on the horizon. In our experience, however, quite the opposite is the case. The field of environmental employment is wide, dynamic, diverse, and in need of people equipped with the required skills. It will have an enormous need for qualified people in the years ahead.

Environmental professionals are educated and trained to improve and maintain environmental quality or to manage natural resources. They work for corporations, as independent consultants, in nonprofit organizations, in government, and in educational institutions. In the course of researching a forthcoming book on environmental careers, our organization, the CEIP Fund (formerly the Center for Environmental Intern Programs), has found that the range of specializations and job categories in the environmental field has been continually expanding. For instance:

- Connie Leach is coordinator of the New England-Vermont Solid Waste Management Project, created by 27 communities to take a regional approach to solid waste issues, with a focus on recycling, waste-to-energy, and landfiling.
- Don Macdonald is an environmental compliance officer with Chemical Waste Management Inc., in St. Louis. He conducts company

audits of waste management facilities including incinerators, landfills, solvent recovery, and deep well injection sites.

- Kathryn Kelly, president of Environmental Toxicology International Inc., in Seattle, oversees a consulting firm that specializes in assessing health risks of various projects, such as toxic waste sites.
- Tom Stanley, a natural resource manager for the Cleveland Metroparks System, works with a staff of ten to maximize and manage the diversity of a 19,000-acre park system that surrounds the Cleveland metropolitan area.
- Karen Van Dyke, area forester for Mead Corporation in Escanaba, Michigan's Upper Peninsula, supervises logging crews, reforestation projects, and timber sales with private individuals, state government, and the U.S. Forest Service.

BY LEE P. DEANGELIS

- Dave Gregorich, administrative officer of the California Tahoe Conservancy, supervises a staff of 18 who develop and implement programs through land acquisition and site improvements to preserve the Lake Tahoe environment.
- Philip Van Soelen and a partner own and operate a native plant nursery in Fulton, California. Drought-resistant native species

began to be popular during the previous drought, in 1976-77. The year they launched California Native Flora Nursery, 1981, was the first of three wet years, and "our first annual gross was \$1,000!" Van Soelen says. Now, however, in this year's drought, the company is thriving.

All the above-named are highly educated environmental professionals, employed in challenging, socially significant work that commands salaries ranging up to \$50,000. Some hold positions that did not exist until a few years ago.

Jobs in the environmental field are created as society identifies needs and demands that they be addressed. New job categories and employment opportunities evolve as needs

are recognized and priorities are set through laws, regulations, and changes in the marketplace and lifestyles.

In 1970, on Earth Day, nobody had yet envisioned the need for a "Superfund" to clean up hazardous waste sites. The nation had just come to recognize the need to treat raw sewage and to control very visible air pollution. Only af-

ter significant gains in these areas, in the 1980s, did attention turn to hazardous waste. It then emerged as a top-priority issue, and a multibillion-dollar hazardous waste effort was launched.

Before the National Environmental Policy Act passed in 1969, nobody dreamed that one could make a living by putting meanders back into streams that had been confined to cement channels or by restoring tidal action to diked marshes. NEPA required

mitigation when damage to wetlands could not be avoided and thus created a whole new class of restoration specialists.

What new issues will come to the fore in the 1990s? Beyond 2000? Impossible to tell now, but it's safe to say that they will create even more environmental specialists. Jobs in the environment will increasingly demand problem-solvers able to use special skills and multiple talents to deal with complex issues.

So how should a young person trying to find an appropriate environmental career look at what's available? We will take a quick look at ten major environmental fields; highlight some of the trends, issues, and driving forces that can be expected to affect where jobs will be; and note what training and skills these jobs will demand, and who employers are likely to be. These jobs are much more diverse than most people envision at the mention of the word "environmental."

Solid Waste Management

This is one of the major environmental issues right now, as is clear from the daily news. Landfills are overflowing, new ones are almost impossible to find, ocean dumping is increasingly unacceptable. Recycling programs and waste-to-energy facilities are spreading and expanding. The field is growing in complexity and challenge.

"Waste disposal is very parochial, very political, and very emotional," says Milan Kluko, a solid waste consultant in Houston, Texas. "Those entering this field should be well aware of this. However, it is at the local level that the action is, and, I think, the fun is both in the public and the private sector."

Jobs can be found with local governments that are developing solid waste management plans, grappling for ways to recycle, to use waste for generating energy, and to educate the public. Many municipalities are looking for recycling coordinators. There is work, also, with consultants and within the growing solid waste industry.



HEIDI BRETT

Michelle Roest works in San Francisco schools to set up and promote recycling. She is employed by the city and county Solid Waste Program.

Preparation: civil, mechanical, and environmental engineering; public health; hydrogeology; planning; economics; public and business administration; communications; and education. So far, we know of no educational institution that offers a major in recycling.

Hazardous Waste Management

Billions of dollars will be spent cleaning up abandoned hazardous waste sites, minimizing waste in industry, treating waste, recycling, and disposing of waste. Key driving forces for activity in this area are the federal Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation and Liability Act (commonly known as the Superfund). State and local legislation are also major factors. There are job opportunities in almost all sectors of employment—corporations, government, nonprofits, and consultants.

Preparation: undergraduate degree in chemistry, biology, geology, or engineering; some hydrology, toxicology, public health, economics, and public policy. Graduate studies in public health, toxicology, engineering, industrial hygiene, public and business administration.

Water Quality

The federal Clean Water Act has been and will continue to be a major driving force. Issues related to toxic chemicals and non-point-source pollution are growing in importance. There will be opportunities in the protection of estuaries, coastal waters, and wetlands. Almost 75 percent of the nation's population will live within 50 miles of the Atlantic and Pacific coasts in the 1990s, according to a 1984 U.S. Census Bureau report. Coastal water quality issues will command attention.

Opportunities exist in all sectors, but major action is at local and state levels. Water

supply and sewage treatment are local issues, and solutions to national problems are applied locally.

A wide range of people is in demand: civil, chemical, and environmental engineers; chemists; public health specialists; ground water specialists; also biologists, especially microbiologists, for laboratory and field work. Skills in finance will be important because water supply and treatment projects involve millions, even billions, of dollars.

Air Quality

This field is poised for resurgence. The federal Clean Air Act is expected to be amended to deal with problems of toxic air pollutants, indoor air pollution, and acid rain. Last summer, scientists and public officials grew alarmed about ozone and carbon monoxide. Many metropolitan areas exceeded the ozone standard more often than in the past. Depletion of the ozone layer in the upper atmosphere is causing increasing concern, as is the greenhouse effect.

New problems that require new solutions mean new job opportunities. As Gerald Emison of the Environmental Protection Agency observed at the Second National Conference on Meeting Environmental Workforce Needs in April 1985:

While moving into new areas, we must sustain the infrastructure of air pollution control which we have built up over the last fifteen years. . . . I see plenty of exciting new work to keep our solid core of professionals busy for a long time to come.

Action is with state and local governments, which implement the Clean Air Act and their own regulations, and with consultants who serve government and industry.

For a career in air quality, a range of scientific and technical skills will be required. Education should include chemistry, environmental science, and engineering, as well as mathematics, computer science, and public health.

Planning

We highlight planning as a field because "environmental planning" is practiced at the local, regional, and increasingly at the state level. Jim Bernard, director of the Natural Resources Policy Division for the State of Maine, explains:

COURTESY ROBIN LEWIS



Planners are people who, through job description or maybe the way they structure their jobs, get to see the real picture and realize that the sum is greater than the whole of the parts. A staff person for a water quality agency would look at applicable regulations when issuing a permit to an industry discharging into a particular river; an environmental planner wants to know what effect that discharger is going to have on the ecology of the watershed and the gulf that it empties into and what are the cumulative effects down the road.

Government, primarily local government, employs two-thirds of present planners. The rest are with consulting firms that serve local governments. Opportunities will continue to be created at the local level, especially in

those areas of the country experiencing rapid population growth.

