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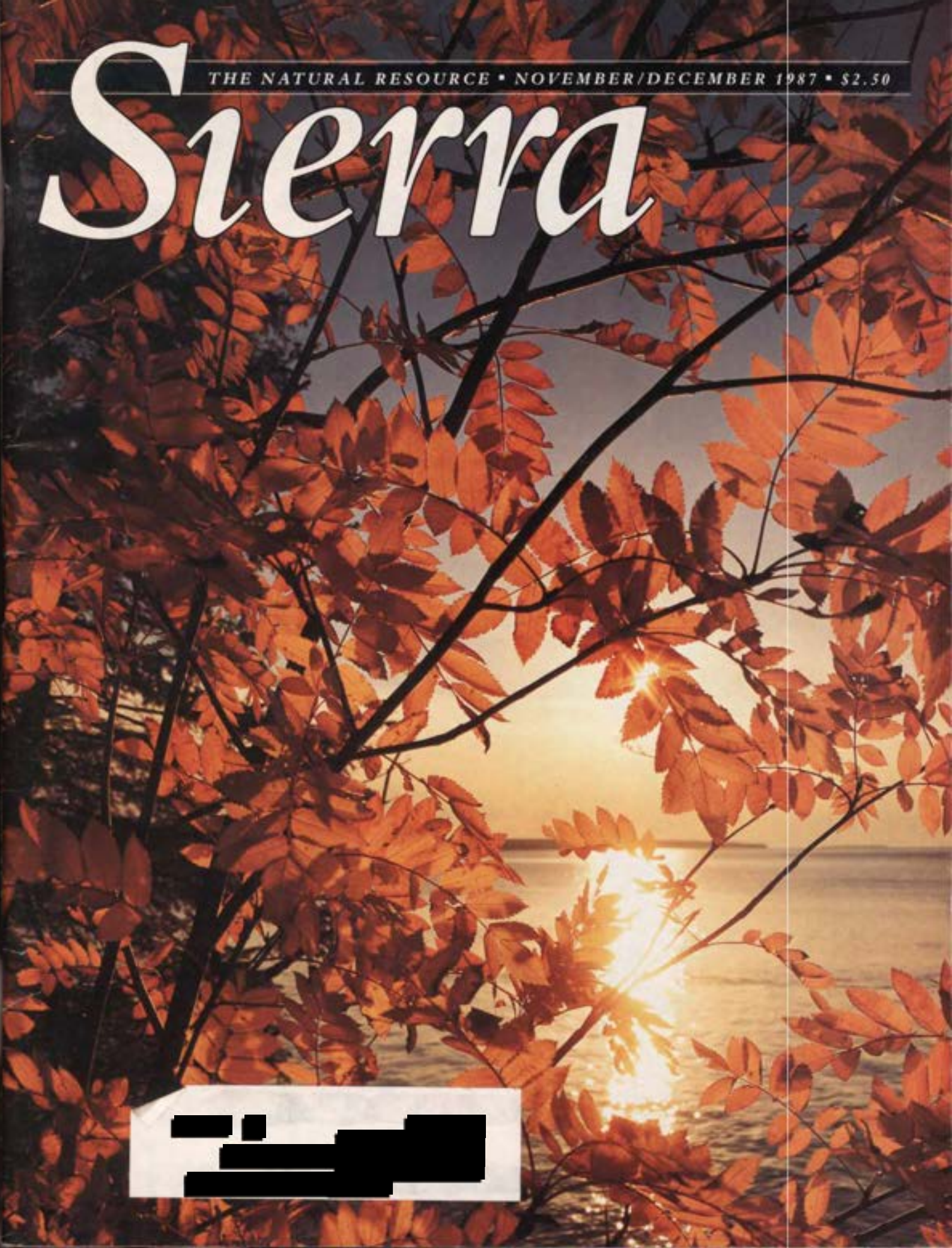

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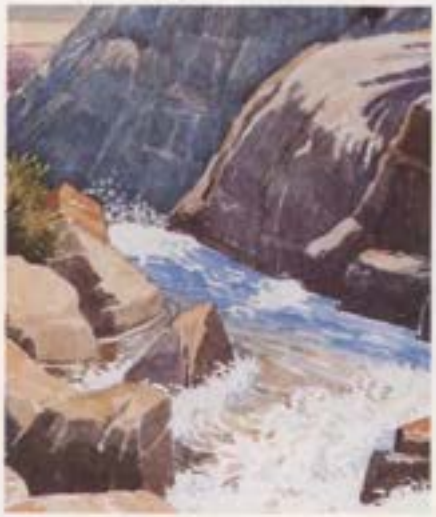

COVER: Fall foliage frames a view of Lake Superior from one of the Apostle Islands. For more on the Great Lakes, see page 42. Photo by David Muench.

Sierra (USPS 499-930) (ISSN 0161-7362), published bimonthly, is the official magazine of the Sierra Club, 730 Polk St., San Francisco, CA 94109. Annual dues are $33. Members of the Sierra Club subscribe to *Sierra* through their dues. Nonmember subscriptions: one year $12, two years $20; foreign $16; single copy $2.50. Second-class postage paid at San Francisco, CA, and additional mailing offices. Reprints of selected articles are available from Sierra Club Information Services.

POSTMASTER: Send address changes to Sierra Club Member Services, 730 Polk St., San Francisco, CA 94109. Along with your old and new addresses, please include a *Sierra* address label. Telephone (415) 776-2211 (voice); (415) 776-8107 (TDD).

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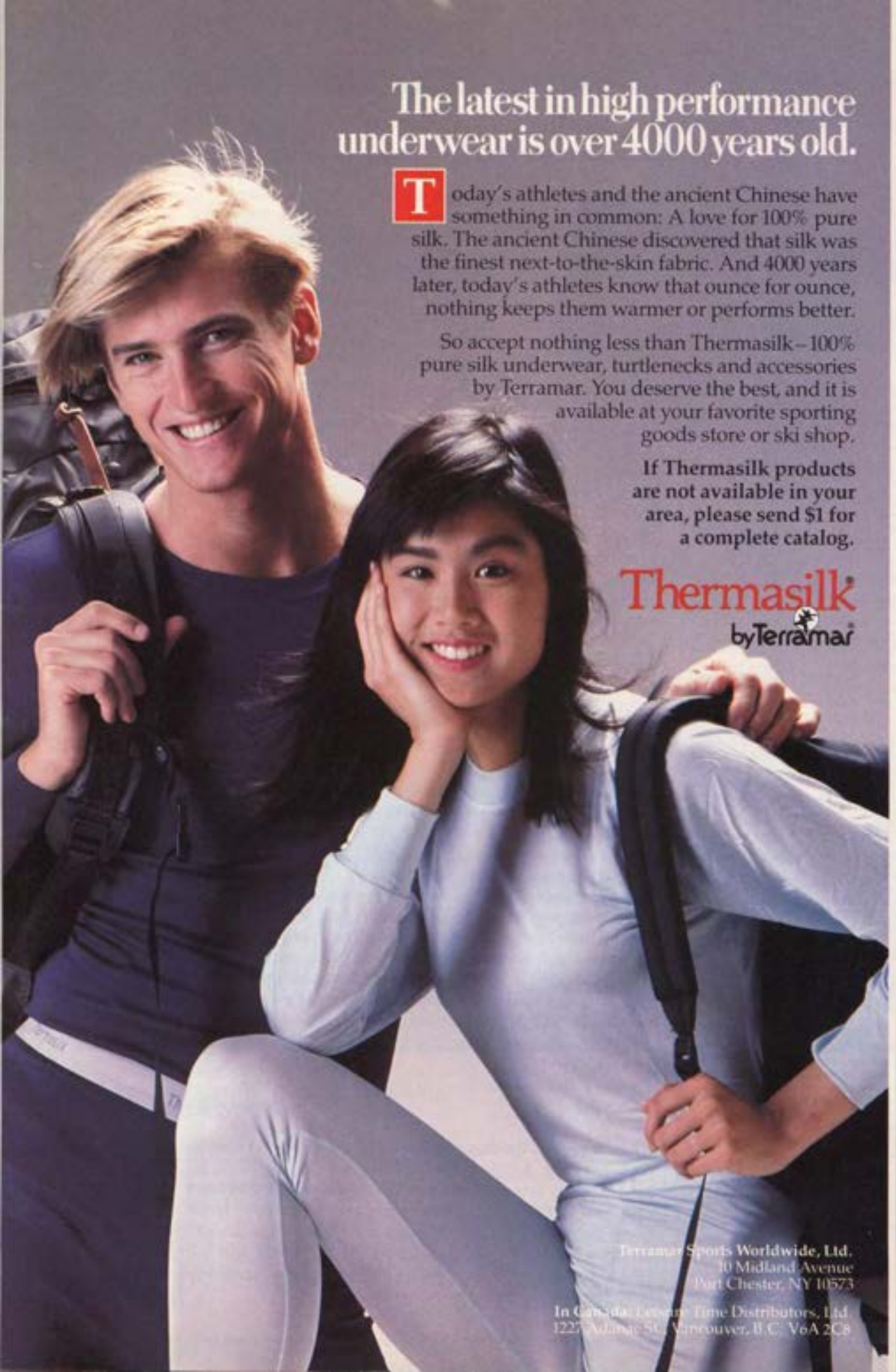
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LETTERS

HERE FOR THE LONG HAUL

When a new Editor-in-Chief takes over a magazine that one expectantly tramps to the mailbox for (like love letters), it is an unsettling experience.

Welcome, Jonathan F. King, but with reservations.

"Beyond the Mountaintops" (September/October 1987) suggests that you are torn between seeing *Sierra* as a general-interest environmental magazine, a spotlight for Club-member activities, and a magazine for Sierra Club (and other) activists.

You say that "we can devote less attention than we might wish to the many crucial and complex topics confronting today's activists, because we also serve as the primary source of environmental information for hundreds of thousands of nonspecialist readers."

I strongly urge more—not less—attention be devoted to crucial environmental issues; to Sierra Club activist concerns; and to box-type columns of the "how to take action on this issue" sort, for the many Club members and generalists who are not activists, but who would act on given issues at given times.

A magazine with a strong voice might not always win the generalist popularity contest, but it will, over the long haul, win an ever-larger, loyal, and committed group of readers. The power of the media—and this is also its mystery—works two ways. It can pander to the mind-set of an existing population and enjoy a high degree of popularity, or it can gradually influence and alter that mind-set, becoming perhaps a bit less popular and a bit more influential. And isn't the latter what we want? The Earth says yes.

Patricia H. Fairless
Kent, Ohio

I have enjoyed the magazine's evolution, over the decade of my membership, from being a "house organ" (the *Sierra Club Bulletin*) to *Sierra*. Certainly, the Sierra Club and the issues it confronts have had a similar evolution. However, I am greatly dismayed by the fact that I have to search—practically with a magnifying glass—to discover that *Sierra* indeed is "the official magazine of the Sierra Club." (See the contents page, lower right-hand corner, in tiny tiny print that is barely readable.)

Come on, *Sierra*: Are you ashamed of what you are?

Ron P. Good
Mill Valley, California

WASTE AS A RESOURCE

In her excellent article "Garbage In, Garbage Out" ("Priorities," September/October 1987) Carolyn Mann wrote, "Cities should burn trash . . . only after less damaging waste-reduction, recycling, and source-separation programs have been implemented."

The point, of course, is that waste can be a resource and that industrial and manufacturing operations can be altered in some cases to greatly reduce waste. Many industries, fortunately, are taking these two approaches, with significant benefits in economic terms as well as in waste reduction. While we work on appropriate use or disposal of the wastes we generate, we should also have a vigorous program for cutting to a minimum the waste we do produce—for example, by extending the useful lives of products, from bottles and appliances to automobiles and houses.

The broader the range of possibilities considered for handling our waste problems, the greater the chances of finding the optimum mix. As environmentalists, we must lead the search for options and encourage public actions that move toward the acceptable levels of pollution we must sooner or later find—levels that can be harmlessly assimilated by the Earth.

John A. Freeman
Emeritus Professor of Biology
Winthrop College
Brevard, North Carolina

WHAT PRICE DECAF?

In "Once More, With Compliance" ("In Depth," September/October 1987) Carl Pope wrote that solvents are "carcinogenic, neurotoxic, and potential

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sources of birth defects." True enough. He's correct that they should be replaced "wherever safe substitutes are already available." However, his off-the-cuff proposal that "where alternatives are not available, the EPA needs to establish a schedule for reducing and then eliminating production" betrays a yawning ignorance of the unique properties of solvents. The free market cannot develop substitutes for ether, chloroform, toluene, and the hundreds of other solvents; they are critical and irreplaceable in the separation, purification, and synthesis of organic compounds. Banning their production would immediately halt medical and chemical research, including work on compounds to treat cancer and viral infections.

Eric Krock
Champaign, Illinois

Carl Pope replies: Krock is correct when he states that "the free market cannot develop substitutes. . . ." But scientists and engineers *can* (for most uses), given sufficient incentive. The purpose of asking the EPA to schedule production cutbacks and eventual phaseouts is to provide the incentives that the market does not currently provide. Residual, unique needs may or may not remain, and if they do, they should be appropriately accommodated. But we do not need to use methylene chloride to produce decaffeinated coffee, or benzene to raise the octane of gasoline. It is massive industrial uses like these, where ease and cost rather than research needs drive the market, that make solvents major commercial chemicals. It is also likely that in the process of developing substitutes for the major commercial uses, scientists would discover new, and safer, products suitable for most and perhaps all laboratory and research needs.

S.D.I. AND COMP SCI

In his article on the Strategic Defense Initiative ("The Dark Side of the Force," September/October 1987), Richard Rawles leaves the reader with a somewhat misleading impression of the role of computer scientists in SDI research. The computer-science community has consistently and loudly protested the proposed battle-management strategy and, indeed, the whole SDI concept. Among the many grounds for this position have been the impossibility of doing meaningful work based on nonexistent technologies and the likelihood that any such research would be put to political use. Although such research is going on within the SDI program, it is being done with virtually no participation by professional computer scientists.

Edward Angel, Chairman
Department of Computer Science
University of New Mexico
Albuquerque, New Mexico

A QUIET SOLAR REVOLUTION

Although "Dark Days for Solar" ("In Depth," July/August 1987) was a good overview of the current solar industry, it failed to emphasize one critical issue looming over the industry: Will we continue to support the remaining solar-electric divisions of oil company giants such as Atlantic Richfield (ARCO Solar) and AMOCO (Solarex)? By buying their products we buy into their plan of controlling energy supplies—in whatever form—and we further their public-relations objectives by not questioning their true motives in the solar industry.

Most photovoltaic enthusiasts got into the business with a commitment to solar as the clean, renewable, nonpolluting electricity that could, combined with conservation, quickly reduce our dependence on fossil fuels and nuclear power plants. How can such enthusiasts feel good about buying products from the very oil companies against which we battle every day on Capitol Hill over tax credits, conservation, subsidies, and, most compelling, oil drilling off the coast of California and other states?

Finally, I must disagree that only "government backing or a technological breakthrough" will make good times for the solar industry. Although these would be welcome boosts (particularly when conventional fuels are so heavily subsidized that comparing the economics of solar versus oil is nearly impossible), even without them the industry will grow rapidly. Solar is cost-effective now, for many applications. I urge consumers to seek ways to participate personally in the quiet solar-electric revolution now under way.

Susan Bryer Starr
Rohnert Park, California

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FLOATING THE HUDSON: BIG APPLE COMMUTERS GET MELLOW

After decades in dry dock, the ferries of New York City are afloat again. As recently as last year not a single private carrier plied the tides of the Hudson River; the government-run Staten Island ferry was the only maritime alternative to the city's overloaded highway system. But eight new private ferry lines now transport thousands of commuters to Manhattan from slips in New Jersey and the outer boroughs, and city planners have declared full steam ahead for more routes.

DAVID GAMBLE

"Everyone's really excited about it," says Michael Huerta, the city's ports commissioner. "There is a romance about getting out on the water."

There is also, promoters argue, convenience. While motorists and bus passengers fume in New York City's legendary traffic jams, and mass-transit riders elbow their way onto crowded trains, ferry operators beckon with reliable schedules, hospitality, and a view to boot.

"You get on the boat, and we hand you a cup of coffee and a doughnut or bagel," says Walter Mihm, whose Direct Line service runs seven of the new lines. "By the time you finish the coffee and read the paper, you're in Manhattan. No traffic lights, no tunnel tie-ups. It's a lovely, relaxing trip."

Mihm found little ridership and less official encouragement when he initiated a ferry line ten years ago. But recent waterfront development sparked interest in the idea of floating to work, and federal pressure on the city to reduce automotive air pollutants gave a boost to ferry development.

There have been a few ripples of trouble: In June, two Direct Line ferries collided in heavy fog, slightly injuring their port bows and 16 passengers. And two new lines, one from eastern Long Island and one from Fort Lee, New Jersey, have closed for lack of business. Another drawback: Ferry fares run about double the price of bus and train tickets, although they are competitive with the cost of driving and parking a car.

Despite the setbacks, entrepreneurs are lining up at the docks. Huerta's office has 11 applications pending for new ferry routes, including direct service to LaGuardia Airport. City officials say that about 3,000 commuters use the private lines each day, and they expect that number to rise as operators expand schedules and use bigger boats.

A crucial test comes with the changing seasons—if ridership continues to increase during the cold winter, commuting by ferry will prove itself more than just a fair-weather fad in the nation's most populous city.

—Gary Langer

SCORECARD

- More than 170 members of the House of Representatives have signed a letter urging prompt adoption of strong amendments to the ***Clean Air Act*** that include all of the Sierra Club's proposed reforms.
- A decade of dispute ended in July when Canadian officials announced that ***South Moresby***, the southern portion of the Queen Charlotte Islands off the coast of British Columbia, will be protected as a national park.
- The ***nuclear weapons test-monitoring agreement*** between the Natural Resources Defense Council and the Soviet Academy of Sciences has been extended through August 1988. The goal of the scientific exchange is to show that compliance with a test-ban treaty can be verified through seismic monitoring. (For more on this topic, see *Sierra*, January/February 1987.)
- A Superior Court judge in San Francisco granted a reprieve to ***California's mountain lions*** by postponing indefinitely the state's first authorized hunt in 16 years, which was scheduled to begin October 10. The judge ordered the state Fish & Game Commission to further analyze the impacts that the hunt would have on California's mountain lion population.

BARBRA PROCHNOW, WHALE PHOTOS BY FRANS LANTING

A FLUKE TO CALL YOUR VERY OWN

Two years ago, a humpback named Humphrey took a wrong turn in the Pacific and spent 25 days cruising the channels of California's Sacramento–San Joaquin River Delta. By the time he left, he had become the nation's most beloved leviathan. "A lot of folks took Humphrey to heart," says Mark Palmer, director of the Whale Center in Oakland, California. "Since then, we've had more and more people who want to develop a personal commitment to whales."