Preparation: undergraduate degree in geography, cartography, urban studies, environmental studies, or natural resource management. Strong writing and computer skills will be helpful. A master's from a university accredited by the American Planning Association may be needed. The key is to obtain skills for becoming a manager of change. Among areas planners must understand: communication, law, economics, coalition building, public administration, historical preservation, zoning, and mediation.

Environmental Education and Communication

Like planning, this is important to all environmental fields. As Thomas Leverman, president of the Alliance of Environmental Education, pointed out: "Our environment 20 years down the road will be the product of the education we are doing today."

Environmental education, in Leverman's words, is "explaining interrelationships and effects in our environment." It is making sure that a developer understands the impact of his proposed development, that the corporate executive is aware of hazardous waste issues, that city children understand milk production, according to Leverman. The field includes conservation education, nature study, issue-oriented education, and environmental education in the formal class setting, as well as the realm of communications and public relations.

The jobs may not be as easy to discover as openings in other fields. They exist in non-profits and public agencies, and may be part of work in public relations with some companies and agencies. What about the obvious place, schools? Unfortunately, the integration of this education into the K through 12 curriculum has not happened to the level envisioned in the 1970s. Few "environmental educators" are employed by school districts.

Teachers of traditional subjects can integrate environmental themes into subject matter, be it a science, social studies, geography, or history.

Preparation: a foundation in environmental studies or natural resources and strong communication skills. Artistic skills such as photography, layout, and design are useful, as is a background in the performing arts.

Land and Water Conservation

This is an "umbrella" environmental field incorporating management of land and water resources, especially those in a natural setting, whether it be in a national park or a preserve on the urban fringe. The field includes planning, natural resource assessment and management, maintenance and restoration of environmental quality, and preserving open spaces and natural habitats.

Growing development pressures are increasing land acquisition and preservation efforts as well as concerns over water supply. Natural areas are being managed more proactively, technically, and holistically. States and localities are leading the way with much prompting from nonprofits, especially land trusts.

This field is attractive to many environmental job seekers and therefore more competitive than others described so far. But more agencies and organizations are entering the picture, and there will be more opportunities.

Undergraduate education should focus broadly on natural resource management and environmental studies with a strong

scientific base, including field courses. Volunteer work, internships, summer jobs, and class projects with or through potential employers should be pursued. Those who seek a career in this field should expect to do seasonal and contract work before finding a full-time position.

Open Door, Insert Foot

One way to get a foot in the door of environmental work is as a CEIP associate. The CEIP Fund is the largest on-the-job trainer for environmental careers in the country. Since it was founded in 1972, it has placed over 3,300 college students and recent graduates in paid positions lasting from three months to a year with corporations, consultants, government agencies, and nonprofit organizations. The jobs are in environmental protection, health, and safety; natural resources management; and community development. In 1987, 300 CEIP associates in 17 states received a median weekly salary of \$357 each. The Fund recruits for projects it develops, evaluates candidates, and refers them to sponsoring organizations, which make final selections. CEIP handles payroll and administrative services, monitors projects through site visits, and provides career counseling. There are regional offices in San Francisco, Boston, Cleveland, and Seattle.

CEIP also sponsors environmental career conferences and seminars, publishes summaries of these conferences, and has prepared *The Environmental Careers Book*, by senior associate Stephen C. Basler, to be published by Island Press in early 1989, with assistance from the J.N. Pugh Jr. Charitable Trust. See Conference Log in this issue for an announcement of an upcoming CEIP conference. For more information on CEIP programs, write CEIP Fund, Department WFRA, 68 Harrison Ave., Boston, MA 02111.

L.P.D.

Fisheries and Wildlife

This may be the hardest environmental field to break into. Competition is keen, and just about the only employers are federal and state agencies.

However, here as in other fields, there is need for talented individuals able to deal with difficult issues like habitat depletion, ecosystem management, toxic contamination, aquaculture, and increased use of marine resources.

As in other fields mentioned, there is an increasing shift to state and local levels. As the society becomes ever more urbanized, the demand arises for habitat enhancement and ecosystem management close to home.



Biologists Stephanie Kaza and David Green show young visitors to the Point Reyes Bird Observatory a song sparrow they are about to release. It was captured and banded as part of a long-term study of the birds' life history and well-being.

Preparation: A combined undergraduate degree in fisheries and wildlife, or fisheries or wildlife combined with ecology or forestry or areas related to ecosystems and habitats; communication and management skills; as well as understanding of computers, statistics, and modeling in fisheries and wildlife.

A master's degree is advisable, after experience in volunteer work, internship, or class projects. As in land and water conservation, the first job is usually seasonal. Helpful moves include joining a professional association, the Wildlife Society, or the American Fisheries Society. It's a way to get acquainted with people in the field and to become informed.

Forestry

Gone are the days when the forester was the jack-of-all-trades timber cruiser/firefighter who spent all of *his* days in the field. The forestry field is diversified and specialized now. "The diversity of opportunities is tremendously expanded from just 15 years ago," comments Gregory Smith, associate director of the Society of American Foresters.

The federal Forest Management Act, and comparable state legislation, demands that forests be managed for multiple uses, including wood products, wildlife habitat, recreation, and water quality. There is also an increasing emphasis on urban forestry. This may seem surprising to some, but mixed-usage forests in urban areas total more acreage than all land managed by the U.S. Forest Service. Trees play an important role in urban areas. They add value to property, are of aesthetic significance, help to purify the air, provide shade, moderate temperature, im-

prove water quality, are habitat for wildlife, and reduce flooding.

Foresters are employed by federal agencies, states, and private industry in about equal proportions. The job market is improving and continuing to improve, for three reasons. First, the demand for forest products and recreational opportunities in forests continues to grow. Second, many foresters who entered the public sector, especially the Forest Service, after World War II are nearing retirement. Third, according to the Society of American Foresters, there has been a 50 percent decline in students entering undergraduate programs in forestry or related programs since 1975, when enrollment peaked. Jobs did not expand to match the rise in graduating candidates, and a downward spiral of interest began. In addition, many students who would have gone into forestry some years ago are now drawn to the newer natural resource programs, such as water resource management and environmental conservation. "If enrollments continue as they are now, we will have some shortages in four or five years," Smith predicted. In some areas, job vacancies already exceed graduating candidates.

The Society of American Foresters has a listing of about 50 colleges that offer accredited undergraduate programs in forestry. A broad forestry education is advisable, with a minor in a more specialized area, such as soil science, wildlife, surveying, business, economics, or computer science. Another option is to pursue a "track," such as forestry economics, within a forestry program.

Once again, volunteer work, internships, and class projects are avenues toward experience. Seasonal work allows for building

skills and making contacts and is advisable before graduate work.

Parks and Outdoor Recreation

Many people who have chosen a career in an environmental field trace their interest to outdoor experiences at a state or national park. This is a field where many job seekers immediately think of the National Park Service. However, potential employers include other federal agencies that manage lands for recreational uses, such as the Forest Service, Fish and Wildlife Service, and Bureau of Land Management. They also include state parks, forests, scenic river areas, and wildlife refuges, and regional and local park systems.

Aside from rangers, such agencies also employ people in administration, law enforcement, education, natural resource management, site operations and maintenance, and research. As in other fields, the opportunities are moving closer to where people live. Parks, open space, and wilderness areas are being created near to and within urban areas. Wetlands, rivers, waterfronts, meadows, old farm land, and abandoned railroad beds are being reclaimed for parks and recreational opportunities.

There is also a trend toward year-round use and multiple use. Professionals must work to accommodate large crowds that include sightseers, hikers, hunters, fishermen, boaters, users of off-road vehicles, and researchers.

For those whose interest is primarily in parks administration, an undergraduate degree in parks and recreation management might be advised. For those more interested in natural resource management in parks, a natural science background with a strong ecological base is suggested.

Salaries

Pay is as dynamic and diverse as are the opportunities. It will depend on education,

experience, the type of employer, level of responsibility, and geographic region. In general, someone with a bachelor's or master's and no experience will start at \$15,000 to \$30,000 a year. With three to five years experience, \$18,000 to \$42,000 can be expected. Managers with five or more years and 2 to 20 staff receive salaries ranging from \$24,000 to \$56,000.

Whither from Here?

Most environmental fields have professional associations, which are listed in the *Encyclopedia of Associations*, available in public and college libraries. There is also the National Association of Environmental Professionals, which has 1,200 members and publishes a quarterly newsletter that includes job listings. The association can be reached at P.O. Box 15210, Alexandria, VA 22309-0210. (703) 660-2364. In California, the Association of Environmental Professionals holds meetings in eight regions and publishes a newsletter with job listings. Student memberships are available. Contact the president, Brian Smith, City of Escondido, 201 N. Broadway, Escondido, CA 92025. (619) 741-4671. Remember that many of these fields are new and evolving. Even the term "environmental professional" did not exist two decades ago.

Environmental work options are expanding and diversifying, offering opportunities for socially useful creativity to young people who are just beginning careers, and also to more experienced people who want or need a change of direction. □

Lee P. DeAngelis is director of CEIP's Great Lakes Regional Office in Cleveland. He has planned and coordinated environmental career conferences and has served as editor for two environmental career publications. He has a bachelor's in environmental conservation from Cornell University and a master's in natural resources from the University of Michigan School of Natural Resources.

Planting the Future

During the past 12 years, Circuit Riders have planted at least 100,000 tree seedlings on denuded hills and eroded stream banks of Sonoma County. In the process, they have set more than a thousand young people and unemployed adults on new routes to productive and satisfying lives.

Ellie Rilla, executive director of Circuit Rider Productions Inc., does not know precisely how many of the young trees have taken root, restoring riparian habitat and reforesting damaged lands. Nor can she say exactly how many of the people who have completed the nonprofit organization's various job training programs are gainfully employed. But there is ample evidence—statistical and other—that the Circuit Rider philosophy works. It was selected as a model youth program by both the New York State Labor Department and the National Commission on Youth Resources, was honored by the Sonoma County Private Industry Council for outstanding job training and job placement in 1986 and again in 1987, has received other awards, and can produce a solid list of satisfied clients.

The premise on which this unusual organization was founded is that "human and natural resources, people, forests, fish, soils, water and scenic beauty are mainstays of local economies." Its aim is to combine responsible resource management and development of a trained, reliable work force for the good of the community. It is a particularly effective example of the kind of venture that is appearing more frequently on the national scene as a result of the growing necessity to repair damage to natural resources and neglect of human lives.

The concept behind the enterprise is similar to that which has made

the California Conservation Corps and other youth corps programs increasingly popular, said Rilla, a former biology teacher and youth conservation corps director. "The reason the CCC and others like it are so successful is that they get a tremendous amount of work out of those kids," she said. "Land service agencies that have suffered cutbacks love the conservation corps style. That formula has swept the nation. A conservation corps is started every month now in some state or city."

At the same time, enforcement of environmental laws and regulations has launched a restoration industry nationwide. Circuit Rider is also a part of that. Of its annual budget of about \$800,000, 50 percent is met by fees for services, 45 percent by grants (mostly for vocational training programs), and 5 percent by donations.

It all began in 1976 when five Sonoma County residents, all with environmental and youth education backgrounds, decided to get the word out about environmental injustices, Rilla said. Toward that end they launched a youth video project, then a youth and urban forestry program. From these, an organization grew and branched out into two separate but integrally related divisions: environmental restoration and vocational training.

Four full-time professionals now direct projects in revegetation, erosion control, and wildlife and fisheries enhancement. They provide environmental management and consulting services to public agencies, community groups, farmers, businesses, and others. They plant willow trees and build small check dams to control erosion, take inventory of rare and endangered plant species, and revegetate newly developed areas.

One recent project restored vegetation to a site at the Geysers geothermal power plant, where serpentine in the soil is toxic to all but a few plants. Another involved replanting native salt bush plants on an area in the Mojave desert that had been disrupted by geothermal exploration.

Like the circuit riding ministers, judges, and salesmen of old, these modern restoration professionals go where they are needed. In one current project, sponsored by the State Coastal Conservancy, they are working with local farmers to stop erosion on upstream gullies that, unchecked, would continue to damage wetlands.

"Revegetation, or environmental restoration, is a mix of landscaping, forestry, biology, and erosion control," explained Circuit Rider's vegetation management specialist, Rocky Thompson. "We work to restore natural, native plants. Since we are a nonprofit organization, we take on projects no one else would touch before."

Meanwhile, vocational training programs help people who need a boost into gainful participation in the economy. GAIN (Greater Avenues for Independence), is for recipients of Aid to Families with Dependent Children; Youth 2000, for high-school students at risk for dropping out; and TREE, for adults interested in learning landscaping, tree care, and environmental conservation.

TREE, the oldest of these programs, undertakes projects for nonprofit community organizations that would be unable to afford commercial prices. Graduates of the TREE program have become professional landscapers, forest technicians, park workers, and foremen and linemen for major and small tree service firms.

Participation in one program can

lead into others. Some of the TREE students first took part in Circuit Rider's summer youth conservation corps, which has 14- to 21-year-olds building trails, park benches, and playground equipment, and helping with stream enhancement and landscape installation. Some who graduate from TREE are hired into the environmental restoration division.

Some former staff members and trainees have gone on to start their own, related, enterprises. Philip Van Soelen used to work for the Circuit Rider native plant nursery, which evolved from a surplus of plants and seedlings left over from TREE projects. In 1981, with TREE graduate Sherrie Althouse, he opened California Flora Nursery in Fulton, supplying native and drought-resistant plants. "Right now natives are very fashionable. They are much in demand with the threat of a drought," he said. "But plants go through fads." The nursery's gross income has nearly doubled each year recently, and the owners are considering possible expansion from one to six acres. Circuit Rider continues to operate its nursery. "It's a subspecialty of the kind of things California Flora sells," said Rilla. "We sell only native species collected in the wild."

Another former staffer, Steven Chatham, is now an independent consultant and contractor for ecological restoration, in partnership with his wife, Lizbeth Prunuske, working mostly in Marin County. "We found there was a niche that was not being filled," he said. "It's not a huge niche, but there will be an increasing demand for ecological restoration."

Rilla agrees: "We can't do all the work there is to be done."

How much work there is for environmental restorers depends on how strictly government laws and regulations are followed, and also on



(Above) Circuit Riders Ellie Rilla (left), Rocky Thompson, and Michelle Wellington. (Below) California Flora associates.

how much development is taking place. "Environmental regulations are the backbone of the business," said Rilla. "Some counties are tightening up. In some cases, theirs are even more restrictive than state and federal regulations."

"Ultimately, environmental restoration is a growing field," said Thompson, "although I wouldn't encourage people to go into some of the new four-year college programs right now because of the uncertainty about which direction the next federal administration will take. The societal

level of concern about the environment is another factor. Things are trendy, they come and go." Chatham recommends that young people interested in the field go into a traditional discipline, with emphasis on restoration, rather than specializing too narrowly. He foresees a need for a variety of professionals in restoration work, including biologists, engineers, attorneys, and others.

Kristi Farnham

Work-Study in the Santa Cruz Mountains

IT WOULD HAVE BEEN EASIER to maintain trails the conventional way, by hiring three or four adults year-round. But the Santa Cruz Mountains District of the California Department of Parks and Recreation does the job differently, and it gets more for the money. Each summer, it takes on a group of 16- to 18-year-olds for eight weeks to work six hours and study their environment for two hours daily, earning \$1,000, plus ten units of high school credit.

Done the conventional way, trail repair would be a routine job, even boring. Done by the Forestry Conservation Aides (known as the youth corps), it provides a rare learning experience for numerous young people and

summer vacation from Humboldt State University, where he is majoring in forestry. Before joining the corps he had never considered forest conservation.

"That's why I'd never go back to teaching school," said Fosgate, a former high school teacher. "There you can try for 40 minutes, maybe it will work every once in a while. But the neat thing about this program is, with people like 'Gonio,' they have no idea what they want to do, but you get them at the right age . . ."