One way to do that is to become involved in a unique program: whale adoption. While primarily a fundraising effort by whale-protection organizations, whale adoption serves another purpose. According to the sponsoring agencies, it is a way of transforming concern for an entire species into attention to a particular individual. "It's an opportunity to get to know and love your very own whale," says Palmer.

Four centers around the country offer humans the chance to develop a special relationship with a cetacean. Since April 1984, 3,500 people have paid $20 to adopt an orca whale through the Whale Museum on Puget Sound (P.O. Box 945, Friday Harbor, WA 98250). Each new parent receives a parchment adoption certificate, a photo and biography of baby orca, and updates on whale research.

Through Northern California's Whale Center (3929 Piedmont Ave., Oakland, CA 94611), adopters can choose and name their loved one from a list of a thousand gray whales. For an annual fee of $50, parents receive an adoption certificate and a color glossy of their whale. The money raised is used for the center's marine-conservation work.

If your heart is set on a humpback, contact the Whale Adoption Project (P.O. Box 316, Woods Hole, MA 02543). For $15 a year, parents choose their little big one from some 70 candidates and receive a photo of their whale, a certificate naming them as its official protectors, and a quarterly newsletter.

Humpbacks can also be adopted through the Pacific Whale Foundation (101 North Kihei Road, Kihei, Maui, HI 96753). Begun in 1981, the foundation's Adopt-a-Whale program is the longest-running in the country. Annual adoption fees range from $15 to $75.

Staff from all four programs note that whales make great gifts. So if crowded shopping malls are more than you can bear as the holiday season approaches, don't buy Moby Dick—adopt him.

—Marisa Gaines

FROM ELIOT, WITH LOVE

ELIOT PORTER

A true work of art, says Eliot Porter, "is the creation of love, love for the subject first and for the medium second." For more than 50 years Porter has transformed his love of nature and of color photography into images that detail an unspoiled Earth.

Porter, 86, has recently announced his plans to leave his photographic estate to the Amon Carter Museum in Fort Worth, Texas. In celebration of the gift, the museum is organizing the first retrospective exhibition of Porter's work. The show's 120 photographs will be on display at the museum from October 31 until January 3, when the exhibit will go on national tour. *—Annie Stine*

BUT WILL THEY EAT GLOWWORMS?

Pampered throughout their lives, the chickens of Bresse, in east-central France, are one of that nation's gastronomic prizes. The birds, fed on a mixture of corn and milk, boast a firm flesh and earthy flavor that help make them the world's most pricey poultry. The French government, which goes to great lengths to maintain the international reputation of that country's finest products, accords the *poulet de Bresse* a coveted *appellation d'origine controlée*—sort of a gourmet's Good Housekeeping seal of

MARC TULANE, RAPHO-PHOTO RESEARCHERS

approval—as though each chicken were a bottle of *grand cru* Bordeaux.

Hence the current flapping of wings over a proposal to establish a nuclear waste storage facility in the Bressan heartland, at Montrevel. Authorities claim that the tons of waste, to be stored in a supposedly stable layer of salt hundreds of feet underground, would pose no danger to the people and poultry of the region. Growers and processors of Bresse chickens are in no mood to entertain even the possibility of a mishap, however. Two highly publicized accidents at French nuclear reactors have undermined public faith in that industry's carefully cultivated image of safety. The chicken growers fear that the merest perception of possible radiation danger would deal the *poulet de Bresse* a marketing blow from which it might never recover.

Beyond that, there is the gastronomic angle to consider—as there always is in France. Just as the winemakers of Bordeaux and Burgundy attribute the worldwide reputations of their grapes to peculiar attributes of local soils, so the Bressans claim that the blend of lime and salt in their *terroir* contributes to the special savor of their birds, which fetch prices three times higher than average on the Paris market. No one who has ever enjoyed a roasted Bresse chicken served in a cream sauce with wild mushrooms could fault the growers for their reluctance to preseason their prized poultry with plutonium. —***Jonathan F. King***

DAVID DAMBALE

SIERRA CLUB VOTERS PUT FORESTS ON FIRST

Last year the Sierra Club Board of Directors adopted a resolution giving Club members the opportunity to express their conservation priorities. Accordingly, the first annual membership advisory poll was conducted in March, and 14,443 valid ballots were completed. Members were asked to vote for no more than 5 of the 15 issues listed. The envelope, please . . .

CONSERVATION PRIORITY	NUMBER OF VOTES
1. Forest Conservation	6,005
2. Air Pollution Control	5,867
3. Water Pollution Control	5,476
4. Toxic Waste Control	4,904
5. Parks and Refuges	4,681
6. Coastal Protection	3,541
7. Water Resources	3,401
8. Species Conservation	3,126
9. Nuclear Power and Waste	3,037
10. BLM Wilderness	2,874
11. Population	2,489
12. International Environment	2,284
13. Arms Control	2,110
14. Soil Conservation	1,800
15. Oil and Gas Leasing	894

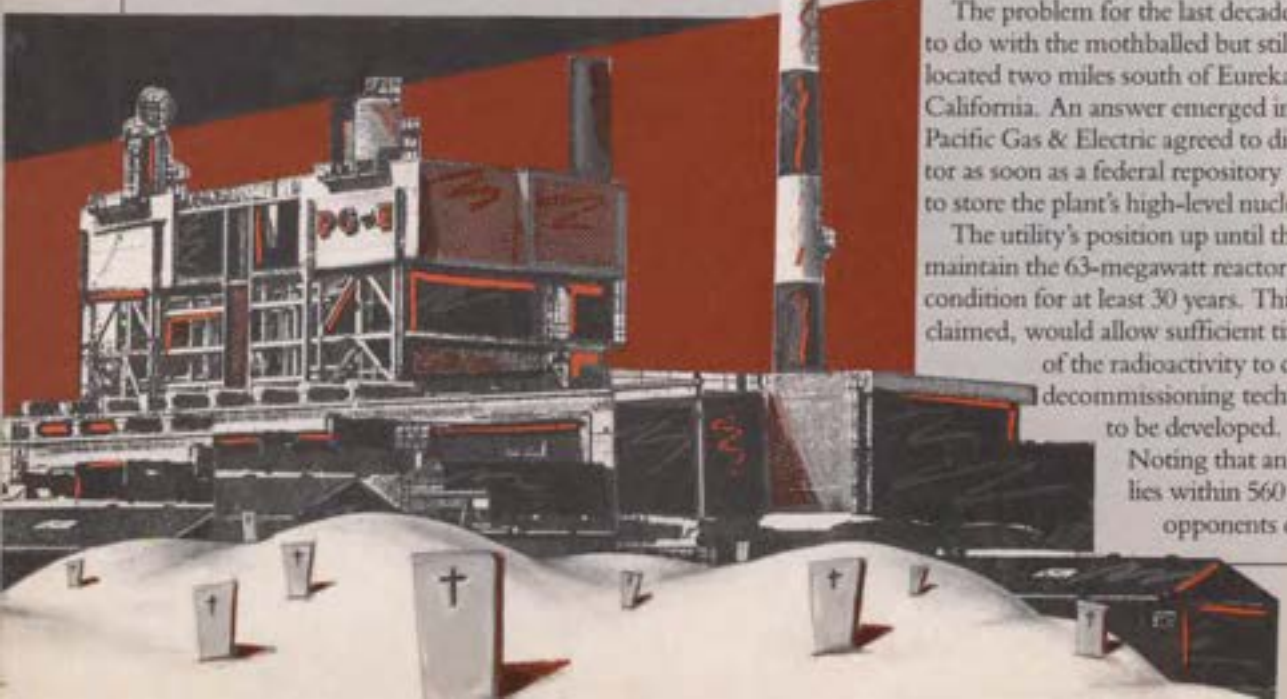
ONE MORE FOOT IN THE GRAVE

When it went on-line in 1963, the Humboldt Bay nuclear power plant was expected to operate for 30 years. To the dismay of its promoters, it shut down forever just 13 years later.

The problem for the last decade has been what to do with the mothballed but still-hot facility, located two miles south of Eureka in Northern California. An answer emerged in June, when Pacific Gas & Electric agreed to dismantle the reactor as soon as a federal repository became available to store the plant's high-level nuclear waste.

The utility's position up until then had been to maintain the 63-megawatt reactor in its dormant condition for at least 30 years. This, PG&E officials claimed, would allow sufficient time for some of the radioactivity to decay and for new decommissioning technologies to be developed.

Noting that an earthquake fault lies within 560 feet of the plant, opponents of PG&E's plan



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had asked the Nuclear Regulatory Commission to require immediate removal of the plant's highly radioactive spent fuel. However, that request has been dropped in return for two concessions—the promise to decommission early and to improve safety at the plant.

The Redwood Alliance, one of the groups involved in the agreement, is now focusing on the search for a federal repository. But the Department of Energy's high-level-waste program is currently at a political impasse, and it may take at least 16 years before a repository is in place.

—Mary Abbott

TWO CHEERS FOR THE RAINFOREST

The Deal Is On in Bolivia . . .

Struggling to repay crippling debts, many developing countries turn to their forests, clearcutting hundreds of acres every day for lumber, mining, and cattle ranching. But in July, Bolivia and a U.S.–based conservation organization put an original turn on that wheel of misfortune.

In an innovative swap, Bolivia agreed to preserve 3.7 million acres of rainforest in exchange for a reduction of its national debt by $650,000. Conservation International, a nonprofit organization based in Washington, D.C., engineered the exchange with the help of a $100,000 donation from the Frank Weedon Foundation. (Many banks involved in foreign lending, realizing they will never get their entire loans back, are willing to "sell" their unpaid debts for a fraction of the amount that they originally loaned.)

"The Bolivian transaction sets a precedent in offering a long-term creative solution to the world's debt crisis," says Peter Seligman, director of Conservation International. "It demonstrates that nations can meet their food and fuel needs without destroying their natural resources and begin to reduce their debt at the same time."

The newly protected area is adjacent to the existing Beni Biosphere Reserve in northern Bolivia. A unique Amazonian region, the reserve supports 13 of Bolivia's 18 endangered animal species.

—Marisa Gaines

STEPHEN J. KRASEMANN DRK PHOTO

. . . The Deal Is Off in Nicaragua

Under pressure from environmentalists in his own country and abroad, Nicaraguan President Daniel Ortega on June 18 cancelled an agreement to sell 3,200 square kilometers of virgin rainforest in southeastern Nicaragua to a Costa Rican timber company. Environmental groups now hope to turn the area into an international peace park, a plan Ortega supported in the past.

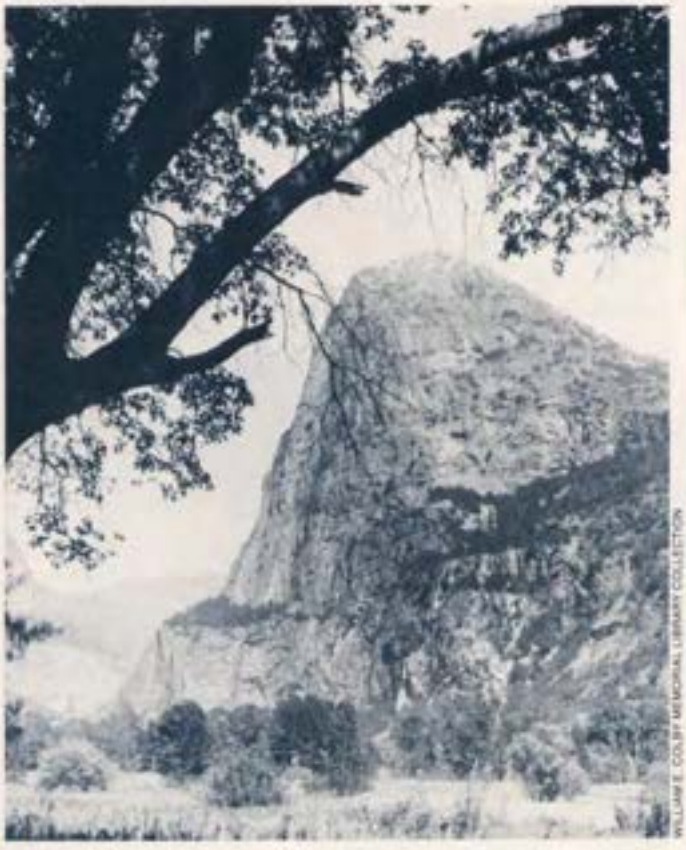
More than half of the 5,000-square-kilometer San Juan River watershed tract had been ceded to timber magnate Ramiro Sanchez in August 1986 by Nicaragua's State Forestry Corporation and Vice Minister of Industry. Virtually unexplored, the area is one of the wettest in the Americas and is believed to contain some of the densest plant and animal populations of the continent's tropics.

Under the agreement with Sanchez, Nicaragua would have received $25 for each cubic meter of hardwoods harvested. But according to Joshua Karliner, policy director of the San Francisco–based Environmental Project on Central America, if the country were to log and process the wood itself, it could receive $450 per cubic meter.

This disparity and the sorely inadequate safeguards

S. KRASEMANN DRK PHOTO

FLASHBACK



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Hetch Hetchy Valley, before it was inundated. One of John Muir's sacred places, the valley was a casualty of an early California land-use battle. For a report on Interior Secretary Donald Hodel's plan to restore Hetch Hetchy, see page 34.

Sanchez offered for the watershed caused many Nicaraguans to charge that the sale violated principles of self-determination and environmental protection espoused by Ortega. Opposition grew after Nicaragua's Association of Biologists and Ecologists overcame attempts at censorship and forced the story into the press last spring. Lawyers' groups and agricultural associations then joined the fray on behalf of the rainforest. Finally, international environmentalists meeting in Nicaragua in May sent telegrams to Ortega protesting the sale.

While the sale has been

officially cancelled, the problems are not over. The lower section of the San Juan makes up the Nicaragua–Costa Rica border. Costa Rica is expected to exert significant pressure to develop the watershed next year when a 99-year-old treaty giving exclusive control of the border portion of the river to Nicaragua expires.

—Susan Zakin

DAVID SHORT

SHARE THE AIR: ISRAELIS TAKE RAPTORS UNDER THEIR WING

Not so long ago, if an Israeli pilot said he was downed by a hawk, he was probably not talking about a surface-to-air missile. Most likely he was speaking literally, for Israel's position on the only land bridge between Africa, Europe, and Asia puts it directly in the pathways of several species of migrating birds. In fact, during the last decade the Israel Air Force has lost more jets to collisions with large birds than to all Arab forces. This battle for the skies is one reason Israeli conservationists have taken to the air.

For the past four years, ornithologists from the Israel Raptor Information Center, a project of the Society for the Protection of Nature in Israel, have been developing a detailed profile of the bird migrations in their part of the world. At first the researchers stayed on the ground, gathering information about the routes and sizes of the flocks. But in 1985 the birdwatchers began using a powered glider to obtain precise data on the birds' air speeds and altitudes as well as on the locations and sizes of the thermal currents utilized by the migrants.

According to project director Yossi Leshem, the birds are wary when the glider first approaches, but they soon see the intruder is not aggressive and accept it as a larger-than-average fellow traveler. "With the motor off, the only sound is the air rushing over the wings," says Leshem. "At times we've had thousands of eagles or storks or pelicans all around us. There just aren't words to describe the feeling."

Glider research is not unique in ornithology, but the raptor center's project is by far the most extensive of its kind, according to Leshem. More important, the project is successfully protecting both birds and pilots. Military computers using project data to plot flight plans are now so adept at avoiding migratory flyways that collisions with birds, which used to run to hundreds a year, are now a rare occurrence.

—Joe Matazzoni

FIELD NOTES

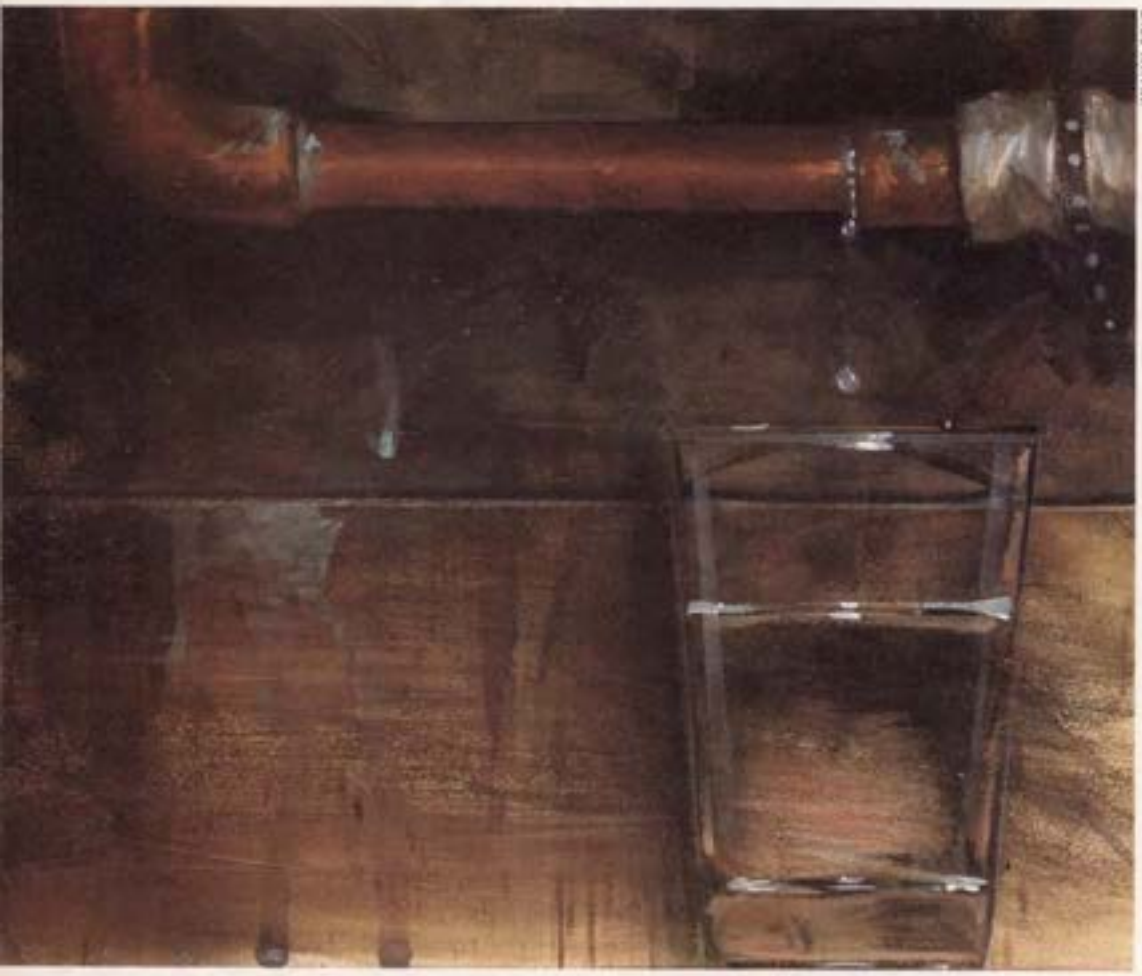
"Cut open a hyacinth bulb—who would dare?—and it is said you will find already perfectly formed the stalk of flowers waiting for spring. The seasons are contained, one within the other, in an endless series of Chinese boxes; this year's bud holds next year's blossoms; this spring's egg holds every egg that has been and every egg that is to be. In July the dogwood's leaves are turning and the buttons of April's blossoms are already forming.