We had arrived at the first work site, a roadside atop a cliff over which people had been dumping garbage into a forest and creekbed. A pile of junk metal lay beside a huge garbage bin filled with unsorted trash. Five corps members in yellow hardhats and green park uniforms were hauling up more trash with a rope pulley. About 100 feet below, along the wooded creekside, others were gathering more stuff—old tires, mattress frames, car parts. Some objects—a wrecked sports car, for instance—were too large to be lifted by hand and would have to be hoisted mechanically. There is no vehicle access to the bottom of the cliff.

The dump site was on an 18-acre parcel purchased by the Sempervirens Fund to be donated to the parks department as an addition to Big Basin Redwoods State Park. Its cleanup was a contract job that would bring in \$11,600 this year for the youth corps, supplementing trail maintenance funds. The trash would also serve as instructional material in the study section having to do with waste and recycling.

Kirby stopped to visit awhile, then moved on to a second job site at Big Basin. "This next crew is replacing an 18-foot footbridge that was built by the CCC (Civilian Conservation Corps) in the '30s," he said, driving into a



KIRBY FOSGATE

The meadow classroom.

helps to build an informed, caring constituency for parks and forests. The program started in 1974, and since then 875 teen-agers have taken part. Some subsequently moved into careers they had not envisioned before.

"A lot of people take the job just for the money and end up learning a whole lot," said the Forestry Conservation Aide program director, Ranger Kirby Fosgate, as he drove with a visitor to one of the corps' work sites one morning last summer. A case in point waved to him from the side of the road: Gorgonio Martinez, a former youth corpsman, working as a park aide during his

campground and parking his jeep. "They're about to pour the cement foundation. The bridge beams are all ready to be set in place." "Is this a hard job?" the visitor asked. "A lot harder than working at Burger King, but you learn new things," replied Kitty Davis, from Santa Cruz. "Not as hard as I thought it would be," said Jason Hopkins from Felton. "A change from the Mexican restaurant where I've been working," said Renee Frommherz, from Felton. "Better than working at Burger King," said Aaron Fontanilla, of Santa Cruz.

The crew was about to break for lunch and class, during which Lupe Fabian, of Watsonville, would present a report on plate tectonics. Everyone is expected to take a turn with a report. Davis had chosen the ozone layer issue as her theme, Hopkins would cover food efficiency, particularly meat consumption and how it affects Third World countries. "I'm a vegetarian, so I've been collecting information on this for over a year," he explained.

An Outdoor Classroom

The youth corps in the Santa Cruz Mountains state park district is one of several youth corps programs now in the state. In addition to the California Conservation Corps, in existence since 1978, there are several county and city programs: in Sonoma and Marin counties, San Francisco, the East Bay, Sacramento, Los Angeles, San Diego, and in Tulare County. A program is scheduled to start in Long Beach. The U.S. Forest Service has 14 programs in national forests in California. Most of these programs aim primarily at improving job skills and helping young people become employable while also doing useful public service and conservation work.

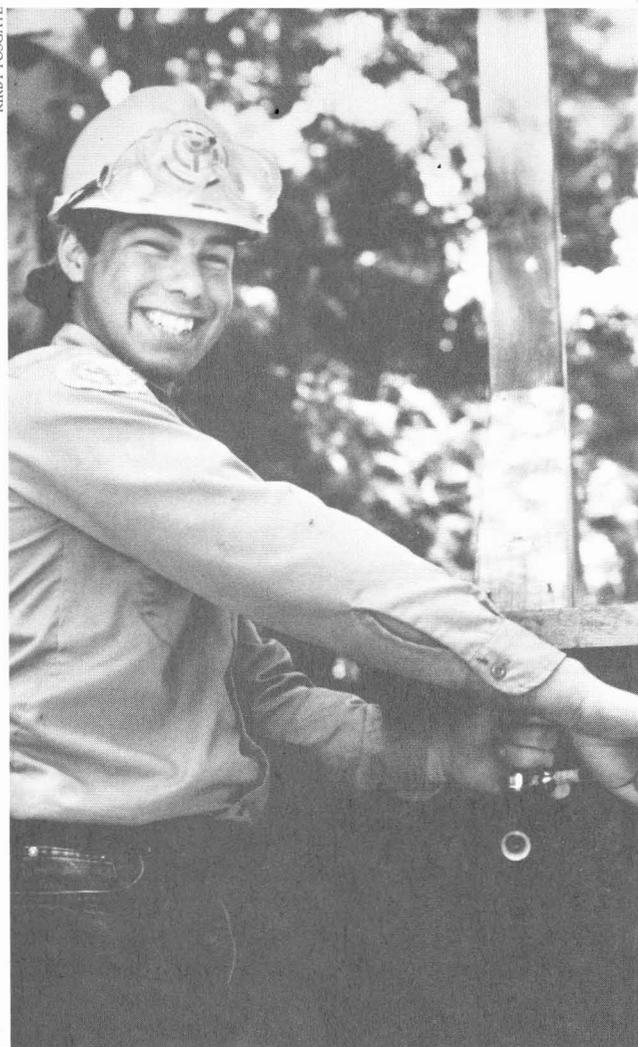
Many programs also require a minimum age of 18.

What especially distinguishes the corps Fosgate directs, however, is the structured, daily program of environmental study, offered in cooperation with the county school district. "We cover plants and animals, but also broader ethical issues. Should you shoot deer if the herd is too large? Should you have a large family? They don't teach that in school much anymore," said Fosgate. Corps recruits are tested on material to be covered at the outset of the program, and tested again at the end. "We've used the same test for ten years, so I can see what the kids are learning in school," Kirby said. "Some come in very informed, others don't have the slightest idea of a basic food web—and there seem to be more of the second kind."

The Santa Cruz youth corps is a rescued remnant of the federally funded Youth Conservation Corps, which existed between 1970 and 1982 nationwide until funds were withdrawn. Subsequently, Congress provided that the U.S. Agriculture and Interior departments should operate YCC programs, but provided no more special funding. The For-

About to hoist the bridge beam.

KIRBY FOSGATE



est Service was to spend no less than \$3 million of its budget on such programs.

Rocky Solas, manager for Human Resources and Community Development in the U.S. Department of Agriculture Forest Service's Southwest Region, said there were about 400 young people in YCCs in California last summer. Of these, 100 are in six special four- to ten-week programs for children with disabilities, operated in cooperation with three school districts, offering up to 16 units of high school credit.

The regular YCC members in the Forest Service's YCC are neither in special units, nor do they have special supervisors. They are integrated into crews or into programs for senior citizens, said Solas. They work at the federal minimum wage of \$3.25 this year, but will receive the state minimum of \$4.25 an hour next year. Two hours a week are set aside for environmental education. "The

work they do is outstanding," Solas said. "We follow them and have hired quite a few of them later, after college."

Like other YCCs, Kirby Fosgate's dissolved in 1983. In 1985, however, it was revived on a small scale, without federal aid, in cooperation with the County Office of Education. Many credit the program's revival to Fosgate's commitment to it. The school system hires teachers to act as crew leaders under its Regional Occupational Program, which is meant to provide job training. The schools also pay the student workers with a grant from the parks district.

"This is a good example of the kind of cooperation state agencies could develop if they wanted to," said Linda Curtis in the Regional Occupational Program of the County Office of Education. "I can't imagine a better way to use taxpayer money. Quite a few of the kids later go to college in environmental fields, or go into landscaping, horticulture, the firefighting program—some job to do with the environment."

Fosgate begins to recruit in local high schools in February. Before he accepts a person, he tries to make sure the parents will cooperate. Strict discipline is the rule. "Yesterday, one person said he had to take time off for a family vacation," he said. "I had to can him. The corps would have drawn and quartered the guy."

The demand of attendance has a different significance here than it does in school, and corps members appreciate that. "You can't call in sick all the time because you're needed," explained Toni Jones, who this particular day was on a crew working to

KIRBY FOSGATE



Cleaning up an illicit dump site.

repair a split-rail fence along the road by the park visitor center. "And not only are you needed, you're accomplishing something." She lowered the claw hammer she had been using to tighten fence wires, stood up straight and wiped an arm across her forehead. "I was gonna go to beauty college," she said, "but now I'm not sure."

Later, as she sat in a circle at the edge of a meadow with the others, trying to understand plant succession, Toni participated with enthusiasm, offering some sharp observations. Why were there no bushes in the middle of the meadow? asked Tim Rusk, the crew leader assuming his role as teacher. What was the evidence, if any, that succession was underway here? What plants colonize rock first? Where are the transition zones? What will be the climax community here? He did not lecture, but asked them to look and find out. They sat in the grass, tired and obviously feeling they had done a good day's work, interested and trying to understand. "It's good for the kids to work," Rusk said later.

"Here they are not A, B, and C students anymore." Learning can once again be what it is before educational pressures: the pleasure of discovery.

There is, however, a gloomy note to the story. The Forestry Conservation Aides used to be the hiring pool for seasonal jobs in the park district. Now these jobs are far fewer—though there is more work to be done—and as regulations require that priority go to minority people or people whose families are on public assistance, those outside these two categories have considerably less chance of being hired as park aides for the summer. What's more, Fosgate finds, sadly, that he cannot honestly encourage everyone to aspire to become a park ranger anymore because there are few employment opportunities. "More people are using the parks," he said, "but we have fewer rangers." He hopes that in the future more jobs will be created to help protect and maintain the nation's parks, forests, and wildernesses.

—R.G.

KIRBY FOSGATE



All together now!

Have you ever read a book that profoundly changed your perception of the natural world and your place in it? Conservancy staff member Karen Rust was talking of such a book one day, so we asked her to write about it. Then we asked a few dozen people, each known for significant environmental work, the same question. We present their replies as an exciting reading list, perhaps the basis of a new curriculum for our children, the future stewards of our natural resources. See Page 42.

I of the Storm

BY KAREN RUST

Through serendipitous good timing, I finished re-reading *Storm*, by George R. Stewart, two days before a raucous August thunderstorm sprinted through the Bay area.

The build-up to this recent meteorological display was unlike the events leading up to the storm in Stewart's book, which was published in 1941.

The clouds, however, matched those I imagined while reading this gripping novel.

I have seen dark, horizon-filling clouds born of sudden summer thunderstorms in the deserts of the southwest; black, low-lying, sullen clouds in the valley of the Sacramento; hugely towering gray and pink and white summer clouds above the Sierra Nevada; and the hazy-bright whiteouts of winter blizzards among those same peaks.

Until I read *Storm*, the after-image of clouds was about the extent of my long-term consciousness of weather. After the cold and the rain and the wind were gone, I mostly remembered the clouds. Not a huge leap forward from those ancient people gently sneered at by Herodotus, as quoted by Stewart:

"The storm lasted three days. At last, by offering victims to the Winds, and charming them with the help of conjurers, while they sacrificed to Thetis and the Nereids, the Magians succeeded in laying the storm." And then he added dryly, "Or perhaps it ceased of itself."

The main character in Stewart's book is the storm, Maria. The author describes her birth and growth, the people who watch her approach to the coast of California, the people who fight through the wind and rain and snow of her 12-day life, the other storms she spawns, and finally, her death. In telling the story, Stewart draws you into a wonderfully simple looking network of people, animals, places, and events, and shows you—with enthusiasm, humor, and amazingly good writ-

ing—that the network *is* simple, and profoundly important. That network is our ecosystem. It is comprised of: people, sometimes working with, sometimes fighting the elements and the terrain to keep our modern way of life humming along without interruption; animals, entangled in the "things" of human activity, and engaged in their own ongoing pursuits; places, the actual terrain which dictates where the water flows, where the people live, and how the winds themselves move across the earth.

The network also includes events: those climatic, geologic, even cosmologic happenings which originally shaped this earth and do so still; and of course, there are the human "happenings," which we tend to think are of great import, but probably are not, in the great sweep of time. Stewart contends that "events" of weather, that is,

storms, are integral parts of the network, not just outside agents that affect the ecosystem.

Stewart also shows that, because people have stopped merely talking about the weather, and have attempted to do something about it, modern societies have to go to extraordinary lengths to keep the artificial processes going; to keep the roads open over high passes in the dead of winter; to keep the trains and planes moving through forces of

"Most movements of people have been not so much quests for better countries as for better atmospheric conditions...In the twentieth century a temporary variation of rainfall put Okies upon the highway by the hundred-thousands..."

nature much more powerful than any single machine; to guard the free flow of electricity along power and phone lines; to keep the water behind the giant dams from bursting through or over, and so keep as much of the pecking order from drowning as possible.

Those charged with determining the exact moment and amount of water release, or diversion, know that land and crops and

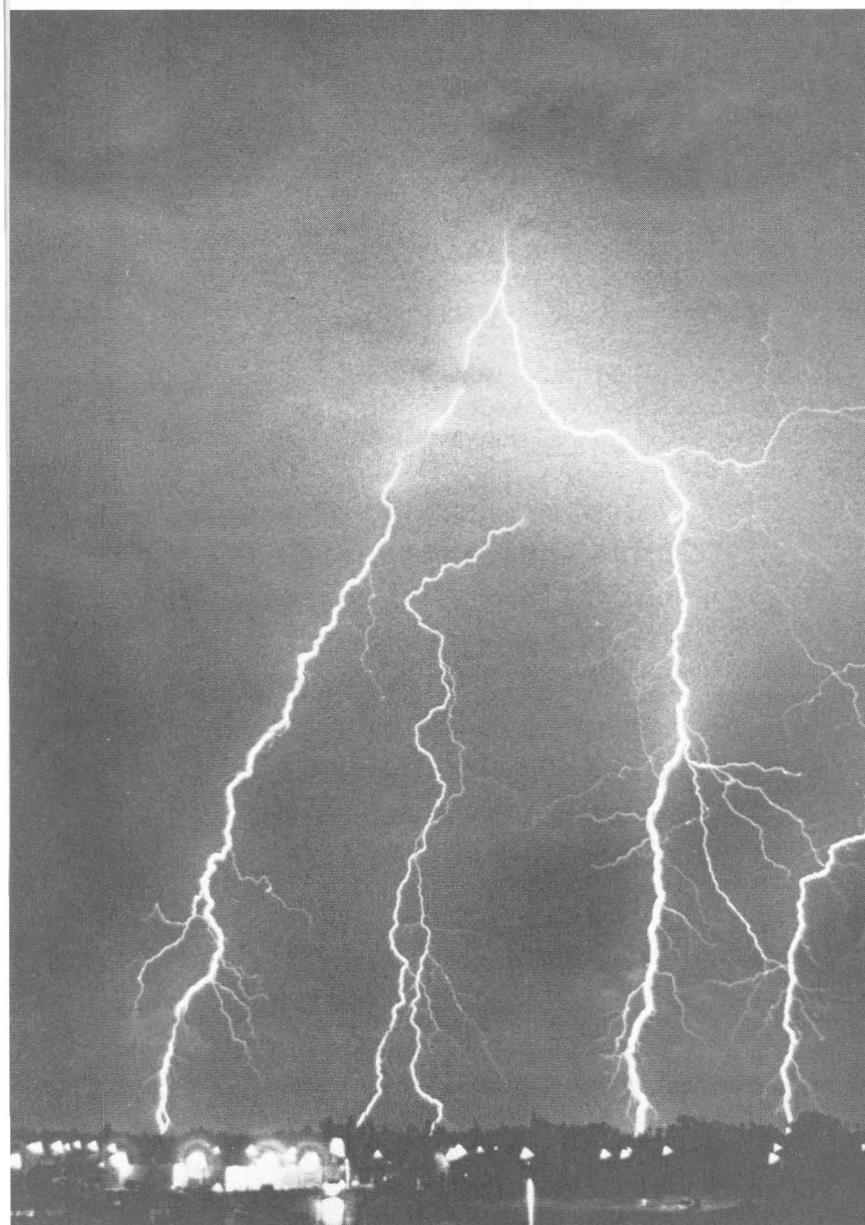
buildings may be flooded, and animals may be left to the rising waters if time does not permit otherwise, but people must be saved. In the effort to avoid even the first situation, people have, and do, and will lose their lives. Very few of those not involved in the struggle will even know if these losses have occurred. Unless you know someone who works clearing the Sierra passes of snow, or keeping the utilities in operation, or the tracks open—or do such work yourself—or unless you have read *Storm*, it is not easy to conceive of all the activities, and dangers, generated by the appearance of inclement weather.