In November, in the middle of a rocky path, I found a tiny clump of bluets blooming, pale and fragile, under a cold and stormy sky. I dug it up and brought it indoors and it bloomed all winter long, sending up smaller and smaller buds on thinner and thinner stalks until spring came, when it softly died, consumed by the effort to rectify its error."

CLEAN WATER

Heavy Metal on Tap

The EPA is warning Americans about lead in drinking water, but some experts think the problem requires even stronger measures.



WILLIAM CONE

Michael Kantor

Over the centuries, lead has played a useful yet decidedly sinister role in civilization's drama. Wealthy Romans drank wine from utensils lined with the dangerous metal—and suffered widespread sterility, stillbirths, and mental retardation as a result. Today most people associate lead poisoning with paint-eating children or additives in gasoline. But significant quantities of the toxic metal are also turning up in our drinking water.

Now that lead in gasoline has been reduced, drinking water is being targeted as a high-priority problem. "Drinking water is now the most widespread general source of lead contamination in the United States," says lead toxicologist Ellen Silbergeld of the Environmental Defense Fund.

Contamination occurs when water, particularly corrosive (acidic or soft) water, leaches lead from the solder in copper-pipe joints and from the pipes connecting house plumbing to the main water lines.

Although the solutions—additives that make water less corrosive, and the use of pipe and solder without soluble lead—seem simple, corrective action has been slow in coming.

The EPA estimates that some 42 million Americans drink tap water tainted with unhealthy levels of lead. Because newly installed solder dissolves easily, new-home dwellers or those in older housing with recent repairs are particularly at risk. In these cases, lead levels can remain above the current federal standard of 50 parts per billion (ppb) for as long as five years after installation.

So far evidence of the problem has turned up wherever proper testing has been done, including Boston, Seattle, and Washington, D.C. Occupants of new housing in Cleveland and Philadelphia have been exposed to excessive levels of the metal, too.

Although the effects of acute lead poisoning—retardation, stunted growth, and death—have been known for centuries, recent findings suggest that even concentrations long believed safe pose a significant threat.

"No one thought such low levels would really matter," says medical researcher David Bellinger of the Boston Children's Hospital and Harvard Medical School. "But there may not be a threshold below which lead is safe. The normal level in blood should be zero." Compelled by increasing concern about low-level exposure in children, the Centers for Disease Control reduced what it deems allowable levels of lead in children's blood three times since 1971. But now physicians suspect that concentrations well below the current level of 25

micrograms per deciliter of blood provoke a number of health effects: lowered birth weights and retarded mental development in infants; diminished height and IQ in children; and hypertension in men. (Women have not yet been tested.)

The EPA proposed cutting the amount of lead allowed in tap water from 50 ppb to 20 ppb back in November 1985. In a December 1986 staff report, EPA economist Ronnie Levin estimated that under the current limit about 240,000 children have suffered slightly lowered IQs. According to estimates in the same report, the more stringent standard would save a total of about $1 billion each year in health-care costs and corrosion damage to piping. The lower standard would cost some $200 million annually to implement, for a net benefit of about $800 million a year.

But if the response so far is any indication, it may be a long time before affected consumers stop getting lead in their drinking water. The EPA held Levin's report six months for scientific review, releasing it after it was leaked to *The Washington Post* in November 1986. Now the EPA says the proposed standard won't be in its final form before June 1988. It will then be another eighteen months to two years before the standard is enforced.

In 1986, Congress amended the Safe Drinking Water Act to require a state-enforced ban on the use of materials containing lead in public drinking-water plumbing by 1988. But, according to Silbergeld, inexpensive lead solder will remain available for other purposes and could be used illegally on drinking-water pipes despite the ban.

The EPA's monitoring requirements are also controversial. The EPA lets water companies do their own testing. While following EPA guidelines, some companies sample in a way that underestimates lead content, critics claim.

Typically, samples are drawn from water that has been running for several minutes. This procedure misses water that has been standing in the plumbing —where nearly all the lead is picked up —and pulls in new water from distribution mains in the street.

"The monitoring doesn't reflect exposure," says Stephanie Pollack, director of the Conservation Law Foundation's (CLF) lead project. "With the current approach, it doesn't matter what ppb limit the EPA sets, it'll never find the problem."

The chief of the EPA's Drinking Water Branch, John Trax, agrees that the sampling procedure is not what it should be. "There's no question that fully flushed sampling misses the mark," he says. But Trax adds that a revised monitoring policy will accompany the proposed change the agency plans to make in the allowable lead content.

Accurate monitoring is critical, especially if the EPA invokes a standard lower than 20 ppb. According to Silbergeld, recent independent research and the EPA's own calculations make a strong case for a limit of 10 ppb or less.

Trax says that, overall, his agency has adequately addressed the problem. He points out that it has been a leader in educating the public about the issue, and that as early as 1980 the EPA had regulations directing the states to measure and report water corrosiveness. Trax admits, however, that the agency probably

didn't "push the states hard enough" to do something about corrosion.

On this point, critics agree with the EPA. "The agency must make the states require utilities to reduce corrosiveness," says CLF's Pollack. "It's easy and relatively inexpensive to do." The process involves adding compounds (such as lime) that lessen the acidity or softness of the water.

Meanwhile, the EPA and a few states are urging consumers to protect themselves. An EPA brochure, for instance, instructs residents to use only cold tap water for cooking and drinking, to let water run before taking a first drink in the morning, and to be wary of water-softening units that could increase corrosion. (To order the brochure, call the EPA at [800] 426-4791.)

Silbergeld insists, however, that the federal government stop passing the burden on to the consumer. To successfully protect consumers, Silbergeld says, the EPA must implement a standard of 10 ppb or less and take steps to reduce water corrosiveness. The agency should also develop a workable ban on pipe and solder containing high levels of lead.

"I think it's always been a matter of public trust that we could turn on a tap anywhere in this country and have good water," she says. "Lead poisoning is one of the top ten childhood diseases in this country. It's virtually untreatable, but entirely preventable. It seems so senseless not to deal with it."

MICHAEL KANTOR *is a freelance writer living in Missoula, Montana.*

THE OCEANS

Guarding Neptune's Sacred Grounds

The seas give us food, energy, and mystery. As understanding of the oceans grows, so does our interest in protecting them.

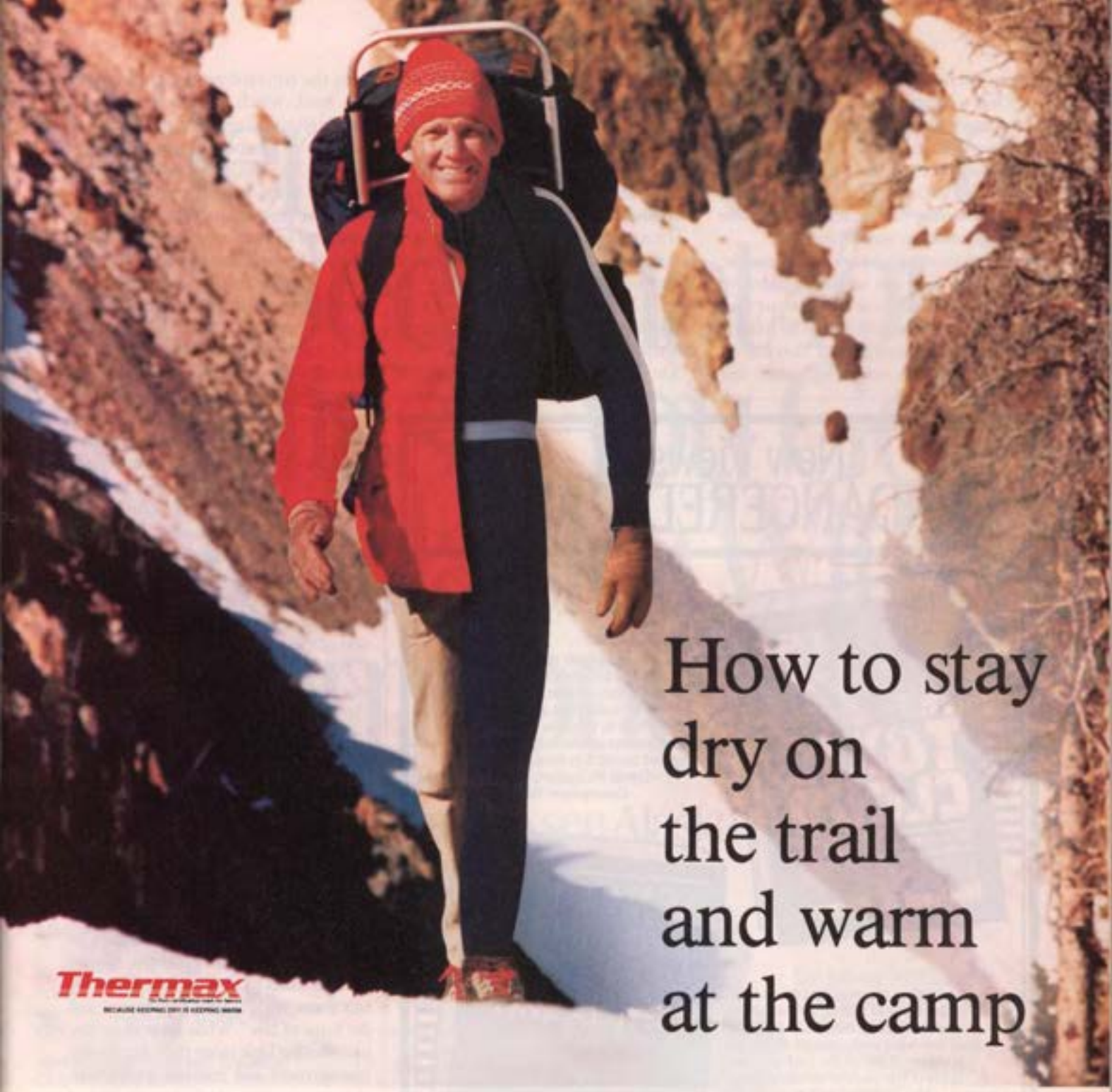
Mark J. Palmer

NATURALIST TOM JOHNSON has pointed out that the planet Earth is misnamed: Three quarters of the globe is covered by ocean. Historically, our nation's lack of attention to ocean conservation has reflected this bias toward dry land. But now one small federal program is working to compensate for that neglect.

While it may seem a little out of place in an agency that studies hurricane patterns and how ocean currents affect the movements of fish, the Marine Sanctuary Program is part of the Commerce Department's National Oceanic and At-

DOUG PERRINE/DRK PHOTO

A diver visits the silent world at Key Largo Coral Reef National Marine Sanctuary.



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mospheric Administration (NOAA). "Only a handful of people in this country know that the program exists," says Nancy Foster, former director of the Marine and Estuarine Management Division of NOAA. "But it's all we have for protecting marine ecosystems from ocean surface to ocean floor."

Underwater parks are not unknown, but such areas are usually wedded to land, with more focus on the coast than on the waters just offshore. The Marine Protection, Research and Sanctuaries Act of 1972, the federal legislation that set up the sanctuary program, noted this emphasis. The act states: "This Nation historically has recognized the importance of protecting special areas of its public domain, but these efforts have been directed almost exclusively to land areas above the high-water mark."

That exclusivity continued even after passage of the act, with the Commerce Department unable to get its feet wet until 1975, when the first marine sanctuary was established. To date, only seven sanctuaries have been designated.

One of the program's problems has been the labyrinthine designation process itself, which requires detailed and highly technical research into the qualifications of prospective sites. Although the final decision to designate a sanctuary is up to the Secretary of Commerce, the entire proposal must be reviewed by Congress and approved by the Fish and Wildlife Service, the Minerals Management Service, and, under the Reagan administration, the Office of Management and Budget.

A more serious problem has been the lack of adequate funding. In a period when federal budgets for conservation programs have been slashed again and again, a relative newcomer such as marine sanctuaries suffers disproportionately—there's not much money to cut in the first place. In 1983, Rep. John Breaux (D-La.) attempted to scuttle the program altogether. A coalition of conservation groups, including the Sierra Club, staved off Breaux's attack by working successfully for reauthorization of the act.

Foster attributes some of the program's difficulties to public perceptions. "In the United States, we haven't learned to look at the marine environment in the same ways that we have learned to look at the terrestrial environment," she says. "We probably need to do a better job of explaining why protected waters are important."

According to Miles Croom, manager of the Gulf of the Farallones National Marine Sanctuary (NMS) in Northern California, the purpose of sanctuaries "is to acknowledge formally the special characteristics of these areas and to protect them with federal regulations and the force of law." While limited money provides for little more than day-to-day management and resource protection, some sanctuaries conduct research and have established recreation and interpretive programs for the public.

Those sanctuaries that have been designated represent the incredible diversity of the United States' oceanic frontier. Each of the seven units now in the system is a unique entity with an independent management plan and specific regulations. The designated sanctuaries are:

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- *Channel Islands NMS*—A group of rocky islands and diverse marine habitats, this is the aquatic counterpart of Channel Islands National Park in Southern California.
- *Gulf of the Farallones NMS*—Located 30 miles west of San Francisco, the area boasts 23 species of marine mammals and the largest seabird rookery in the north Pacific outside of Alaska.
- *Looe Key NMS*—Another coral reef area in Florida waters, Looe Key provides outstanding snorkeling and scuba adventures.
- *Fagatele Bay NMS*—Established in 1985, this tropical coral reef in American Samoa is the system's newest sanctuary.

Several "active candidate" sanctuaries are also in various stages of review, including California's Cordell Bank, just north of the San Francisco Bay Area; Flower Garden Banks, the northernmost tropical coral reef in the Gulf of Mexico; and the underwater Norfolk Canyon, off the coast of Virginia.

Some members of Congress are not waiting for Reagan's Commerce Department to initiate protection of significant areas of the ocean. Representative Leon Panetta (D-Calif.) responded to inaction on a local proposal by introducing legislation to establish a Monterey Bay National Marine Sanctuary. California Democratic Reps. Barbara Boxer and Mel Levine have gone even further by proposing that a 200-mile-wide swath along the entire California coast be designated a sanctuary that specifically prohibits oil and gas leasing, nuclear-waste dumping, and toxic-waste burning. The bill, H.R.920, is a direct response to the sweeping offshore-oil-leasing proposals of Interior Secretary Donald Hodel. In Boxer's words, the legislation "plays no games, cuts no deals, and still gets the job done."

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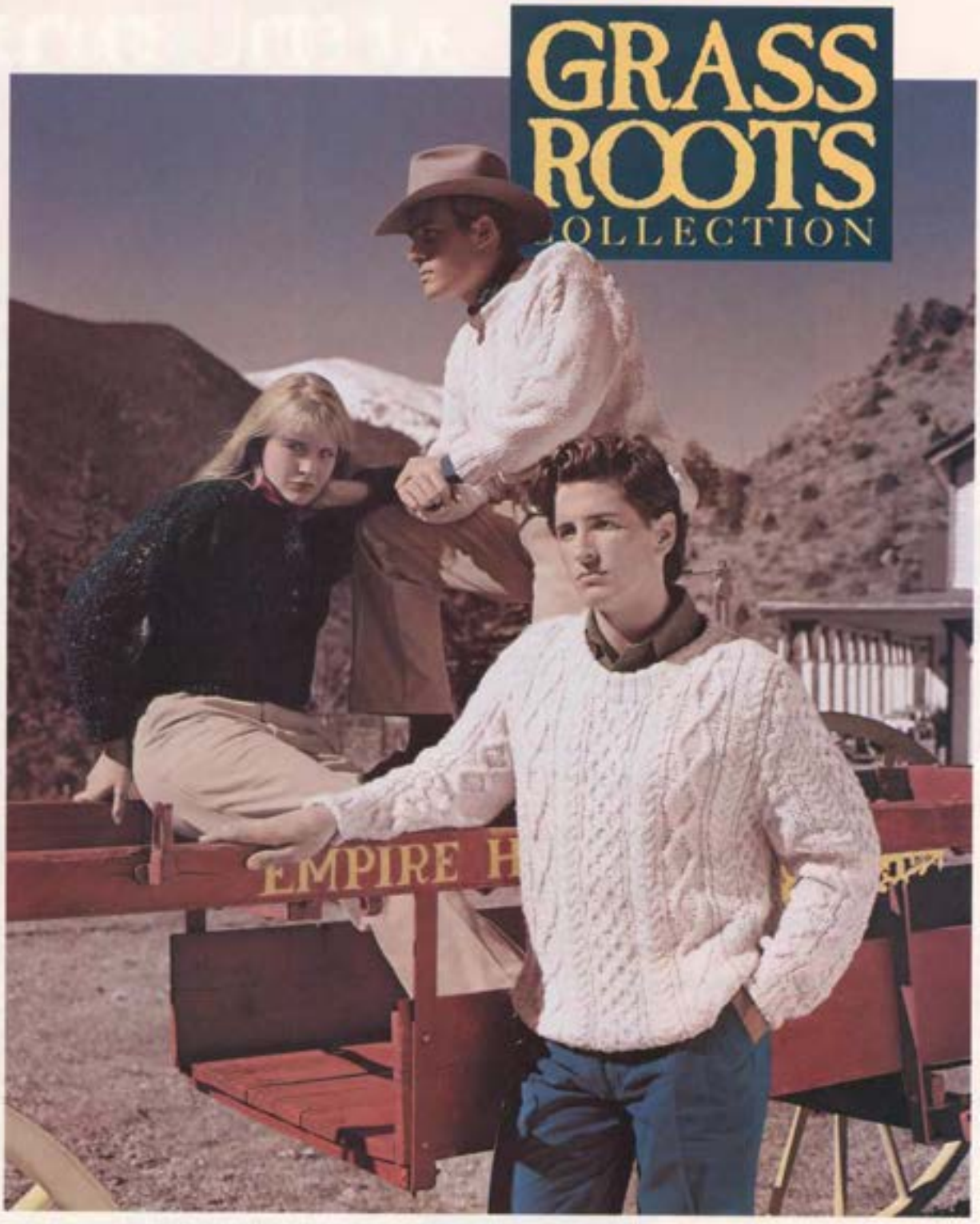

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gram has only narrowly avoided the rocks and shoals of political whims and is often becalmed by bureaucratic indifference, such planning for further protection of the ocean can seem the stuff of mermaids. But as marine biologists and conservationists point out, the future health of our watery planet may well be determined by how seriously we devote ourselves to caring for the seas.

MARK J. PALMER *is the administrator of the Whale Center in Oakland, California, and chair of the Sierra Club Wildlife and Endangered Species Committee. He regularly leads Club cruises in the Gulf of the Farallones National Marine Sanctuary.*

CLEAN AIR

L.A. to E.P.A.: Don't Hold Your Breath

Despite the Clean Air Act's year-end deadline, Los Angeles and many other American cities still suffer from polluted air.

Marla Cone

IT'S A TYPICAL summer day, and a brown haze looms on the horizon. The mountains that ring the city to the north and east are out there somewhere, but you have to squint to see them. To the west, 26 miles offshore, lies Santa Catalina Island, lost in a sky as murky as dirty bathwater. This is a clear day in Los Angeles.

An average of three times a week, many of Southern California's 13 million residents breathe unhealthy air. In the Los Angeles basin, levels of ozone (the primary ingredient in what we call smog) are often three times greater than the nation's health standards allow.

Ten years ago, Congress hoped December 31, 1987, would be a landmark day for Los Angeles and the nation's other smoggy cities. That day is the deadline set by the Clean Air Act for achieving the EPA's health standards. But December 31 will come and go without fanfare—the Los Angeles basin still will violate the ozone standard more than 150 times a year. And 61 other cities, including New York, Houston, and Chicago, will violate the standard up to 30 times a year as well.

In all, 80 million Americans breathe unhealthy concentrations of ozone, a pollutant formed from a mix of fumes emitted by industry and cars. Excessive ozone levels cause loss of lung function, chest pain, coughing, and wheezing, even in healthy individuals. Many cities will also fail to meet the act's December 31 deadline for lowering carbon monoxide, a pollutant, produced largely by motor-vehicle exhaust, that aggravates heart disease.

Why have so many cities failed to meet the requirements of the Clean Air Act, considered one of the nation's most important public-health laws?

California air-quality officials say the act set an unrealistic deadline, especially for Los Angeles. To comply, 80 percent of automobile and industrial emissions in the Los Angeles basin would have to be eliminated.

"Congress had a noble goal ten years

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ago that we can never lose sight of—providing everyone with healthy air," says Jananne Sharpless, chair of the California Air Resources Board, the state's top air-pollution control agency. "We've fallen short of that goal for many reasons. That doesn't mean the visionaries in Congress were wrong—we simply did not yet know the magnitude and complexity of the problem."

Environmentalists agree that L.A.'s smog problem will not be solved for years. "There's no magic wand you can wave," says Mary Nichols, clean-air activist and former chair of the Air Resources Board. "We must squeeze more reductions out of every single source." But Southern California is exceptional, she says. "Most of the other cities are failing to meet the Clean Air Act by a small margin. All but a few will be able to meet the deadline within five years."

Los Angeles is partly a victim of its unusual meteorology and spectacular topography. With its ubiquitous sunshine, which bakes pollutants into ozone, and surrounding mountains that trap fumes beneath an inversion layer, the basin holds smog like a soup bowl. The natural conditions clash with the area's 8 million cars and industry, including a dozen oil refineries.

Despite a population that has mushroomed unabated since the 1950s, the state cut in half its emissions of hydrocarbons—a key ingredient of smog—mainly by forcing automakers to manufacture cleaner cars. But the amount of hydrocarbons released into the Los Angeles basin is still too high.

Now Congress is again trying to come up with a plan to improve the nation's air. Proposed amendments to the Clean Air Act by Rep. Henry Waxman (D-Calif.) and Sen. George Mitchell (D-Maine) would give the country's smoggiest cities a reprieve of up to 15 years. The cities, however, must eliminate more emissions from cars and industry. Under the Waxman bill, smoggy areas such as Los Angeles and Houston would have to require 30 percent of all new cars to run on cleaner alternative fuels like methanol by 1998.

That leaves Congress with a tough question: Should Southern California, which has the most stringent pollution controls in the world, be forced to make

FRANK S. BALTHIS

Smog officials blame fate, Congress squabbles, industry says it's doing its part, and the population swells. Meanwhile, Los Angeles leads the nation in ozone pollution.

them even tougher because its weather, geography, and popularity give it the nation's unhealthiest air?

Environmental Protection Agency Administrator Lee Thomas had hoped to ignore the 1987 deadline for the nation's cities as long as they were making progress toward healthy air. But now he says the Clean Air Act forces him to impose economic sanctions. Thomas announced in June that he would ban major industrial construction in 14 areas nationwide, including Los Angeles and its rapidly growing suburbs. Targeted are new power plants, oil refineries, large aerospace companies, and other businesses that emit more than a hundred tons of pollutants a day.

The moratorium, which could become effective next year, isn't expected to stop any new construction, because most air-quality laws already prohibit major new polluters. But, Thomas says, "Psychologically, I think it has a substantial effect." Politicians and business leaders are concerned that the sanctions will give their cities a bad reputation. "It paints the picture of an area in trouble," says Barbara Sullivan of the Southern California Association of Governments. Civic leaders also worry about the next step Thomas could take: a freeze on federal highway and sewer funds.

Thomas admits that the construction ban probably won't convince Congress to come up with a new smog plan this year. "I see a lot of smoke," Thomas says. "I'm not sure I see a lot of fire."

Ironically, the same criticism has been leveled at Thomas. Sharpless says the tough talk about sanctions is a smokescreen to cover up the EPA's "erratic, disruptive, and unfair" interpretation and enforcement of the Clean Air Act.

"The EPA has been a stopped-up sink for years and has not been providing leadership or developing pollution-control measures," one California air-quality official says. "The problem isn't that the act failed. It's that the EPA failed."

When the 1987 deadline was written into law, "No one knew we'd have an anti-Clean Air Act EPA," says Carl Pope, the Sierra Club's Deputy Conservation Director. Local and state officials have sought technical and legal guidance from the EPA for ten years, but the federal agency has been slow to move.

Nevertheless, California has been lauded as bold and innovative in its regulation of motor vehicles. Even Pope gives the state's Air Resources Board "high marks." But Pope also says Southern California air-pollution-control officials don't deserve high marks for getting tough on industry. He calls it "scandalous" that a state and federal audit showed that 60 percent of industrial expansions were being constructed without the required permits from the South Coast Air Quality Management District, the regional agency that regulates industry in the four-county Los Angeles basin. The Sierra Club has sued the EPA for not cracking down on the district.

If people are committed to breathing healthy air in Southern California, it will take major changes, such as methanol-powered cars, mandatory carpooling, or population controls. Even power lawnmowers may have to be regulated. Nichols says the Los Angeles basin could have clean air in 20 years—at a cost of $400 per family per year. "People would be willing to pay," she says.

Thomas agrees that "hard choices" confront the nation's large cities. "In the Los Angeles area, you're talking about substantially reducing the number of vehicle miles traveled," he says.

Still, Los Angeles may not have healthy air for many years, if ever. And that leaves a lot of unanswered questions for Congress. At the top of the list: Does the American public care enough about its lungs to make lifestyle changes? "For many of these questions, we don't have an easy answer," Thomas says. "Or even a difficult answer." ■

MARLA CONE *is a staff writer for the* Orange County Register *in Santa Ana, California.*

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NATIONAL PARKS

Is Interior Secretary Hodel's proposal an audacious plan to restore a spectacular "lost" valley, or a nefarious scheme designed to divide environmentalists and their political allies?

Undamming Hetch Hetchy

Carl Pope

One Tuesday in August, Sierra Club Chairman Michael McCloskey received an astonishing telephone call from an old law-school classmate. On the line was Interior Secretary Donald Hodel, who has been on the opposite side of most political issues from McCloskey since those days.

"Hello, Mike—this is Don Hodel."

"Hello, Don," said McCloskey, who was frankly surprised by the call—and even more surprised by the time it was over. For during their conversation Hodel laid out an idea that he characterized as brand-new, yet one that from the Sierra Club's perspective was more than 70 years old: the restoration of Yosemite National Park's spectacular Hetch Hetchy Valley.

As most conservationists know, Hetch Hetchy was lost—presumably forever—in 1913, when Congress authorized the construction of O'Shaughnessey Dam to provide water and electrical power to the distant city of San Francisco. Ten years later the 430-foot-tall dam—then as now, the only major hydroelectric facility within a national park—was completed, and the waters of the Tuolumne River backed up to fill the narrow, eight-mile-long valley. The fight to save Hetch Hetchy was the last of John Muir's life, and its loss not only broke his heart but marked the first major defeat for the young Sierra Club, only then beginning to wage its battles on behalf of wilderness in the national arena.

Where had his bold idea come from? McCloskey asked Hodel. The Secretary said it had emerged from some discussions he'd been having with his staff, and that he was serious in proposing it. He told McCloskey that he had already outlined his proposal to Mayor Dianne Feinstein of San Francisco, the city that built O'Shaughnessey Dam and that not only derives its water supply from Hetch Hetchy reservoir but profits from the sale of the electricity the massive dam generates. The conversation concluded with Hodel's indication that an extensive study would be conducted to see if the idea is workable, and how it might be best carried out. It would be an undeniably complex undertaking to tear down O'Shaughnessey Dam, locate alternative sources of water for San Francisco, and possibly compensate the city for lost revenues from the sale of power—but Hodel seemed determined to pursue the idea as far as practicable.

McCloskey hung up wondering why Hodel—whose previous enthusiasms seemed to be reserved for exploitative activities like offshore oil drilling and the leasing of Alaska's Arctic National Wildlife Refuge for oil development—had suddenly turned into a conservationist on this issue. This is one of the two main questions that Hodel's intriguing initiative has raised—the other being, of course, whether the idea is in fact feasible.

No one except the Secretary of the Interior himself can say with certainty what caused him to support the idea of restoring Hetch Hetchy to its original splendor. Certainly the plan marks a sharp divergence from his other policies, which have favored development of the nation's natural resources over their preservation and protection. Some early press reports speculated that Hodel was really promoting the restoration of

Hetch Hetchy as a way of building support for construction of the long-delayed, partially completed Auburn Dam on the American River in the Sierra foothills. There was certainly a basis for this speculation at one time: In a memorandum to Interior Department officials, Hodel suggested that if San Francisco were to require a new water source after the demolition of O'Shaughnessey Dam, Auburn might be it.

As much as anything else, this suggestion reflected Hodel's limited knowledge of the fine-grained complexities of California's water-delivery system. Hodel and his staff have since been made aware that environmentalists flatly oppose Auburn Dam, which would be far too expensive (at $2.1 billion) and environmentally damaging to complete, and in any case is not needed to provide San Francisco with its present level of water deliveries. Also, other cities have prior claim to water rights on the American River, while San Francisco's rights are to water from the Tuolumne River system. Hodel has subsequently withdrawn Auburn Dam as a possible alternative water source. He reportedly vowed at a late-summer meeting with environmental leaders, including the Sierra Club's McCloskey, that Auburn Dam "would not be built as a federal project in [his] lifetime."

Others have theorized that Hodel's proposal was motivated by a desire to split the alliance between conservationists and the Northern California politicians who have traditionally been sympathetic to their concerns. (For example, both groups have been actively opposing Hodel's plans for oil drilling off the California coast.) But this strategy, if such it be, is ill founded: While San Francisco and the Sierra Club have disagreed since 1906 on what to do with Hetch Hetchy Valley, these disagreements are certainly not going to disrupt their shared outrage at the idea of subjecting environmentally sensitive coastal areas to oil drilling and development.

It also has been suggested that Hodel, once James Watt's right-hand man at the Interior Department and a continuing

supporter of his policies, has no desire to suffer a similar political fate. (Watt was drummed out of office by a flood tide of public indignation in 1983.) At the very least, his support for the restoration of Hetch Hetchy gives Hodel a response to use when newspaper editorial boards accuse him of being blindly, compulsively anticonservation.

More charitably, and without diminishing one's outrage at the rest of the Interior Secretary's policies, it must be noted that if Don Hodel were ever going to take a strongly proconservation stance, Hetch Hetchy would be a likely place to plant his feet. After all, his plan is nominally designed to promote the interests of the national parks as recreation resources—and the concept of "parks for people" seems to be one of Hodel's soft spots.

The Secretary has made it clear that the mistakes that have so diminished the grandeur of Yosemite Valley must be avoided at Hetch Hetchy: There will be no lodges, no stores, no automobiles in the restored valley. That will make it possible for millions of people over the course of generations to enjoy Hetch Hetchy and still have a far more tranquil, natural experience than they can enjoy today at Yosemite Valley. And that idea, it appears, holds a very strong appeal for Hodel.

A drumbeat of opposition to the idea of restoring Hetch Hetchy has throbbed steadily in San Francisco's media since Hodel's announcement. "The Secretary's vision is terribly flawed," editorialized the *San Francisco Chronicle*, which went on to brag, in classic booster's rhetoric, that Hetch Hetchy "is a whirring core that produces water, energy, and capital for millions." (As if the dam were one of the wonders of the world, guaranteed to endure for centuries, or as if the generation of revenue for San Francisco were the legitimate function of a national park!)

For her part, Mayor Feinstein seems to want to strangle the very notion in its crib: "Crazy," "the height of folly," and "the worst idea . . . since the sale of weapons to the Ayatollah" are among

her public characterizations of the proposal. She has even called O'Shaughnessey Dam "beautiful" and the water it delivers to San Francisco the city's "birthright."

There are, of course, complexities that will have to be addressed, both in theory and in practice, before progress can be made toward realizing Hodel's plan. Critics of the plan often refer to the difficulty of replacing San Francisco's "lost" water supply. How, ask the local media, would San Francisco and the other cities to which it sells Hetch Hetchy water meet their needs?

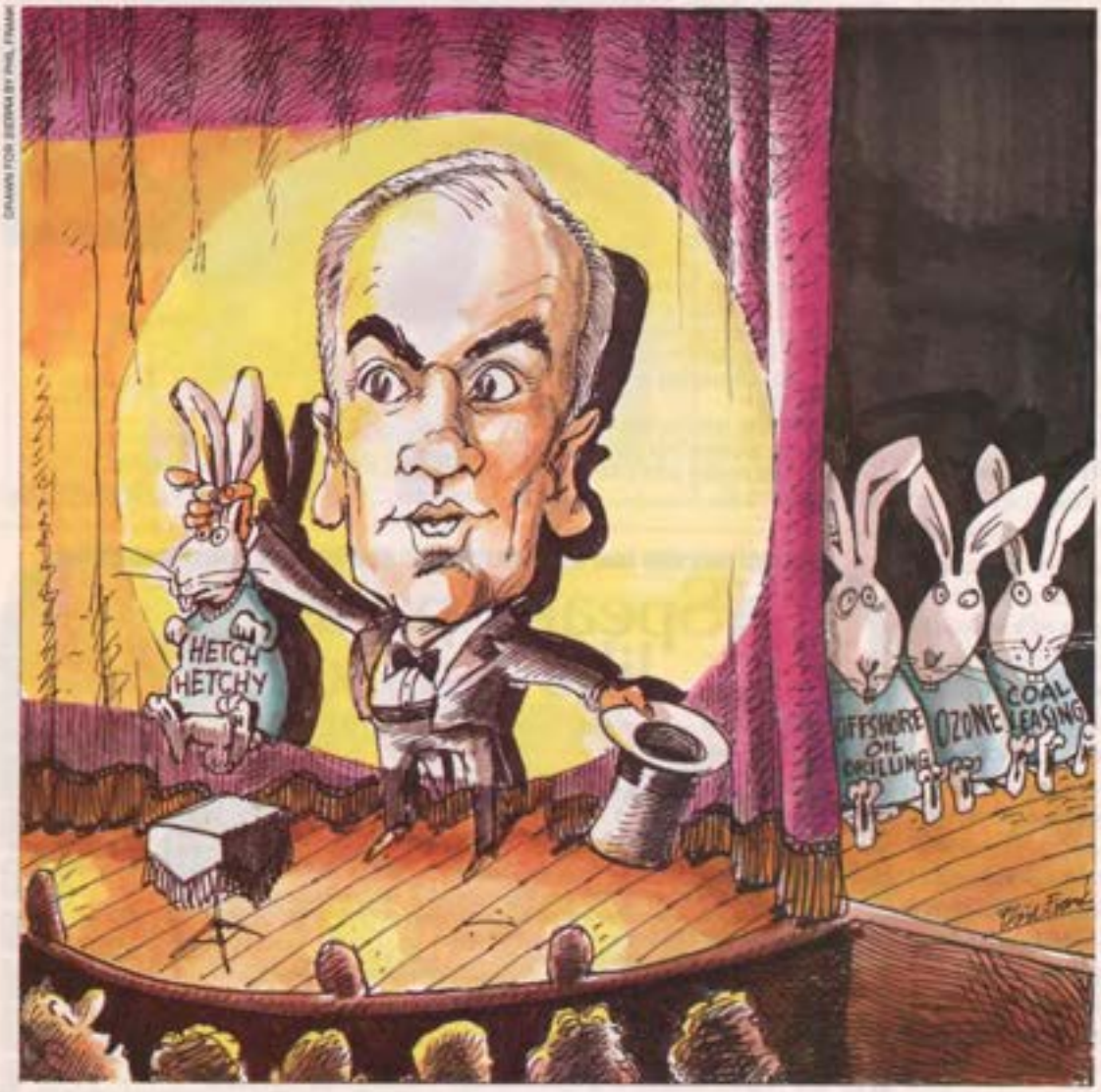
The answer to that question is surprisingly simple: San Francisco would get its water from the same river it currently taps—the Tuolumne. Removing O'Shaughnessey Dam at Hetch Hetchy will not cause San Francisco to lose the water it now uses; the city will simply lose one of the many places where this water can be stored. (As David Brower has often said, you don't lose a drop of water when you tear down a dam. Rain and snow continue to fall on the watershed; all you lose is one place where the water stops, and where part of it evaporates.) There are other reservoirs on the Tuolumne system where it appears San Francisco can easily store the water that floods Hetch Hetchy today. In fact, the Tuolumne has more excess reservoir capacity than almost any other river in California.

Electrical power is a more difficult issue. With O'Shaughnessey Dam demolished, San Francisco would lose about half the power it generates on the Tuolumne. (About half comes from dams on the river that would not have to be touched in order for Hetch Hetchy to be restored.) Although there is enough surplus electrical-generating capacity in the region to replace this lost power, the city would lose the net revenue it derives from the sale of this power to other municipalities. (That sum—nearly $50 million in 1986—is expected to be reduced by half this year because of California's dry winter.) One may well ask why San Francisco's general fund should be enriched by a dam in a na-

tional park. Unfortunately, that question was answered by Congress in 1913 when it passed the Raker Act, which authorized the city to construct a dam at Hetch Hetchy. It will not be easy to work out the arrangements that will convince San Francisco to give up this jealously guarded source of revenue.

for restoring Hetch Hetchy, and then to develop the means whereby that restoration may be financed.