What George Stewart accomplished through his book, for me, was to make the elements magical and alive:

In the stupendous work of transport the paramount agent was the atmosphere, thin and insignificant though it was in comparison with the monstrous earth itself. Within the atmosphere the chief equalizers of heat were the great winds—the trades and anti-trades, the monsoons, the tropical hurricanes, the polar easterlies, and (most notable of all) the gigantic whirling storms of the temperate zones, which in the stateliest of earthly processions moved ever along their sinuous paths, across ocean and continent, from the setting toward the rising sun.

Storm was written in the early days of World War II, and in the introduction, Stewart cites that fact to explain why readers might find the “attitudes a little grim” in it. While some of the dialogue is a bit dated, the narrative is vibrant and timeless. *Storm* is still in print, and the more recent editions have an introduction by another famous observer of things “California,” Wallace Stegner.

Stewart’s writing served to make the workings of the natural and man-made world more familiar to me; to make me know the connections in life, and the threats we humans pose to the natural order; and to show me the explosive/corrosive power of the natural order in relation to human endeavors. In the midst of the current drought, I wonder what nearly opposite efforts are being undertaken for



nearly the same reasons. Is someone calculating the amount of water that can be released from reservoirs without draining them? Are Caltrans crews facing road repairs necessitated by the dryness and heat? Are the timber and grass fires leaving the West vulnerable to catastrophic flooding when the rainy season hits? Who is keeping on top of all this, and is it coordinated, or haphazard?

When the thunder and lightning blew through last summer, I wondered if the U.S. Weather Bureau picked the mini-storm up on its sophisticated satellites, and if that capability really makes anything easier or safer for people doing the same jobs today as the people in Stewart's book.

At a primary level, the lesson of *Storm* is that the interconnections must hold: no matter where in this country, no matter where on this earth, the whole is comprised of all of the parts. The survival of the whole is dependent on the interconnectedness of the parts, which are dependent on the survival of the whole: the endless loop that is the cycle of life.

All of the parts of air and land and water come together to form the storm. Without the different components, in the proper proportion, the storm cannot exist. Different parts of a society come together to survive the storm. And when some elements of a society do not come together in cooperation, the storm often claims more victims than it might otherwise.

Of climatic changes even larger and longer-lasting than storms, Stewart wrote:

[M]ost movements of people have been not so much quests for better countries as for better atmospheric conditions. "A place in the sun" explains much of history more exactly than we usually realize, except that just as often we should say, "A place in the rain." In the twentieth century a temporary variation of rainfall put Okies upon the highway by the hundred-thousand, just as in the third century a similar shift might in a single year hurl the Huns against the Chinese frontier and set the blue-painted Caledonians swarming at Hadrian's Wall. In the mass as in the individual, man is less a land-animal than a creature of the air.

Because I have lived or played in many of the locations described by Stewart, I may have been more interested in *Storm* than someone from another part of the country. My own egocentricity does not explain the whole of this book's impact on me, however. When a big storm hits, I now think of the people out in it—working, and possibly dying. I see the effect air movement half a globe away has on the weather in California. I am aware that the burrowing of a ground squirrel can spell disaster for creatures living downhill, and that an accidental occurrence can be of greater help than the best-laid plan. The weather can be an overwhelming, deadly force—with beautiful aspects. I still love those clouds; I just keep a closer eye on them.

Stewart's book is of such instructive value that my view of the world has been forever changed by it, and I unhesitatingly recommend reading *Storm*. □

We asked State Coastal Conservancy staff to suggest people to whom we should address the question: "Have you ever read a book that forever changed your perception of the natural world and your place in it?" Most of those named—and virtually all who responded—are known for significant work on behalf of the natural environment. Turn the page for the books that so deeply affected them.

A Reading List

Books That Changed Our Lives

- Edward Abbey**, *author* **Collected Poetry of Robinson Jeffers / Walden**, by Henry David Thoreau / **The Way Things Are**, by Titus Lucretius Carus
- John J. Berger**, *author and executive director, Restoring the Earth* **A Sand County Almanac**, by Aldo Leopold / **Walden**
- Joseph E. Bodovitz**, *president, California Environmental Trust* **Silent Spring**, by Rachel Carson
- David R. Brower**, *founder and chairman, Earth Island Institute* **A Sand County Almanac**
- Richard Chamberlain**, *actor* **The Universe Is a Green Dragon**, by Brian Swimme / **The Power of Myth**, by Joseph Campbell with Bill Moyers
- Margot Patterson Doss**, *columnist and author* **The Sir Roger de Coverley Papers**, by Joseph Addison, Richard Steele, and Eustace Budgell / **"Trivia, or a Walk Through London on a Rainy Morning,"** poem by John Gay
- Mark Dubois**, *International Rivers Network* **The Destruction of California**, by Raymond F. Dasmann
- Colin Fletcher**, *writer* **The Nature of the Physical World**, by Sir Arthur S. Eddington / **The Phenomenon of Man**, by Pierre Teilhard de Chardin / **Religion Without Revelation**, by Sir Julian Huxley
- Dave Foreman**, *co-founder, Earth First!* **A Sand County Almanac**
- Ruth Galanter**, *Los Angeles city councilmember, former environmental consultant* **Fire and Storm**, by George R. Stewart
- Peter Grenell**, *executive officer, Coastal Conservancy* **Garden Cities of Tomorrow**, by Sir Ebenezer Howard
- Rasa Gustaitis**, *editor, Waterfront Age* **Never Cry Wolf**, by Farley Mowat
- Dr. Michael Josselyn**, *director, The Romberg Tiburon Centers* **A Sand County Almanac**
- Petra K. Kelley**, *founder of the Green Party, member of West German Parliament since 1983* **On Civil Disobedience**, by Henry David Thoreau / **Small is Beautiful**, by E.F. Schumacher
- Bill Kortum**, *veterinarian* **"A Raid on the Oyster Pirates,"** from **Tales of the Fish Patrol**, by Jack London / **The Crossing**, by Sir Winston Churchill / **Across the Wide Missouri**, by Bernard De Voto
- Luna B. Leopold**, *professor of geology, UC Berkeley* **A Sand County Almanac**
- Wilma Mankiller**, *Cherokee principal chief* **God Is Red**, by Vine Deloria Jr.
- Robert Maynard**, *president and editor, Oakland Tribune* **Silent Spring**
- John McCosker**, *director, Steinhart Aquarium* **Soft Energy Paths: Toward a Durable Peace**, by Amory B. Lovins

Joseph Petrillo, attorney and former executive officer, State Coastal Conservancy **The Outermost House**, by Henry Beston / **Silent Spring** / **Walden**

Harold Retler, San Francisco tree planter **The Immense Journey**, by Loren Eiseley

Joseph Sax, professor of environmental law, U.C. Berkeley "Walking" essay and **Walden** by Henry David Thoreau

Stewart Udall, conservationist-author **Silent Spring**

Bibliography for "Books That Changed Our Lives." The dates and editions listed are the latest and lowest priced we could find.

- Across the Wide Missouri**, by Bernard De Voto. American Heritage Library: 1964. \$9.95, 480 pp.
- On Civil Disobedience**, by Henry David Thoreau. See **Walden**.
- Collected Poetry of Robinson Jeffers**. Stanford University Press: 1988. \$60, 521 pp.
- The Crossing**, by Sir Winston Churchill. Telegraph Books: 1981. Reprint of 1903 edition. \$35, 598 pp.
- The Sir Roger de Coverley Papers**, by Joseph Addison, Richard Steele, and Eustace Budgell (from the *Spectator*, London: 1711-12). The Limited Editions Club, New York: 1945. 198 pp.
- The Destruction of California**, by Raymond F. Dasmann. Macmillan: 1965. 247 pp.
- Fire**, by George R. Stewart. University of Nebraska Press: 1984. \$7.95, 336 pp.
- Garden Cities of Tomorrow**, by Sir Ebenezer Howard. Attic Books: 1985. 125 pp.
- God Is Red**, by Vine Deloria Jr. Dell: 1983. \$3.95.
- The Immense Journey**, by Loren Eiseley. Random House: 1957. \$3.95.
- The Nature of the Physical World**, by Sir Arthur S. Eddington. Folcroft: 1935. \$37.50.
- Never Cry Wolf**, by Farley Mowat. Bantam: 1984. \$3.50, 176 pp.
- The Outermost House: A Year of Life on the Great Beach of Cape Cod**, by Henry Beston. Ballantine: 1976. \$2.95.
- "A Raid on the Oyster Pirates," from **Tales of the Fish Patrol**, by Jack London. Macmillan: 1905. 243 pp.
- The Phenomenon of Man**, by Pierre Teilhard de Chardin. Harper & Row: 1959. \$7.95, 318 pp.
- The Power of Myth**, by Joseph Campbell with Bill Moyers. Doubleday: 1988. \$19.95, 231 pp.
- Religion Without Revelation**, by Sir Julian Huxley. Reprint of 1967 edition, Greenwood: 1979. \$24.75.
- A Sand County Almanac, & Sketches Here & There**, by Aldo Leopold. Oxford University Press: 1949. \$7.95.
- Silent Spring**, by Rachel Carson. Fawcett: 1978. \$2.95, 304 pp.
- Small Is Beautiful: Economics As If People Mattered**, by E. F. Schumacher. Harper & Row: 1973.
- Soft Energy Paths: Toward a Durable Peace**, by Amory B. Lovins. Harper & Row: 1979. \$4.95.
- Storm**, by George R. Stewart. University of Nebraska Press: 1983. \$8.95, 349 pp.
- "Trivia, or a Walk Through London on a Rainy Morning," poem by John Gay.
- The Universe Is a Green Dragon: A Cosmic Creation Story**, by Brian Swimme. Bear & Co.: 1984. \$8.95, 173 pp.
- "Walking" essay by Henry David Thoreau, from *Oxford Book of American Essays*, edited by James Matthews. Oxford University Press: 1914: 547 pp.
- Walden**, by Henry David Thoreau. Bound with *On Civil Disobedience*, NAL: 1973. \$2.25, 256 pp.
- The Way Things Are: the De rerum natura of Titus Lucretius Carus**. Translated by Rolfe Humphries. Bloomington, Indiana University Press: 1968. 225 pp. □

Book Reviews

Well-Crafted Walks

Coast Walks: One Hundred Adventures along the California Coast, by John McKinney. Olympus Press, Santa Barbara: 1988. \$10.95, 264 pp

Coast Walks is a well-done companion for the casual hiker of the California coast. Building on a well-crafted framework of traditionally styled descriptions of 100 hikes at established coastal sites, McKinney includes local color and increases appreciation for California's most precious and fragile natural resource. His understanding of and love for



the shoreline is deep and correct, and it shows.

However. The book deliberately includes "for the most part" only "good trails to lovely places," and I'm not sure that's entirely a good idea. The author has chosen a minimum of preservationist evangelism in this work in the "belief that the coast walker who truly cares, will rise, unprompted, to the defense of our shores."

It is my belief that the proper emotion is outrage and that dedication to the idea of

preserving what little is left of the coast grows strongest when you see the rape up close.

Don Engdahl

Don Engdahl has walked the length of the California coast. He is a solar pond specialist with the state Department of Water Resources.

You Can Get There from Here

The Ranch Papers: A California Memoir, by Jane Hollister Wheelwright. The Lapis Press, San Francisco: 1988. \$19.95, 152 pp

The Hollister Ranch is an "albatross" of California's coastal access program. The 14,000-acre subdivision encompasses 8.5 miles of Santa Barbara coastline, none of which is open to the public despite the public access policies of the Coastal Act and Santa Barbara County Local Coastal Program, and despite the California Coastal Commission's "Coastal Access Program for the Hollister Ranch," adopted in 1981 under provisions of the Coastal Act that call for public access in common-interest subdivisions. The ranch is home to a rich and varied community of native plants, tidepool and marine life, and rare and endangered species including the peregrine falcon, southern bald eagle, brown pelican, and least tern. Its shoreline consists of a series of pocket beaches at the mouths of intermittent or perennial streams, separated by headlands of steep coastal bluffs. The 20 miles of coast lying between Gaviota State Park and Jamala County Beach is also reputed to have some of the best surfing in the world, but is nearly inaccessible due to the lack of roads and to the presence, where there are roads (as at Hollister Ranch), of locked gates.

In *The Ranch Papers: A California Memoir*,

Jane Hollister Wheelwright, who was raised on the ranch and has spent much of her life there, invites us to explore its hidden wonders and to reflect upon the passing of days and seasons as she rides a favorite horse on contemplative excursions over its arroyos and beaches, meadows, and oak forests. This is an unprecedented offer from a member of a community that does not extend invitations lightly.

For generations, the Hollister family held title to five ranches, totaling 39,000 acres and including the 25,000 acres of coastal headlands and uplands stretching from Point Conception to five miles beyond Gaviota, known in Spanish and Mexican days as *La Nuestra del Refugio*. After her father's death in 1961, Jane Hollister Wheelwright and other family members liquidated their holdings, and the land was transformed, as she puts it, from family to luxury living. That transformation, involving the parceling and sale of the property in 100-acre lots, resulted in the locked-gate community that exists today. A coastal permit will issue for the development of a vacant parcel only upon payment of an "in lieu" public access fee, to be used eventually to acquire public shoreline access within the ranch. Owners have paid the fees, not without protest, but have stridently resisted California's effort to acquire public access rights. Just as stridently, they opposed the Chevron corporation's recent condemnation of a pipeline easement along the coastal corridor, but Chevron ultimately prevailed.

The tale of how the Hollister Ranch came to be what it is today is no doubt a captivating one. It is not, however, the tale that Jane Hollister Wheelwright has chosen to tell in *The Ranch Papers*. Rather, the book is her highly personal farewell to, and letting go of, the wild lands of her childhood. It is a lov-

ingly assembled montage of family photographs and memorabilia, samplings of Chumash art, historical maps, and impressions. It is the only journey most of us are ever likely to take within most, if not all, of the ranch, and we are fortunate to have such a guide.

The author begins her wanderings on foot, reflecting on her childhood and its still largely unchanged surroundings. Determined to record every moment and every impression, she urges the reader to listen to the silences of the canyons and meadows, and gradually, to the calls of birds, the roar of the waves, and the occasional drone of a helicopter. On horseback, she watches and describes patterns of light moving across the horizon and the hills. Not a blade of grass escapes contemplation and description. Though her family and personal history, along with the spirits of earlier peoples and events, are all woven into the fabric of this memoir, the story she tells is of the place itself. Nature rules here, but human thoughts and actions are a part of it too; all are directly and faithfully recorded in this book.

You don't have to be facing the prospect of selling thousands of acres of private wilderness to be awed by the power of the natural world, and to question whether any of it really can be owned. Jane Hollister Wheelwright's writing is thoughtful and provocative on these points, and perhaps it acquires a certain poignancy for its context. In the end, though, it's not her status as an owner but her special relation to the land that qualifies her to speak with authority and to compel our sympathies. The Hollister Ranch is a unique part of California's coast, and it is a privilege to share in this truly private experience of it. Today, the Coastal Commission's proposed coastal access corridor is accessible only to oil and gas in the Chevron pipeline, and

there are no immediate prospects for implementing the public access program. This book may be the final farewell to the ranch, for us all.