The physical restoration of Hetch Hetchy Valley after it has been drained raises questions of its own. Some observers have speculated that the valley might be so damaged by silt that it would be decades, even centuries, before it could reattain the grandeur that visitors would seek. However, Alexander Horne, a professor of applied ecology at the University of California at Berkeley, believes that siltation will not present an insuperable problem, and that people could begin to visit the restored Hetch Hetchy Valley within two or three years.



The power issue exemplifies one aspect of the thorniest problem of all: money. No one knows exactly how much the restoration of Hetch Hetchy Valley will cost, although San Francisco's immediate estimate of $6 billion is almost certainly excessive. In fact, the main purpose of the feasibility study that Hodel has proposed should be to identify the most cost-effective method

A second objection raised by opponents of the reclamation proposal is that Hodel's noble intention to reduce congestion in overcrowded Yosemite Valley will be frustrated by a lack of sufficient flat land in Hetch Hetchy Valley. But this misses the point. True, there may not be enough flat land at Hetch Hetchy for banks, liquor stores, and hotel parking lots. But the fact that Hetch Hetchy is much narrower than Yosemite Valley, yet almost as long, means that the visitor's experience will be even more intense there, and that there would be even less justification for allowing motorized vehicles to enter the valley. Hetch Hetchy reclaimed can be Yosemite Valley as that treasure should have been allowed to remain.

It is important to understand that the restoration of Hetch Hetchy will be a long-term project. The Department of the Interior's study process will include the Sierra Club and other interested parties (among them the city of San Francisco). Such a study will determine the cost of restoring Hetch Hetchy; then the slow process of building public support for a specific plan will begin.

The first debate over Hetch Hetchy took a decade and mobilized public opinion across the country. The second debate may take even longer—but it has at least begun. ■

CARL POPE *is the Sierra Club's Deputy Director of Conservation.*

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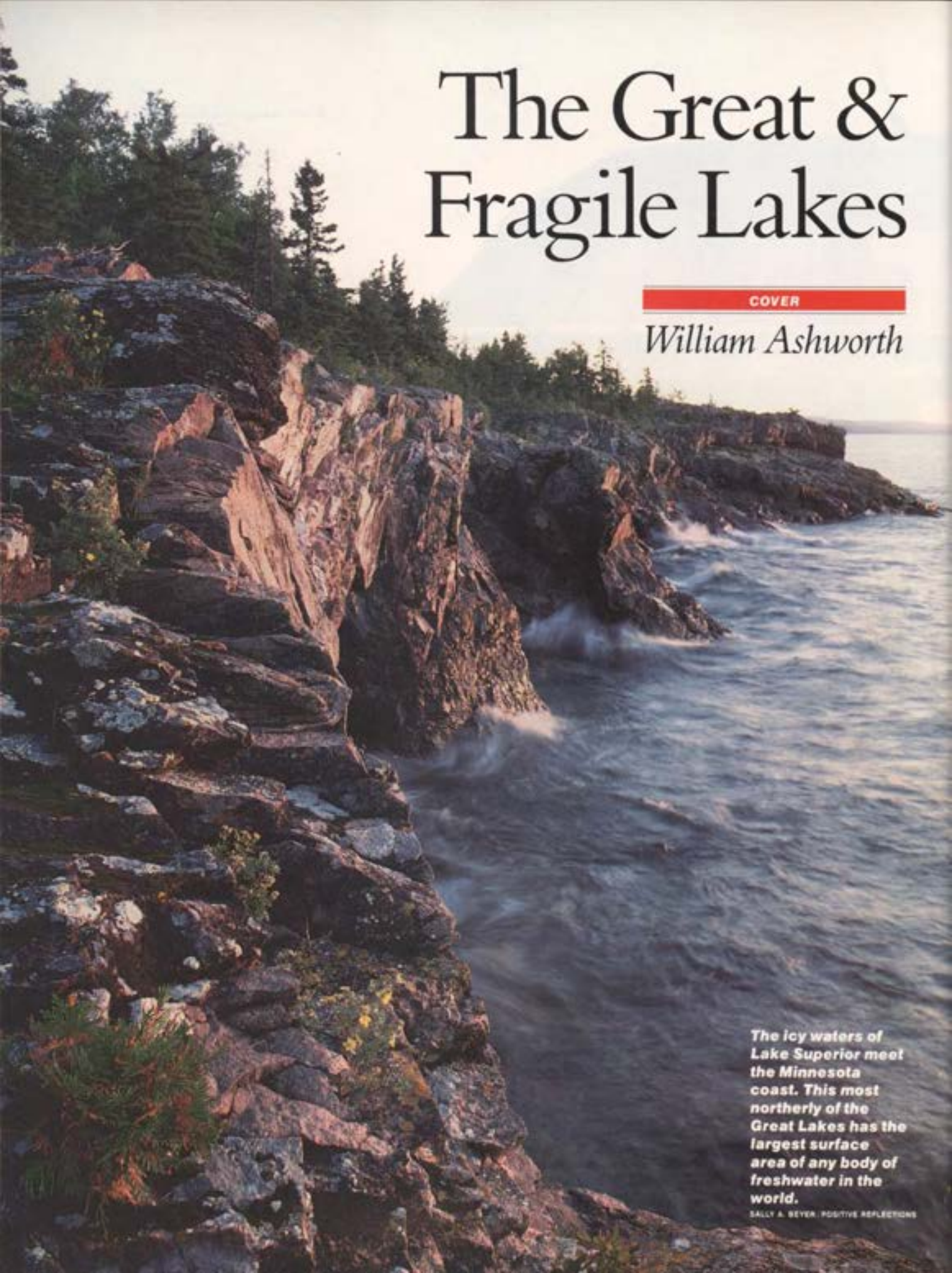

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SALLY A. BEYER / POSITIVE REFLECTIONS

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A moose surveys its territory, Isle Royale National Park in northern Lake Superior. Though peaceful, these remote wilderness waters are troubled by toxic precipitation.

EPA-MASTERFILE

Halting the discharge of untreated sewage (above) brought Lake Erie back from the grave, but it is more difficult to keep the industrial waters of Gary, Indiana (right), from fouling Lake Michigan.

appearance that as Jean Nicolet approached the opposite shore, he put on a red mandarin's robe in order to be properly garbed to greet those whom he confidently assumed would be the Chinese. He was met instead by a group of astonished Winnebago Indians.

The French explorer's miscalculation and sartorial faux pas are easily forgiven. Sometimes called a river of inland seas, the five lakes cover 95,000 square miles. Within their 10,500-mile coastline they hold 5,455 cubic miles of freshwater, slightly more than 20 percent of the world's supply, and approximately 95 percent of that available to the United States.

The Great Lakes are among the youngest features of the North American continent. Born at the close of the last ice age, they occupy basins scooped out by a continental glacier. Lake Erie, the oldest, has existed for only 12,000 years. The three youngest, Michigan, Huron, and Superior, did not take their present shape until 2,000 years ago. The land itself is also rising since being freed of the billion-ton mass of ice. Elevation data here must be given in years as well as feet above sea level: The north shore of Lake Superior is nearly two feet higher today than it was in 1900.

Extreme youth and enormous scale combine to make this a region of spectacular and unforgettable beauty. Polished rock faces, conifer forests, and waterfalls give it the look and feel of the high mountains; sand dunes, surf, and the seemingly endless waters give it the look and feel of the sea.

Despite their enormity, the Lakes are delicate organisms. Their food webs are short, simple, and easily disrupted, and their cold, clear waters are poorly buffered against pollution. The Lakes have an extraordinarily long residence time (the time it takes for a drop of water entering a lake to leave it again through the outlet stream)—two years for Lake Erie, nearly 200 years for Lake Superior, and almost 500 years for the system as a whole. This means that pollutants, once present, do not easily go away; locked into the Lakes, they develop their own life cycles.

If Nicolet were to return today, his silk robes would still billow in the fresh winds on the dunes above Lake Michi-

ROBERT PERRON

gan. Blue waves would break in the wild surf below him, gulls would cry in protest of his presence, and try as he might, even with the tightest squint, he would not be able to see the far shore. But on the south shore of Lake Michigan he would be greeted by a sprawling, stinking conglomeration of steel plants, refineries, waste lagoons, pipes, rails, stacks, and flames roaring out of the bellies of rusting monsters—an otherworldly scene that gives even the most enthusiastic industrialist a shiver.

The sweetwater seas viewed by the early explorers are still awesome, but within this vast reserve no area is totally free of pollution, and parts of the Lakes rank among the most heavily polluted waters on Earth. More than 900 known or suspected toxic substances have been found in their waters, which have been characterized by one government official as "the world's largest sewer." One river flowing into Lake Michigan is more than 90 percent industrial waste, and another flowing into Lake Erie is so heavily covered with oil and grease that the computers aboard the Landsat mapping satellite cannot recognize it as water.

In some places the degradation is blatant; in others it is apparent only to scientists. The floors of most of the Great Lakes harbors and shipping channels are laden with PCBs, phenols, and heavy metals. The Niagara River is bordered by so many leaking toxic-waste dumps (roughly 200 at last count, including the infamous Love Canal) that the mist from the famous falls has recently been fingered as a chief contributor to the surrounding region's elevated rate of cancer.

But after years of apathy, confusion, and finger-pointing, citizens and governments have come together to halt the demise of the Lakes. Old agreements have been given new life, and Congress has taken a stand. Everyone agrees that there is no single solution, and the fight is taking place on many fronts.

Perhaps the most encouraging development is the formation of Great Lakes United (GLU), a coalition established in 1982 under the prodding of Michigan United Conservation Clubs and several other organizations. Bringing together more than 200 environmental, sports-

men's, civic, and religious groups from throughout the binational Great Lakes region, GLU is the first successful basin-wide citizen organization working on Lakes issues. "It's an exciting time," says Sierra Club Midwest Representative Jane Elder. "Great Lakes United is taking off, Congress is beginning to assume some responsibility for the Lakes, and cooperation among the agencies and the citizen groups is way up. We're ready to do what needs to be done."

JOE TRAVER / GANNA LIAISON

In 1978 dioxin drove most residents out of Love Canal, New York; it is a virtual ghost town ten years later. The crisis prompted a renewed effort to coordinate cleanup of the Great Lakes Basin.

Concern for the environment of the Great Lakes dates back to well before the turn of the century. As early as 1872 sawmill wastes were suspected of causing a decline in Lake Michigan fisheries. But it was not until 1909, with the signing of the Boundary Waters Treaty between the United States and Canada, that the first serious steps were taken toward establishing a legal framework for Great Lakes protection. Providing that their waters "shall not be polluted on either side to the injury of health or property on the other," the treaty established a quasi-judicial oversight body, the International Joint Commission (IJC), and set up a process for making recommendations, known as "references," to it.

The IJC was formally convened in 1911. The first reference regarding Great Lakes pollution came in 1912 and resulted in a report six years later that summed up the situation as "generally chaotic, everywhere perilous, and in some cases disgraceful." Nevertheless, no action was taken.

Nor did anything happen when a second reference, in 1946, led to a 1954 report charging that pollution in the connecting channels between the Lakes was causing "substantial" injury to health and property. Most people still felt the Lakes were too huge to hurt. That attitude was profoundly shaken in the early 1960s by widespread reports of the death of Lake Erie.

In retrospect, the word "death" is perhaps a little strong. Lake Erie was actually choking from a lack of oxygen. Inadequately treated sewage from Detroit, Buffalo, Cleveland, and Toledo had fertilized the lake beyond capacity. Algae thrived on a glutton's feast of phosphorus and other nutrients. When the algae died, their decomposition consumed what little oxygen the lake had to give. Millions of dying fish, mountains of detergent foam on Erie's beaches and at the base of Niagara Falls, and hundreds of miles of floating algae mats signaled the failure of the IJC's early efforts.

In 1972 the United States and Canada adopted the first Great Lakes Water Quality Agreement (GLWQA). But even as it was being signed, experts recognized the agreement as seriously flawed. The accord focused almost exclusively on conventional pollution, the visible household sewage and organic nutrients known colloquially as "lumps and colors." Worse, the GLWQA addressed only point sources (industrial and sewage-system outfalls), although it was becoming increasingly obvious that conventional pollution and point sources were not the only problems, or even necessarily the worst. The focus of pollution control was shifting to micro-contaminants—PCBs, DDT, dioxin, and other chemicals—small amounts of which can cause cancer or birth defects. And the pathways these chemicals took into the water were not always through sewage outfalls. The runoff from farm fields and urban streets carried many of them, leaking toxic-waste dumps contributed more, and a surprisingly large amount (in the case of Lake Superior, perhaps as much as 90 percent) floated in on air currents.

Negotiations to broaden the agreement coincided with a series of toxic shocks to the Great Lakes region. In 1976 Lake Ontario was closed to both sport and commercial fishing because of pesticide contamination. Then the nightmare of Love Canal hit the national press. Six months later, in 1978, the revised Great Lakes Water Quality Agreement was signed.

The 1978 agreement is perhaps the first diplomatic document to incorporate modern ecological principles into its goals. Adopting an "ecosystem approach," it states that "restoration and enhancement of the boundary waters cannot be achieved independently of other parts of the Great Lakes Basin Ecosystem with which these waters interact." The agreement also calls for the "virtual elimination" of persistent toxic substances and recognizes a number of sources of pollution that are often overlooked. These include road salting, improper agricultural practices and municipal land-use planning, contaminated river and harbor sludge, and waste-heat discharge. The revised version of the document states emphatically: "Flow augmentation shall not be considered as a substitute for adequate treatment to meet water quality standards or other regulatory requirements." Period. Pol-

lution dilution is not a solution.

Behind the scenes, the goals laid out in this agreement continue to set the Great Lakes activists' agenda. "Where else have two powerful nations pledged to virtually eliminate toxic pollution and manage an expansive resource as an ecosystem?" asks the Sierra Club's Elder. It was a landmark agreement then, and remains so, but it had one central flaw: Neither nation was required to enforce it, and neither has.

Both Canada and the United States have made some effort to comply with the GLWQA, particularly in controlling conventional pollution. Sewage-treatment facilities are greatly improved, and a reduction of phosphate pollution has made a dramatic difference at Lake Erie. But the countries' overall compliance record has been dismal. In 1981, for example—three years after the agreement was signed—the Reagan administration declared that "we know all we need to know" about the Great Lakes. It then disbanded the Great Lakes Basin Commission and attempted to eliminate all funding for Great Lakes research from the federal budget.

In the years since the agreement was signed, new and ominous signs of pollution in the Great Lakes have surfaced. A high proportion of fish from throughout the system exhibit tumors and fin rot. Autopsies performed on beluga whales found dead off the mouth of the St. Lawrence River have revealed excessive levels of toxic compounds in the whales' tissues. State health advisories warn women of childbearing years, children, and, in some cases, all people against eating some 20 species of Great Lakes fish. In 1987, for the first time, even Lake Superior fish made the advisory lists.

Meanwhile, the Army Corps of Engineers still permits contaminated dredge-spoil from harbors to be deposited in the centers of the Lakes. State "clean water" discharge permits continue to allow dumping of toxic substances directly into waterways, and some states have backed away from the principle of zero discharge. In Waukegan, Illinois, where the floor of the harbor is literally half PCBs, cleanup efforts

A DOUBLE DOSE OF DANGER FOR THE LAKES

The people of the Great Lakes region have sufficient cause for alarm: toxic chemicals spewing from municipal and industrial sources, leaking hazardous-waste landfills, pesticides washing downstream, even the stirring up of poisons long since settled on the floors of the lakes. As if that weren't enough, experts have added something new to the worry list. Evidence suggests that airborne toxic chemicals play a significant role in Great Lakes pollution. In fact, more than 50 percent of the toxic pollution in the three upper lakes arrives with the wind.

Toxic air pollutants became a concern in the region in 1975, when PCBs were discovered in a small lake on Lake Superior's isolated Isle Royale. Toxic fallout appeared to be the only possible source for the contamination of this wilderness preserve. Five years later, all doubt was removed: Toxaphene, a pesticide used only in the South and the Northern Plains states, was found on the same island and in fish throughout the Lakes.

Nationwide, billions of pounds of toxic substances enter the air each year from myriad sources, including chemical plants, municipal incinerators, landfills, sewage-treatment plants, power plants, dry cleaners, cars and trucks, and agriculture. Because of their huge surface area, the Great Lakes are an exceptional sink for this toxic fallout.

Residents of the Great Lakes basin receive a double dose of toxic chemicals. They not only inhale toxic particles and gases but also eat fish tainted with PCBs, pesticides, and heavy metals. A 1985 study found the people of the region to be receiving a higher exposure to toxic chemicals than any comparable population in North America. Even at low concentrations these substances can cause cancer, reproductive disorders, birth defects, neurological disorders, and respiratory ailments.

Researchers in the Great Lakes basin have warned the world of environmental hazards in the past; the relationship between reproductive failure in birds and the use of DDT was first recorded in the area. Unfortunately for the people and wildlife of the Great Lakes region, the ecosystem is also becoming a proving ground for the hazards of toxic air pollution.

—Melanie Griffin

JOHN DEVRIES/MASTERFILE

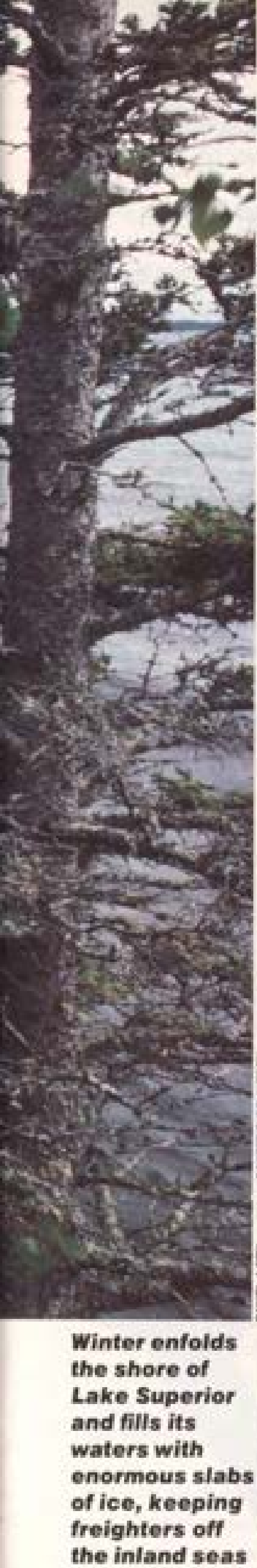
The Great Lakes watershed was once a logger's heaven. Today the emissions from pulp and paper mills invade the region.

Lake Superior's wilder shore: a backpacker reaches the end of the trail in Ontario's Sibley Provincial Park.

At the Soo Locks, boats rise 20 feet as they pass through the three canals and five locks between Lake Huron and Lake Superior.

JOHN & ANN MEVIN PHOTOS

Abnormally high water levels over the past few years have increased shoreline erosion, especially along Lake Michigan. Rejecting land-use controls, some coastal property owners are demanding that water be drained from the Lakes.



At Indiana Dunes National Lakeshore, tourists and technology vie for space on the Lake Michigan beach.

Far left: Cedar Point Amusement Park near Sandusky, Ohio, draws people to Lake Erie.

No honeymoon: drums of toxic waste in the town of Niagara Falls, New York. Officials from Ontario and New York are trying to clean up several such dumps along the Niagara River.

Winter enfolds the shore of Lake Superior and fills its waters with enormous slabs of ice, keeping freighters off the inland seas three months each year.

have been stalled for more than ten years. Approximately a hundred Superfund sites lie within the watershed.

By the summer of 1986, Great Lakes United had grown tired of waiting for government action. The coalition held its own set of hearings on progress under the GLWQA, traveling to 19 sites around the Lakes and on the upper St. Lawrence River. Representatives of the group heard testimony from 382 witnesses, including agency personnel, members of Congress and of the Canadian Parliament, municipal, state, and provincial officials, and private citizens. The coalition's report, "Unfulfilled Promises: A Citizens' Review of the International Great Lakes Water Quality Agreement," makes no attempt to water down the problem.

"Despite progress," write coauthors John Jackson and Tim Eder, "the promises of the GLWQA are largely unfulfilled. . . . Plumes of black contaminants still reach out into the Lakes. Large cities still dump sewage that has only received primary treatment. Industrial smokestacks still belch contaminants into the air. Old dump sites continue to leak dioxins, PCBs, and numerous other insidiously destructive chemicals into rivers and lakes. Agricultural runoff continues to release massive quantities of pesticides and phosphorus-laden fertilizers into the Basin's waters. Dredging operations still pour toxic sediments into open waters. Every day hundreds of trucks still dump contaminated fill into the Lakes."

Most witnesses at the hearings agreed with this sorry assessment. "Love Canal was only a warning," one speaker remarked gloomily.

The governors of the eight states and the leaders of the two Canadian provinces bordering the Great Lakes region were tired of waiting too. In the summer of 1986 they signed the Council of Great Lakes Governors' Toxics Substances Control Agreement. The accord pledges a uniform set of standards for industrial and municipal effluents as well as for fish-consumption advisories. It also standardizes permit procedures for siting potentially polluting industries.

But diplomacy and agreements are not action. At the Great Lakes United annual meeting in Niagara Falls, Ontario, in May 1987, a representative of the Michigan governor's office described in glowing terms the progress that had been made under the Toxics Agreement. She cited new standards, increased communication and cooperation among the state and provincial governments, and heightened commitment of the various states to Great Lakes issues. Afterward, a United Auto Workers representative from Cleveland asked a single question: "Does this mean that there are fewer toxics in the Lakes this year than last?" The somewhat startled answer: "Why, no."

At long last, other powerful voices have joined the fight to save the Great Lakes. The region's politicians have begun to recognize the extent of popular support for protecting this resource, and their actions are bolder. In January 1987 Congress overrode President Reagan's veto of the Clean Water Act, which contained a series of amendments relevant to the Lakes. The act centralizes federal management authority for the entire U.S. side of the Great Lakes Basin in the EPA's Great Lakes National Program Office (an office that the Reagan administration had earlier sought to eliminate).

In passing the Clean Water Act, the federal government agreed for the first time to comply with the goals of the GLWQA. The amendments also require the EPA to create a basinwide Toxics Monitoring and Surveillance Network and to call for a five-year demonstration program in nutrient reduction and toxics cleanup. The latter was directed at five specific toxic "hot spots" on the U.S. side of the Lakes.

"Finally, the Clean Water Act gives more than a token gesture to the Great Lakes," says the Sierra Club's Elder. "The way we read the language, the goals of the Water Quality Agreement are U.S. policy. We plan to see those goals realized."

Environmental Protection Agency officials are less clear about just what the Clean Water Act requires for compliance with the agreement, but concur that "it gives us more punch," according to Bob Beltran of the agency's Great Lakes National Program Office. "The reorganization gives us four staff teams instead of three, and with the adoption of the standards from the GLWQA we now have something we can bludgeon the states with."

But Sierra Club Great Lakes Committee Cochair Sam Sage counters: "There are still not enough people to enforce the Water Quality Agreement. There are 18 toxic hot spots on the U.S. side alone in urgent need of attention. Cleanup will require the same sort of technical expertise and support as Superfund, but right now there's no one out in the field doing the job."

Nevertheless, the spirits of environmental activists around the Lakes have never been higher. Due in part to their efforts, Congress is considering new legislation to control a wide range of toxic air pollutants, a move that would greatly reduce additional contamination of the Lakes. States with weak permit programs are coming under heavy scrutiny by citizen groups and the EPA alike.

Indeed, the citizens of the Great Lakes area are organizing and pushing for action, not just promises. Great Lakes United's membership continues to grow. The Sierra Club and the National Wildlife Federation have added Great Lakes experts to their staffs in the region, and the Audubon Society is planning to open a Great Lakes office in 1988. From Toronto's Pollution Probe to the Lake Michigan Federation to a new Lake Superior Coalition, regional and state organizations have developed their savvy and clout on Lakes issues. The Great Lakes citizens' movement is growing from a handful of weary generalists to an increasingly sophisticated and energized collection of knowledgeable and experienced specialists.

"There's a new feeling in the Great Lakes Basin," says Karen Gottlieb of Michigan's Office of the Great Lakes. "It's changed the way governments are doing business."

No one is so naive as to think that the health advisories cautioning "Don't Eat the Fish" will disappear soon. But neither need the warnings be an everlasting fact of life, as more and more people rise to the challenge written on the T-shirts of the Lakes' citizen protectors: "Keep 'em Great." ■

WILLIAM ASHWORTH *is the author of* The Late, Great Lakes *(Alfred A. Knopf, 1986).*

Yurts!

Modern incarnations of tents time-tested by Mongolian nomads add comfort to winter camping without scarring the landscape.

ERIC HERMANN

SCOTT T. SMITH PHOTOS

Skiers arrive at one of Powder Ridge Ski Touring's two yurts near the Mt. Naomi Wilderness in northern Utah's Bear River Range. The shovel they bring with them could help dig out the shelter after a heavy snowfall—so storing it in the yurt won't do.

Gear hangs everywhere in a yurt's spacious interior. Yurts are usually eight to thirteen feet high at the center, depending on their diameters.

At night a gas lantern illuminates the yurt's translucent skin. A skylight provides a view of the heavens and lets in sunlight during the day. A woodstove, vented through the roof, efficiently heats the yurt's circular space.

Eight tired but contented skiers sprawl in a forest clearing drenched by the afternoon sun, absorbing a panorama of powder-covered slopes and silent forest valleys. We've just covered five miles on this first day of a five-day trek into Idaho's Big Hole Mountains. On our last mile we climbed a thousand feet, so we were eager to drop our day packs—and ourselves—to the snow for a long and well-deserved rest.

Light packs and leisurely rests while winter camping? We should be pitching tents or digging caves, setting up stoves, and attempting to dry damp clothing in the cold air. But our shelter, managed by Teton Mountain Touring of Driggs, Idaho, is waiting for us. Inside, its crackling woodstove warms cold bodies, dries wet mittens, and melts snow for drinking. A gas lantern, a complete set of utensils, and benches round out the creature comforts.

Our winter retreat is a yurt—a round tent 16 feet in diameter and 12 feet high made of heavy canvas stretched over a chest-high wall of wood lattice and a conical roof supported by wood rafters. For centuries yurts have sheltered Mongolian nomads, who designed them to be roomy, warm, and portable. Today increasing numbers of modern nomads—backcountry skiers—are discovering the yurt's advantages over a backpacking tent. Besides offering a spaciousness unexpected in the wintry backcountry, these shelters are practical. They can withstand high winds and two- to three-foot-deep snows.

Best of all, yurts do minimal damage to the environment. When ski tracks melt in the spring the structures can be removed, leaving behind a relatively inconspicuous wooden platform. "Yurts are ideal for remote placement," says yurt-maker and outfitter Kirk Bachman of Sawtooth Outback in Stanley, Idaho. "They approach the security of permanent structures, yet they're portable."

Yurts are visually less objectionable than permanent structures as well. Instead of a one- or two-story cabin, we found only a white, skylight-topped cone—the yurt's upper section—protruding four feet above a snowdrift. Indeed, had we not seen our guide's ski pole planted as a flag in the snow, we might have missed the yurt altogether.

Steps carved in the snow lead into the congenial cave. A narrow table juts out from behind the stove, slicing a kitchen out of the circular room, while benches line the circumference. (Some yurts even have bunk beds.) The focal point, however, is the radiant and comforting woodstove, a practical feature so painfully absent from winter campers' tents.

The yurt's spaciousness and well-stocked kitchen allow us an impressive degree of decadence. After an oyster appetizer we feast on coq au vin, followed by an ice cream specialty made from snow, condensed milk, vanilla, and fruit. Later, a new set of terms applies to familiar objects: the table becomes a bar, the benches become beds, and a shovelful of snow becomes a faucet.

On our second morning, we ski three miles to Teton's second yurt at Elk Flat. Here we spend two nights and days taking ski lessons from our guide, resting, and playing in the snow. We test our new skills on an untracked powder run dubbed Broadway. We ski off a cornice, shout praises for well-carved turns, and scream with laughter at our compatriots' ungainly face-plants. Our guide, Glenn Vitucci, rises off the cornice like a falcon and lands on ice like a duck on water. One of his skis breaks loose, but he schusses after it on the other, leaps, and retrieves the runaway. Around the woodstove that night we sip Irish whiskey and recount Glenn's adventure in an off-key parody of "On Broadway."

Yurts enable skiers to escape crowded trails near popular day-use areas and immerse themselves in winter wilderness. Instead of wasting part of the morning packing cars and driving to trailheads, yurt skiers can hit the snow early. They

JIM WELCH

After breakfast, yurt skiers (left) take off into the wilds unencumbered by large packs. Below, a Boundary Country Trekking group sits down to Mongolian fire-pot stew prepared in a yurt's well-stocked kitchen.

MINNESOTA OFFICE OF TOURISM

BELOW: BETTY POLLOCK

JIM WELCH

Yurts don't mar a wilderness view the way a permanent structure does, but they can be hard to find after a storm. Their conical roofs shed snow well and are sturdy enought to support two- to three-foot-deep loads.

Yurts were first field-tested hundreds of years ago in the severe weather extremes of the central Asian steppes, where winds often reach 90 miles per hour. Their round walls eked maximum living space from a limited supply of wood and animal skins.

can cover territory far from the trailhead and carve turns in the trackless powder of undiscovered bowls. And instead of late-afternoon dashes to trailhead parking lots, yurt skiers can enjoy quiet sunsets from their isolated but well-equipped winter home.

Our outfitter's three yurts are just three to five miles apart—short distances for hiking, but well suited to serve as base camps for extensive backcountry skiing. The company runs tours for skiers of all abilities. On some the guides simply accompany the skiers, while on "grand tours" they cook all meals and carry all food and group gear.

Most outfitters insist that their guides accompany skiers—a proviso that will bother experienced backcountry skiers who are adept at finding their way in snow. For most skiers, however, a guide fee—about $100 per group per day—is worth the expense. Professional guides can lead a group to a yurt even when it's buried deep in fresh snow. They can direct skiers to the best skiable terrain, are trained in wilderness first aid, and are usually good coaches. When we planned the Big Hole trip, we resented the guide requirement at first, explaining to the outfitter that we were experienced skiers with plenty of hut tours and winter camping trips behind us. But skiing with a guide for five days was a pleasure. (Some outfitters allow skiers who have completed one of its courses to schedule later trips without a guide.)

While yurts are not as plush as permanent cabins, they weather bureaucratic storms better. Like most backcountry yurt companies in the United States, Teton Mountain Touring operates under a U.S. Forest Service permit. While specific policies vary from one forest to another, new permits for permanent structures are rarely issued. The Forest Service and a smattering of state forest agencies, which oversee the bulk of backcountry skiing terrain in the U.S., are usually more willing to approve seasonal structures such as yurts.

Targhee National Forest officials give Teton Mountain Touring good marks for its minimal impact. Rangers review the yurt sites each summer and have found little or no wear on the environment. According to Keith Birch, the forest's public-information officer, "The yurts have less impact than fall hunting camps, especially camps that use horses." Because yurts are winter dwellings, snow protects the surrounding forest floor. Outfitters usually locate yurts near areas of dead timber for firewood, which is chopped and stacked before winter's onset. Pit toilets are carefully covered with soil and relocated each winter.

About a dozen outfitters, most centered in the Rockies, organize yurt-to-yurt ski tours. Never Summer Nordic, based in Fort Collins, Colorado, operates three yurts in Colorado State Forest that are allowed to stay up year-round, and Idaho's Sun Valley Trekking builds its yurt trips around gourmet meals. To the east, Minnesota's Boundary Country Trekking operates yurt tours in the Gunflint Trail System. Interest in the tents is spreading, according to yurt-maker Bachman. He has sent yurts to Minnesota, Utah, Wyoming, Washington, Colorado, and British Columbia.

While yurt-touring is easier than winter camping, the yurt skier must follow the same precautions as the expedition skier. On a multiday trip, skiers cannot scramble back to the car if an emergency arises. This means each skier should always carry warm clothes, waterproof matches, rations, and a map and compass. Replacement ski tips, ski-pole baskets, and binding parts are also essential, and a pot for melting snow for drinking water can help prevent dehydration.

On the trail, groups should never split up in unfamiliar terrain, and new routes should be attempted only with caution. Skiers should be familiar with elementary first aid and avalanche safety, and at least one group member should be trained in mountaineering first aid. Many outfitters recommend, and some require, that skiers carry avalanche transceivers—electronic beepers that pinpoint an avalanche victim's location. Each group should have a shovel to dig out the yurt after a heavy snowfall, build snow caves, find buried skiers, and deliver snow for water.

While yurt skiers aren't burdened by heavy packs, they usually carry a larger load than a day tourer when skiing from one yurt to another. Consequently, climbs become more strenuous and descents more dangerous. The pack itself should have an internal frame. A frameless pack will not provide enough support for the load, and an external-frame pack will impede arm and leg movement. External-frame packs also tend to make a skier top-heavy and can injure the neck or head in a fall.

Because of the woodstove's warmth, sleeping bags comfortable to five degrees Fahrenheit are usually sufficient. Foam sleeping pads are necessary unless the outfitter's yurts provide pads or mattresses. Yurt trekkers can indulge in luxuries such as down booties and extra clothing. If the outfitter doesn't provide the food, group members can arrange menus easily: Most yurt kitchens are equipped with a full complement of pots, pans, and utensils that encourage lavish multi-course meals.

Yurt excursions take careful planning, however. Most important, skiers must consider their individual abilities. If members' skills vary, short loop trips are best; the yurts become base camps enabling skiers to take off on day excursions that match their talents. If all members ski together well, they can attempt longer and more strenuous expeditions. Most organized yurt trips expect each group member to ski at an intermediate level; few limit enrollment to super-skiers only.

"There's a lot of trepidation, a feeling that hut skiing is only for hard-core skiers," says Bob Jonas of Sun Valley Trekking. "But anyone who can backpack can ski tour."

We spend the fourth and last night of our Big Hole tour nestled in a yurt overlooking Pine Creek. We while away the evening in front of the fire playing charades, sipping brandy, and musing about backcountry skiing, luxuriating in the comfort of a low-impact yurt and the security of a good guide. Tomorrow, three final miles will lead us to the trail's end, where we'll meet the truck that will shuttle us back to our cars. We'll have outdone the adage, "Take only pictures, leave only footprints." When spring rolls around, the yurts will vanish, and our footprints will melt away. ■

Eric Hermann is a freelance writer in Fort Collins, Colorado.