Marcia Grimm

Marcia Grimm is staff counsel to the Coastal Conservancy. She visited the Hollister Ranch beaches under an order for entry issued to the Conservancy by the California Superior Court in 1983.

Neither Fish Nor Fowl

A Scientist at the Seashore, by James Trefil. Macmillan Publishing Company, New York: 1987. \$8.95, 208 pp

James Trefil attempts to show the interconnection of everything in the universe by taking a physicist's look at things at the beach. In his introduction, he likens the world, as seen by a physicist, to a web. If you start with an inanimate object observed at the beach, and follow its strand, you will eventually end up at a constricted middle built around one of the principle laws of physics.

What Trefil spends the first five chapters showing, however, is just how extremely rare our planet is in the great scheme of things. In the remaining chapters, he provides various levels of fact and esoterica regarding waves, sand, salt water, bubbles, and the known laws of physics as they relate to same. Ultimately, this book misses, although not by much.

It is a quick, easy read, but *A Scientist at the Seashore* is neither fish nor fowl in the end. The book is full of drawings, formulae, photographs, and scientific references, on the one hand. On the other, Trefil interjects ten-

tative attempts at humor, anecdote, and a few childhood recollections.

The reader comes away with a not always very clear understanding of the scientific bases for the phenomenon being described. Trefil states in his introduction that a knowledge of how things work should not interfere with enjoyment of the things themselves. In a book with better organization, better illustrations, and more inspired writing, perhaps this is true. Lax editing also muddies the waters somewhat.

The author does not display a real passion for the simple existence of the ocean. There are no convincing personal stories of experiencing the wildness, beauty, and just plain overwhelmingness of the sea, in demonstration of the interconnections between the sea/shore and all of life on this planet.

Altogether, then, this book is a little less dull than most "science" books, but more tedious than any walk along the shore could ever be. If Trefil wants to popularize his branch of science, he would do better to emulate the enthusiasm, excitement, and charm that Carl Sagan utilizes, rather than make vaguely dismissive reference to Sagan by comparing him to the astronomer Percival Lowell with his "canals on Mars."

Perhaps the most astounding fact gleaned from this slim volume is that the author's personal best for stone skipping is 11 skips. This is not something a grown man should admit in public, and for him to do so leads one to suspect the sincerity of his fervent wish to instruct his daughters in the art.

Karen Rust

Karen Rust is a project manager in the Coastal Conservancy's Public Access Program.

Ebb and Flow

Continued from page 6

recreation and Park District with a Conservancy grant. The gardens are operated by a nonprofit volunteer organization, the Gardens Preservation Corporation, under lease from the recreation district. The gardens consist of pine woodlands, two riparian canyons, open coastal prairie, rocky ocean headlands, and several acres of formally planted native and ornamental species. They were conceived and developed by a retired nurseryman, Ernest Schoefer, who began planting in 1960. The unique microclimate of the site supports a wide variety of plants, including major collections of rhododendrons, heather, ivy, roses, camellias, and Mediterranean climate species. The park is increasing in popularity as a visitor destination, with over 20,000 paid admissions in 1987.

Otay River Enhancement Plan

The Conservancy authorized up to \$50,000 to the Southwest Wetlands Interpretive Association for the preparation of an enhancement plan for an ecologically significant area in the Otay River Valley, west of Interstate 5 and adjacent to San Diego Bay. Several shore and wading birds forage and nest in the marsh, salt pond, and riparian area, including the endangered Belding's Savannah Sparrow and California Least Tern.

The Conservancy's July action supports the efforts of the cities of San Diego and Chula Vista, San Diego County, and the San Diego Association of Governments to establish an Otay River Valley Regional Park on both sides of Interstate 5. It is yet another in a series of recently-initiated public attempts

to preserve open space and guide development in San Diego County's several coastal river valleys. The Otay River wetlands have been significantly reduced in area as marshes have been drained or filled and converted to agriculture and other uses. This preservation and enhancement project will help begin the process of restoring and protecting the Otay River wetlands and providing improved public access.

Carlsbad Agricultural Upgrade

Also in July, the Conservancy authorized disbursement of up to \$137,000 from the Carlsbad Agricultural Improvement Fund to the Palomar Resource Conservation District to provide small-scale matching grants for agricultural improvements to individual agricultural landowners and growers in the Carlsbad area. The authorized grant program will benefit improvement projects on farm lands located within the coastal zone of the city of Carlsbad in North San Diego County. These small-scale grants will help implement land improvements that result in reduced soil erosion, improved drainage, new agricultural water supplies, improved water conservation, or other natural resource conservation benefits. □

KEN DOWNING



CrossCurrents

Editor's Note:
This space invites
readers to express
views on topics re-
lated to urban wa-
terfronts.

A Coastal Crusade

California's damp coast invites walking, a gentle sport that immerses you in sun, salt air, fog, and wind as much as swimming makes you part of water. This past summer, as every summer since Coastwalk started in 1983, I was among those who took part, for personal pleasure and also to protect public access to the coast and the coastal zone's native plants, animals, and landscape.

Since it began with a weeklong walk covering the Sonoma coast six years ago, Coast-

dent whose pedometer clocked 228 miles.

As usual, county, state, and federal officials helped us plan routes and overnight accommodations, which vary annually. Experts joined us along the way, adding much to our pleasure. One evening, for instance, Bob Stewart of the Marin County Park and Recreation District guided us into the Tomales Bay State Park habitat of a spotted owl family. Two owlets, about three months old, followed us part way back to our campground.

Where no coastal access was available—as along Sea Ranch in Sonoma County and on the Bolinas Lagoon in Marin—we shuttled along the highway in cars. Elsewhere, some private landowners again gave permission to cross their property. At Point Reyes National Seashore we walked along a trail that some of us had helped to clear last spring. Our hope is to call attention to the need for more trails.

The threat that Lease Sale 91 represents to the coast was much on Coastwalkers' minds this year—a heavier load to carry than the daypacks on our backs and garbage bags for filling with litter in our hands. Secretary of Interior Donald Hodel has said that Californians must contribute a fair share to the national oil supply and therefore must allow drilling. But it was clear to us that the seascapes of California are like the Grand Canyon of Arizona: everyone's, not just ours. They attract people from all over the nation and the world. To me and my friends on the Coastwalk it was obvious they cannot be sacrificed to economic gain or technological experiment.

Jon Toste, Coastwalk organizer, hopes eventually to extend Coastwalk to the entire 1,100-mile length of the California coast.

Virginia Jones

LOU WILKINSON



Hearty Coastwalkers en route. walk has expanded to include Mendocino, Marin, San Francisco, and San Mateo counties. This year, 225 of us took part, joining for a day, a week, or longer during a five-week stretch that began July 31 at MacKerricher State Park in Mendocino County and ended September 4 at Cascade Ranch, San Mateo County. Two people walked the entire stretch: Bill Ring, a photographer, biologist, and high school teacher from Chevy Chase, Maryland, and Maree Fink, a Timber Cove resi-

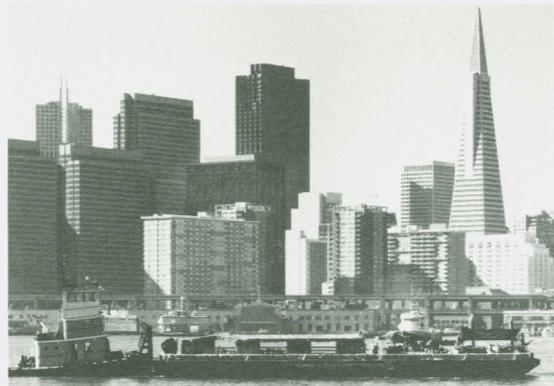


Mystery Photo

Out of the night, when the full moon is bright, comes a horseman known as . . . whoa, it's not Zorro, but another important figure from California's rowdy past. Name him, and win a free subscription to *Waterfront Age*—in fact, this one is so difficult that we'll throw in a copy of our annual report as well.

Last issue's mystery solved: arrival of the animals at Marine World Africa USA's new home in Vallejo, in 1986. At right, the long view.

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