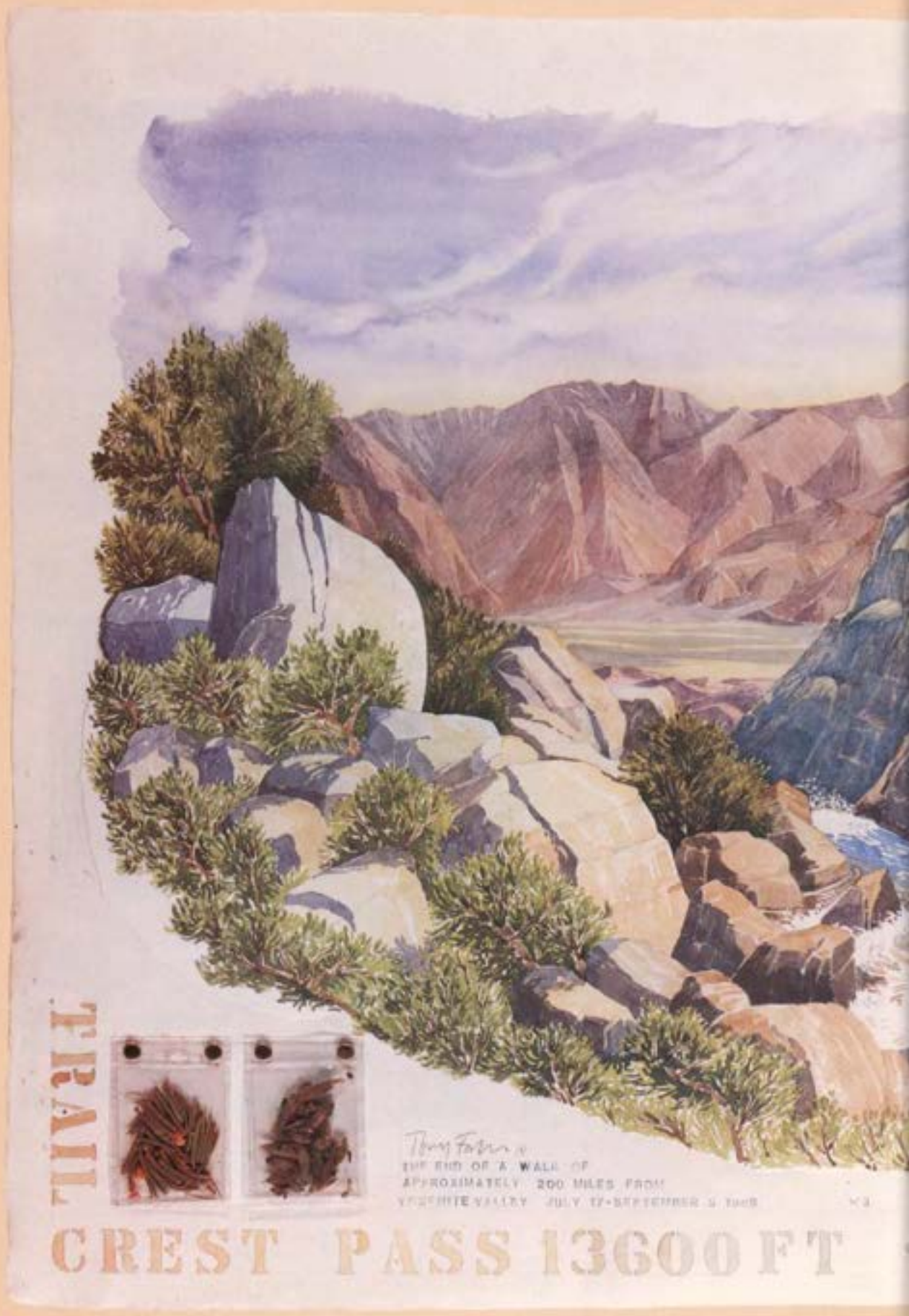
SIERRAN SOUVENIRS

Fueled by his passion for wild places (and endless cups of tea), Cornish artist Tony Foster clambered among the peaks and meadows of the High Sierra for eight weeks in 1986. In addition to the standard assortment of gear that all backcountry travelers tote, Foster carried a selection of watercolors, brushes, and papers—so that he could, as John Muir often wished to, permanently capture as he wandered the spectacular scenes arrayed before him. Four of the 41 "wide view" watercolors that Foster envisioned, planned, and executed on his trek are reproduced on these pages. They reflect his fascination not only with the broad sweep of the Sierran landscape but with the flowers, rocks, and animals he admired on those long days of studying and sketching. Images of those objects (and sometimes the objects themselves, which he dubs "souvenirs") form a decorative frieze around the borders of many of his paintings, offering a counterpoint to the major themes of water, granite, and sequoia. The careful observer will note other bits and pieces, including map segments and photos, that contribute to the final result—each work providing "a vivid account," as one art historian has commented, "specific in detail and immediate in its evocation of a journey as a sensation-filled event in time and space." Lovers of wilderness and watercolors alike will be able to view the full range of Foster's creations at two exhibitions in the United States. "John Muir's High Sierra—A Watercolor Diary by Tony Foster" made its American debut in October at the California Academy of Sciences in San Francisco, where it will remain through January 10, 1988. The show then moves to Boston's Francesca Anderson Gallery from May 5 to 24. Tony Foster's work is represented in this country by the Anderson Gallery and by the Montgomery Gallery in San Francisco. ■

AGNEW MEADOWS TO REDS MEADO

FALLS TOP AND BOTTOM 27 JULY 1986

YOSEMITE


TRAIL
CREST PASS 13600 FT

JOURNEYS END

#1 TRAIL CREST PASS 13800 FT.

#2 LOOKING E-NE FROM TRAIL CREST PASS THE PANAMINT RANGE FROM LONE PINE CREEK

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SAND COUNTY'S CONS

ONE HUNDRED YEARS AFTER THE BIRTH OF ALDO LEOPOLD, CONSERVATIONISTS ARE STILL FINDING INSPIRATION IN THE WORK OF THIS PASSIONATE, PLAINSPOKEN ECOLOGIST.

DAVID RAINS WALLACE

ROBERT McCABE/UNIVERSITY OF WISCONSIN-MADISON ARCHIVES

TWENTY-SIX-YEAR-OLD Aldo Leopold liked his rough-and-ready outdoor job so much that he might have spent his life at it. But one April night in 1913 the young supervisor of New Mexico's million-acre Carson National Forest was caught in a flood and snowstorm. The night out in a wet bedroll led to a near-fatal bout of nephritis, and after an 18-month recuperation he had to settle for less-strenuous administrative posts within the Forest Service. Yet despite this disappointment, Leopold, one of the first graduates of Yale's forestry school, still hoped to accomplish something big in his field.

The success he eventually achieved is now conservation history. Although he began his career in the exploitative realms of frontier-taming and industrial forestry, he ended it by making major philosophical and literary contributions in the brand-new fields of wilderness and predator preservation. His influence, indeed his legend, is felt today throughout the entire conservation spectrum, from Earth First! to the National Geographic Society.

"A prophet is one who recognizes the birth of an idea in the collective mind," Leopold once wrote, "and who defines and clarifies, with his life, its meanings and implications." Although he wasn't referring to himself, Leopold's definition could easily be applied to his own role in the conservation movement. No other 20th-century American has become as identified with the idea of respect for ecological integrity, or what Leopold called "the land ethic."

ERVATION PROPHET

GROWING UP ALONG Iowa's Mississippi River bottomlands, Leopold was an avid hunter and wildlife enthusiast. He saw wildlife as the soul of landscape, as historian Susan Flader notes in her study of Leopold's conservation career, *Thinking Like a Mountain*. Yet, when Leopold began his career with the U.S. Forest Service, wildlife was rapidly disappearing from the Southwest because of unregulated hunting and habitat destruction. Working on his own initiative, Leopold began to promote wildlife conservation, both inside and outside the national forests, and soon attracted the attention of conservation bigwigs such as New York Zoological Park Director William Hornaday and President Theodore Roosevelt. Leopold secured a full-time assignment organizing game and fish protection in the Southwestern District of the Forest Service, set up citizen wildlife groups, and lobbied chambers of commerce. "While making good progress," he observed in his Yale class record, "I think the job will last me the rest of my life."

The job did indeed last the rest of Leopold's life, although not in the form he first envisioned. The Forest Service didn't share his passion for wildlife and kept assigning him to other duties. As long as he remained in the Southwest, Leopold was able to integrate his duties with his passion. His reluctance to see fine deer and turkey country subdivided for summer cabins led him to propose setting aside large roadless areas within the national forests. In 1924 that idea resulted in administrative designation of the first official wilderness area, New Mexico's Gila.

In the same year the Forest Service transferred Leopold to its Forest Products Laboratory in Madison, Wisconsin, where his duties as associate director precluded on-the-job involvement with wildlife conservation. He kept at it in his spare time, however, and in 1928 left the Forest Service to work full time as a wildlife-management consultant. This was a courageous move for a man with five children at a time when the wildlife-management profession we know today didn't exist. Leopold went about the task with characteristic energy. In fact, he literally wrote the book on it. His *Game Management*, published in 1933, is "still regarded as the basic statement of the science, art, and profession of wildlife management," according to Flader.

Also in 1933, Leopold assumed the chair of game management created especially for him at the University of Wisconsin, a position he would retain for the rest of his life. In this capacity he trained a generation of leading wild-

We naturalists have much to live down. There was a time when ladies and gentlemen wandered afield not so much to learn how the world is put together as to gather subject matter for tea-time conversation. This was the era of dickey-bird ornithology, of botany expressed in bad verse, of ejaculatory vapors such as "ain't nature grand."

White-tailed deer in Wisconsin

JIM BRANDENBURG

life managers, served on President Franklin Roosevelt's Committee on Wildlife Restoration and on the Wisconsin Conservation Commission, and helped found or held office in many professional organizations. He was serving as conservation adviser to the United Nations when he died in 1948.

YET FOR ALL OF Leopold's contributions as a pioneer wildlife manager, another dimension of his work was more influential—and represented an even greater divergence from his early plans than did the shift from forestry administrator to conservation professor. As a forester in 1915, Leopold shared many of the views of his mentor, Forest Service Chief Gifford Pinchot. Pinchot's ideas were based on economics. He believed that all the resources of the national forests were for *use*, which needed to be restricted only to assure their permanence.

Because the young Leopold regarded wildlife as a resource like timber or water, he set out to maximize populations of "useful" wildlife (which mainly meant species that were huntable and fishable). "I ultimately plan to raise enough game and fish to provide recreation for twenty thousand people and bring $25,000,000 a year into the country," he wrote in the Yale class record. Permanence of the resource would be ensured by enforcement of game laws, the setting aside of refuges, and extermination of predators. "It is going to take patience and money to catch the last wolf or mountain lion in New Mexico," he wrote in 1920, "but the last one must be caught before the job can be called fully successful."

Leopold worked hard to try to achieve these breathtakingly confident goals—and got mixed results. Effective game laws brought burgeoning deer populations by the mid-1920s. Government trapping and poisoning programs eradicated the wolf and grizzly in the Southwest, and substantially reduced mountain lion and bobcat populations. Yet all did not go as planned. Game birds did not respond as deer did to bag limits and predator-killing. Quail and turkey populations rose to a certain level, then fluctuated for unknown reasons. More disturbing, the growing

Great blue herons, New Mexico

"The Shack," Leopold's Sand County hideaway in south-central Wisconsin.

JIM MICHEL/ROOT RESOURCES

JIM BRANDENBURG

I am glad that I shall never be young without wild country to be young in. Of what avail are forty freedoms without a blank spot on the map?

UNIVERSITY OF WISCONSIN-MADISON ARCHIVES

Arizona, 1911: when Leopold was an avid outdoorsman fresh out of forestry school.

deer herds began to cause problems.

As deer populations soared, browse lines appeared on trees, and desirable forage species began to disappear. In the worst areas, such as the Kaibab Plateau in Arizona, deer overpopulation ended in mass starvation and highly unpopular thinning of the herd by government hunters.

Many of these problems developed after Leopold had moved to Wisconsin, but that didn't make them any easier for him to face. Among the most troubling changes was a Forest Service road that bisected the Gila Wilderness to provide hunters access to overabundant deer. The wilderness that Leopold had conceived expressly to absorb the kind of two-week hunting trip that was becoming impossible elsewhere in the Southwest had been cut in half because of the maximization of its "resource." Leopold later observed: "Here my sin against the wolves caught up with me."

Such disagreeable surprises, combined with a temperament that was thoughtful and observant as well as energetic, prompted a gradual but radical change in Leopold's outlook. When he had moved to the Southwest in 1909, he had been interested in the region's history and aware of how settlement had damaged its landscape. By the early 1920s, influenced by the Russian philosopher P. D. Ouspensky (and probably by Thoreau, whose complete works he owned), Leopold had begun thinking of land not only as an array of resources but as an organism. "Possibly, in our intuitive perceptions," Leopold wrote in an unpublished essay, "we realize the indivisibility of the earth—its soil, mountains, rivers, forests, climate, plants, and animals, and respect it collectively not only as a useful servant but as a living being."

This perception soon led Leopold to reconsider his attitude toward "useless" inhabitants of the land. By 1925 he had revoked his death sentence on southwestern wolves and lions (a little too late for the wolves, unfortunately).

But this reconsideration was limited at first. He acknowledged that it was "important to avoid the extermination of predators" while still maintaining that they should be strictly controlled, especially the invasive coyote. If land was an organism, it was still an organism that could be improved by science and technology. In 1933, Leopold said in a speech to fellow scientists: "The idea of a controlled environment contains colors and brushes wherewith society may some day paint a new and possibly a better picture of itself."

Despite this optimistic assertion, Leopold was growing less confident than before. As deer overpopulation became a major problem not only in the Southwest but in the Midwest and Northeast, Leopold's thinking con-

Tadpoles in New Mexico's Gila National Forest

tinued to move away from its original economic focus to an ecological one. The more he learned about the land's complexity, the more he doubted whether civilization's control of it benefited either the land *or* civilization.

Two trips that Leopold made in the mid-1930s fostered that skepticism. The first was to Germany, a land that civilization had been trying to tame for centuries, supposedly with some success. Gifford Pinchot was enthralled by northern Europe's heavily managed forests. Leopold found them monotonous, estimating that two thirds of the native plant species in German forests had been wiped out by a deer herd kept at abnormally high levels through predator control and artificial feeding. The high yields of deer and timber that Leopold himself had once so enthusiastically promoted had brought serious problems: deer that showed nutritional deficiencies because of their limited diet, and soils that were increasingly thin and acidic because only timber trees were allowed to grow on them.

Ecology is an infant just learning to talk, and like other infants, is engrossed with its own coinage of big words. Its working days lie in the future.

The second trip was to the Gavilan River country in the Mexican state of Chihuahua, a land that civilization had virtually ignored. There Leopold found wildlife and vegetation in a state of diverse equilibrium he had never seen before. Deer and wolves, quail and hawks, turkeys and bobcats, trout and otters all thrived in a landscape that appeared harsh but that contained an abundance of clean water, fertile soil, and nutritious food plants.

"It is ironic," he wrote in *American Forests* in 1937, "that Chihuahua, with a history and a terrain so strikingly similar to southern New Mexico and Arizona, should present so lovely a picture of ecological health, whereas our own states, plastered as they are with National Forests, National Parks and all the other trappings of conservation, are so badly damaged that only tourists and others ecologically color-blind can look

upon them without a feeling of sadness and regret." (Leopold hoped to establish an ecological study area in the Gavilan, but when his son Starker visited the region in 1948 it had been logged, grazed, and scoured by floods.)

Even after the revelations of the mid-1930s, Leopold remained actively concerned with huntable, fishable wildlife. But he found it harder than before, since he no longer advocated popular panaceas such as predator eradication. "Those who assume that we would be better off without any wolves are assuming more knowledge of how nature works than I can claim to possess," he said in 1945 while serving as a Wisconsin conservation commissioner.

During this period Leopold's conservation activities began to take on a wider scope, as though he recognized that the best way to apply the "land health" concept he had perceived in Chihuahua was simply to leave alone as much of the United States as possible. In 1935 he joined with Robert Marshall and other conservationists in establishing The Wilderness Society. Leopold defined the Society (and, by inference, other wilderness groups) as "a disclaimer of the biotic arrogance of *Homo americanus* . . . one of the focal points of a new attitude—an intelligent humility toward man's place in nature." Around the same time he wrote: "In the long run we shall learn that there is no such thing as forestry, no such thing as game management. The only reality is an intelligent respect for, and adjustment to, the inherent tendency of land to produce life."

THE SAME YEAR he helped organize The Wilderness Society, Leopold bought an abandoned farm in central Wisconsin, a sandy, boggy region that had failed to support profitable farming even after drainage projects were built there at the turn of the century. On weekends and vacations away from his job at the University of Wisconsin, he applied himself to observing the daily minutiae of a functioning, if damaged, ecosystem and to making what restorations he could—planting native white pines and sowing prairie wildflower seeds. It was at "the shack," as Leopold called his beloved farm, that he died of a heart attack while helping his neighbors fight a grass fire on April 21, 1948.

And when the dawn-wind stirs through the ancient cottonwoods, and the gray light steals down from the hills over the old river sliding softly past its wide brown sandbars—what if there be no more goose music?

It wasn't until after Leopold's death that the public saw his final, and perhaps most important, contribution to conservation. When World War II took away most of his students, Leopold spent his free time polishing essays he'd been working on since the 1920s. It took him until a week before his heart attack to find a publisher for them. Finally released in 1949 by Oxford University Press, *A Sand County Almanac and Sketches Here and There* has become a basic text of 20th-century conservation.

Sand County's brief, lucid, unassuming vignettes and reflections on Wisconsin wildlife and wilderness journeys contain the quintessence of Leopold's ideas on land health and ethics, explained through his experiences, not simply as concepts. He sees the land's history in the annual rings of a downed oak he is sawing for firewood; he gains his first inkling of the predator's ecological value in the eyes of a dying wolf he has just shot. *Sand County* offers the reader an opportunity to visit the wild American frontier with one of the first ecologists, to follow Leopold to New Mexico's White Mountain in 1909, to the Colorado Delta in 1922, and to Mexico's Sierra Madre in 1936, when these areas were not yet eroded by use or obscured by descriptive jargon, but were simply, as Leopold said, good places to be young in.

Leopold's prose brings the places so alive that the book seems less an elegy for what has been lost than a reminder of what could be if we ever learn to respect the land. While his professional achievements were great, this vision of ecological integrity will likely prove to be Leopold's main influence on the American attitude toward land. The half-day-wide meadow on top of White Mountain, the green lagoons and jaguar-haunted mesquite thickets of the undammed Colorado, the thick-billed parrot flocks of the Gavilan canyons: "Yes," many readers must say to themselves, "this is the way it was meant to be." ■

DAVID RAINS WALLACE *is a naturalist and the author of several books, including* The Dark Range, The Wilder Shore, *and* The Klamath Knot. *Quotations are from* A Sand County Almanac *(Oxford University Press).*

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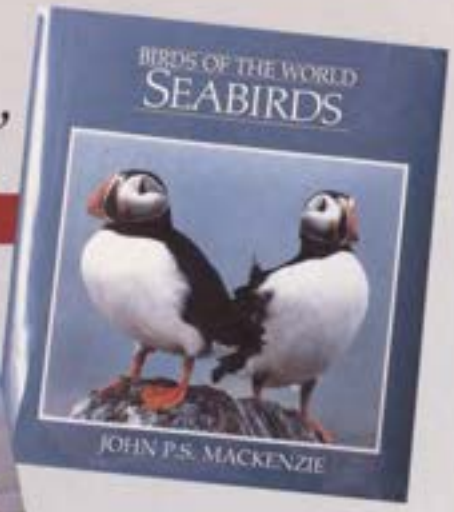

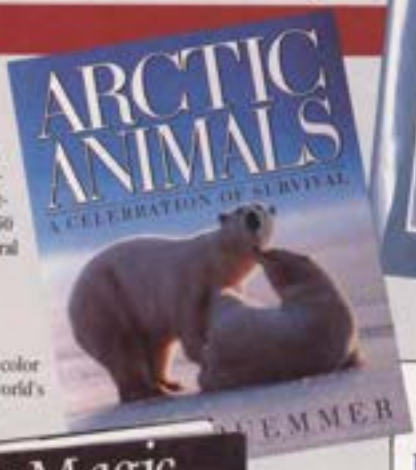

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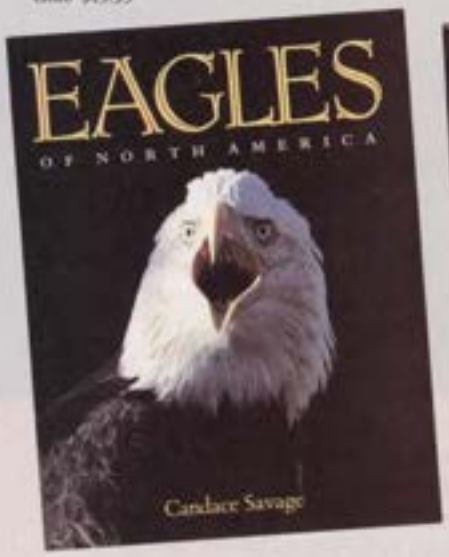

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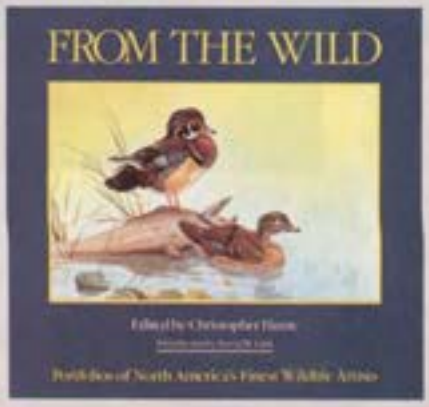

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Top: coastal California; right: trekkers on Dardiya Peak, Nepal

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[88031] Mazatzal Wilderness, Tonto National Forest, Arizona—April 9-16. *Leader, David Mowry, 3848 W. Lawrence Rd., Phoenix, AZ 85019. Cost: $245.* The Mazatzal Wilderness, largest in Arizona, provides many samples of the different climatic and topographic experiences found in the state. We will hike along the crest of the Mazatzal Mountains through ponderosa-pine forests, down into rugged side canyons, and into the Sonoran Desert in spring bloom. The latter portion of the trip will include hiking and camping along the Verde River, one of the few wild and scenic desert rivers in the country. (Rated M)

[88032] The Grand Canyon: South Rim to the Colorado River, Arizona—April 9-17. *Leader, Bob Posner, 2555 Le Conte, Berkeley, CA 94709. Cost: $315.* We meet at the Cameron Trading Post on the Navajo Reservation and drive along the Little Colorado into the Grand Canyon. After exploring the South Rim, we backpack down to the Tonto Plateau to camps at Salt and Hermit creeks and to the Colorado River at Granite and Boucher rapids. Views of the North Rim, leisurely exploration of side canyons, wildflowers, and experiencing the power of Boucher, Crystal, and Hermit rapids are highlights of this trip. (Rated M)

[88033] Galiuro Wilderness, Galiuro Mountains, Arizona—April 10-16. *Leader, Jim Urban, 5170 S. Alton Way, Englewood, CO 80111. Cost: $230.* This seldom visited range 60 miles east of Tucson provides a great variety of hiking experiences, from dry brushy ridges to thickly forested canyons with clear streams. We will loop through the area, camping at elevations ranging from 4,000 to 7,100 feet; night temperatures near freezing are expected at higher elevations. A layover day will allow visiting the site of a western shootout and exploring an old mine. Travel is on an overgrown (and thorny) trail, some of it good but with a bit of cross-country. (Rated M-S)

[88034] Slickhorn Canyon, Southeastern Utah—April 16-23. *Leader, Chuck Shinn, 5318 Redbridge Dr., Boise, ID 83703. Cost: $320.* Slickhorn Canyon is adjacent to the famous Grand Gulch Canyon near the town of Blanding, Utah. During springtime in the desert, we'll explore the numerous Anasazi ruins in the upper canyon arms and enjoy swimming in pools on the canyon floors as we hike to the San Juan River. (Rated L-M)

[88035] Junipero Serra, Ventana Wilderness, Los Padres National Forest, California—April 22-30. *Leader, Bob Berges, 21 Stone Harbor, Alameda, CA 94501. Cost: $200.* Spring is the time of year to stroll through the Coast Range, enjoying sunshine and wildflowers. This moderate trip with a layover day to climb Cone Peak can be a pleasant start to your year's backpacking ventures. We will be hiking on the east side of the range for most of the trip, so a late season storm on the west side shouldn't pose any major difficulties. A good portion of the trip will be in the expanded areas of the wilderness. (Rated M)

[88036] Kanab Canyon/Thunder River, Grand Canyon, Arizona—April 22-30. *Leader, Peter Curia, 1334 W. Willetta, Phoenix, AZ 85007. Cost: $260.* The cornucopia of scenery along our route is perhaps the best the Grand Canyon offers to off-trail adventurers. There is the expanse of the Esplanade, the redwall narrows of Jumpup, the sometimes muddy but always sinuous Kanab Creek, the sculptured floor of Scotty's Hollow, the murmur of Whispering Falls, the crashing of Deer Creek Falls, and, finally, the explosive headwaters of Thunder River. The terrain is difficult, and there are no layover days, but the memories you take with you are forever. (Rated S)

[88037] Navajo Mountain—Rainbow Bridge, Arizona—May 1-7. *Leader Nancy Wahl, 325 Oro Valley Dr., Tucson, AZ 85737. Cost: $205.* Visible for a hundred miles, the rounded dome of Navajo Mountain (10,388 feet) rises on the Navajo Reservation of northern Arizona. Overlooking the San Juan River, this isolated mountain is often called the grandest natural edifice in the southern end of the canyon country, a land of colorful, twisting sandstone canyons, clear creeks and pools, natural bridges and arches, giant domes, and abundant spring wildflowers. This trip is a photographer's delight. (Rated M-S)

[88038] Appalachian Historical Odyssey, Maryland and Pennsylvania—May 21-29. *Leader, Chuck Cotter, 1803 Townsend Forest Ln., Brown Summit, NC 27214. Cost: $240.* On our fifth trip of the "Appalachian Trail Odyssey" we traverse the beautiful state of Maryland. We plan to start in Pennsylvania at Caledonia State Park, heading toward Harpers Ferry, West Virginia. Along the way we will visit Turners Gap, Fox Gap, and Brownsville Gap, site of the South Mountain Battle in 1862. We will also cross the Mason-Dixon Line and visit the Washington Monument and Harpers Ferry (site of John Brown's raid). The beautiful countryside saturated in history makes this trip unique. (Rated L-M)

Note: See also water trip #88068 and Hawaii trips #88057 and #88058.

BASE CAMP/HIGHLIGHT

[88041] America's Paradise Base Camp, Virgin Islands National Park—March 18-24. *Leader, Jim Absher, 225 Ansley Dr., Athens, GA 30605. Cost: $485.* Join us for a week's exploration of tropical splendors on St. John, the least developed of the U.S. Virgin Islands. Almost 65 percent of the island is included in the Virgin Islands National Park. We'll stay in rustic beachfront cottages and hike or drive to various locations for daily walks, snorkeling, or cultural programs. Naturalists will accompany us for many activities. On other days you'll be free to do as you wish: sunbathe, sail, or shop. We'll have jeeps to visit the sights at our own pace and to take us into town for nightlife and Caribbean foods. Meals are not included in the trip price, but the cabins have stoves and ice chests. You'll be amazed at the diversity and beauty of this national park: its tropical forests, white-sand beaches, coral reefs, and more. Plan to stay a few extra days afterward to see other islands.

[88042] Anza-Borrego Natural History, Anza-Borrego State Park, California—March 19-26. *Leader, Carol Baker, 2328 33rd St., San Diego, CA 92104. Cost: $215.* The Anza-Borrego Desert consists of more than a million acres east of the coastal range in Southern California. Uniquely juxtaposed terrain varies from 6,000-foot piney crags to fossilized badlands to a low inland sea that supports a rich variety of desert plants and animals for studying with our naturalist. Participants will carpool to daily camps and trailheads. Hikes are easy to moderate; energetic walkers may climb a peak. Weather should be mild, but rain, wind, and snow are possible at this time of year.

[88043] East Mojave Scenic Area, California—March 26-April 2. *Leader, Ken Horner, 1223 Yale Ave., Claremont, CA 91711. Cost: $295.* Spring gives us a perfect opportunity to visit the desert region proposed as Mojave National Park in Sen. Alan Cranston's California Desert Protection Act. From our camp at 5,600 feet, we will take leisurely to moderate dayhikes to 600-foot sand dunes, caverns, canyons, cinder cones, volcanic spires, mesas, and petroglyphs. More strenuous peak climbs are also a possibility. A naturalist will be with the group to help us learn more about this beautiful area.

[88044] Texas Toddler Tromp: Springtime in the Hill Country—April 3-9. *Leader, Steve Hanson, P.O. Box 160033, Austin, TX 78716. Cost: adult, $215; child, $140.* The central Texas hill country is delightful in the spring with pleasant temperatures and a profusion of wildflowers. We will set up base camps in two state parks (moving once) and visit several interesting natural areas, including waterfalls, a grotto, and a 500-foot granite dome. This trip is designed for families with children 2 to 5 years old, so our hikes and excursions will generally be at a leisurely pace.

[88045] Rogue River Hikeabout, Kalmiopsis Wilderness, Siskiyou National Forest, Southern Oregon—April 25-29. *Leader, Viva Stansell, P.O. Box 959, Gold Beach, OR 97444. Cost: $705.*

[88046] Rogue River Hikeabout, Kalmiopsis Wilderness, Siskiyou National Forest, Southern Oregon—May 9-13. *Leader, Mike Uhtoff, 154 Oak St., Ashland, OR 97520. Cost: $705.* We'll study the spring flowers and passerine birds while we hike the 39-mile Rogue River Trail along the north bank of the wild and scenic river. This five-day raft-supported hikeabout takes the backache out of backpacking and can be easily accomplished by young and old alike (age 12 and up). We'll start at Grave Creek (elevation 689 feet) and drop to Foster Bar (474 feet) on the last day. All we'll need to carry is our cameras as the rafts will transport our gear and lots of great food. We'll camp out the first two nights and spend the second two nights at rustic wilderness lodges. These lodges are famous for their hearty meals, clean beds, and hot showers. Spring is the best time to hike the trail because of the wildflowers and mild weather. Five days will give us plenty of time to explore the historic areas, to swim, and to fish.

Glen Canyon, Utah

[88047] Mexico: Mayans and Mountains—April 29-May 7. *Leader, Carolyn Downey, 1931 E. Duke Dr., Tempe, AZ 85283. Cost: $1,380.* Ancient Mayan ruins, rivers, mountains, and beautiful colonial towns are the highlights of this trip south of the border. In the states of Tabasco and Chiapas, we will visit the major Mayan ruins of Palenque, Yaxchilan, Bonampak, and Comalcalco, plus other smaller sites. Because of the possibility of the Rio Usumacinta being dammed, this may be the last chance to experience some of these incredible ruins. In addition, we will spend time high up in the mountains enjoying one of the most fascinating and charming cities in Mexico, San Cristobal de las Casas, at 7,200 feet. Our trip originates in Villahermosa and will be via air-taxi and bus. Accommodations will be in hotels, and participants will have the opportunity to enjoy local cuisine on their own schedule for some meals. Air transportation to Villahermosa is not included in the trip price.

[88048] Southeastern Wilderness Exploration I, Nantahala and Pisgah National Forests, North Carolina—May 7-14. *Leader, Chuck Cotter, 1803 Townsend Forest Ln., Brown Summit, NC 27214. Cost: $205.* The first in a new series of trips takes us to beautiful western North Carolina. Numerous small wilderness areas were established throughout the state as a result of the 1975 Eastern Wilderness Bill and the 1983 North Carolina Wilderness Bill. By using two different base camps, we will be able to see five of these pristine and primeval areas. Everyone will be transported to the trailheads via carpools to keep expenses to a minimum. This trip is ideally suited for people who do not enjoy the physical demands of an extended backpacking trip but still want to have a wilderness experience.

[88049] Habitat Studies, Gila Wilderness, New Mexico—May 15-21. *Leaders, Belva Christensen and Don Lyngholm, P.O. Box 103, Flagstaff, AZ 86002. Cost: $495.* This area became the first designated wilderness through the efforts of naturalist Aldo Leopold, who believed that land should be viewed as a community, not a commodity. This is the perspective we will take in studying the topography, geology, climatic effects, wetlands, plants, and animals of this beautiful wilderness. Our classes will be conducted by Don Lyngholm, formerly a range ecologist on the Navajo Reservation. Classes will alternate with field exercises, horseback riding, and fishing. Our camp will be near broad meadows at about 7,000 feet. Come and discover the land that Aldo Leopold loved and respected.

BICYCLE

[88052] Bicycling the Outer Banks, North Carolina—May 29-June 4. *Leader, Fred Gooding, Jr., Department of Computer Science, Vassar College, Poughkeepsie, NY 12601. Cost: $285.* Our North Carolina cycling tour will focus on the nation's first national seashore. During our excursion we'll pass three historic lighthouses, take two ferry rides on Pamlico Sound, swim on the unspoiled beaches of the Outer Banks, and enjoy some of the finest and most varied seafood in the east. We'll carry all our gear, buy groceries daily, and camp in private and state-operated campgrounds as well as in those of the Cape Hatteras National Seashore. Leader approval is required.

FOREIGN

[88512] Summertime Trek in the National Parks, Australia and Tasmania—December 15, 1987-January 2, 1988. *Leader, Pete Nelson, 5906 Dirac St., San Diego, CA 92122. Cost: $2,340.* We'll explore three scenic national parks on this trip. Tasmania's Cradle Mountain–Lake St. Clair National Park has high peaks, deep gorges, and alpine meadows, where from a base camp we'll have a choice of walks and ascents to Mt. Ossa (5,305 feet), Pelion Gap, Mt. Oakleigh, or down the Zig Zag track. On Kangaroo Island we travel by camel through spectacular Flinders Chase National Park, where we'll camp. We should be able to see a variety of wildlife, including koalas, eagles, and penguins as well as whales spouting offshore. At Kosciusko National Park in Australia's Snowy Mountains, we will hike between lodges, enjoying wildflowers and grand vistas. There will be an optional walk up Mt. Kosciusko (7,316 feet), the continent's highest peak. Camping gear is furnished.

[88517] Cross-Country Skiing in the Austrian and Swiss Alps—December 19, 1987-January 3, 1988. *Leader, Wayne Woodruff, P.O. Box 614, Livermore, CA 94550. Cost: $2,220.* Spend the Christmas holidays cross-country skiing in the "Heart of Europe." Christmas Day we'll ski western Austria's Vorarlberg region, and New Year's Day we'll be in the Grisons region of Switzerland in the Upper Engadine. This trip is designed especially for beginners and intermediate skiers; previous ski experience is not necessary. Accommodations will be in comfortable hotels. The trip price includes equipment rental and cross-country ski instruction by a certified Nordic ski instructor.

[88530] Cross-Country Skiing in the Austrian Tyrol—January 23-February 7. *Leader, Carolyn Steinmetz, 96 Hawthorne Ave., Los Altos, CA 94022. Cost: $2,080.* Experience the thrill of the Tyrol in winter, gliding silently over alpine meadows covered with crisp, glistening white snow. We will discover the heart of the Tyrolean Alps on this trip designed for both novice and experienced skiers. Morning cross-country ski lessons and after-

noon excursions for all skill levels will be led by licensed Austrian ski instructors. We will spend the weekend in enchanting Salzburg and enjoy a Mozart concert. Accommodations will be in quaint, comfortable, family-run inns. There will also be time for historic tours, shopping, and other après-ski attractions in this legendary winter wonderland. Trip price includes ski equipment rental and instruction.

[88533] Belize: Reef and Ruins, Central America—February 20-29. *Leader, Wilbur Mills, 3020 N.W. 60th St., Seattle, WA 98107. Cost: $1,070.* The longest barrier reef in Central America, an amazing variety of birds and wildlife, and mysterious Mayan ruins—we will find all this and more in Belize! Using a rustic ranch as our base, we'll spend several days in Belize's lush interior exploring limestone caves, a jungle river, and local ruins. One highlight will be an overnight visit to the magnificent Mayan ruins of Tikal in neighboring Guatemala. Then we'll move to the Caribbean coast and a palm-studded island adjacent to the barrier reef. We'll stay at a small guesthouse on the beach, snorkel in crystal-clear, 80-degree water, and feast on fresh seafood.

[88995] Exploring Israel—March 8-29. *Leader, Ray Des Camp, 510 Tyndall St., Los Altos, CA 94022. Cost: $2,545.* Our trip through Israel will give us an intimate view of this tiny land—its people, its landscapes, and its political, religious, and natural history. Driving, hiking, camel trekking, and flying will allow us the broadest possible exploration of the country. Our itinerary will include the coastal area and the headwaters of the Jordan in Galilee to the north and the Judean Desert and the Negev to Elat, the Gulf of Aqaba, and the Sinai to the south. We'll travel with an English-speaking Israeli guide to a crusader castle, a Druze village, Jericho, Qumran, Ein Gedi, Masada, and the Dead Sea. We'll sample kibbutz life, visit the monastery of St. Catherine (where we'll climb Jabal Musa, also known as Mt. Sinai), swim in the Gulf of Aqaba, and explore and enjoy Jerusalem. While on tour we'll stay overnight in hotels and kibbutzim, or camp out.

[88540] Arlberg Ski Adventure, Austria—March 19-26. *Leader, Ann Hildebrand, 1615 Lincoln Rd., Stockton, CA 95207. Cost: $1,610.* Experience skiing where it all began—the renowned Arlberg area of Austria. With the expertise of local guide-instructors we can perfect our off-piste technique, using the convenience of ski lifts. The possibilities for unforgettable descents are nearly limitless as we ski from village to village. The group will be divided into two eight-person sections for the most advantageous instructor/skier contact. Accommodations will be in a comfortable hotel in Lech. The trip is designed for intermediate to advanced downhill skiers who wish to experience the thrill and challenge of off-piste skiing. On-piste possibilities are available for the less adventurous.

[88545] Rolwaling Trek, Nepal—March 19-April 9. *Leader, Peter Owens, 117 E. Santa Inez, San Mateo, CA 94401. Cost: $1,240.* This trip offers a 19-day trek into the remote Rolwaling

JOHN DICOCK

Garhwal Himal, India

Himal, west of Mt. Everest and a few miles south of the Tibetan border. Known as the "Furrow" in the Sherpa language, the Rolwaling has always held a mysterious fascination: Tales of the yeti, the elusive abominable snowman, have poured from the handful of Sherpas who live there. Spring comes early to Nepal and the rhododendrons, Nepal's national flower, will be in full bloom. Maximum elevation reached will be 16,000 feet.

[88550] Exotic Highland and Lowland Parks of Costa Rica—March 27-April 2. *Leader, J. Victor Monke, 9033 Wilshire Blvd., Suite 403, Beverly Hills, CA 90211. Cost: $1,180.* Come explore the incredibly diverse flora and fauna of Costa Rica in the company of expert naturalist guides. In the highlands, we'll visit Poas volcano's moonscape peak with its mile-deep and mile-wide active caldera. We'll also go to adjacent Emerald Lake and the Monte Verde Cloud Forest, the habitat of 2,330 species of plants, birds, and mammals. In the lowlands, we'll visit the Palo Verde Refuge, which is a sort of intercontinental hotel for migratory fowl, and historic Santa Rosa, abundant with wildlife. It's springtime every day in Costa Rica. Come and enjoy this exotic and beautiful country.

[88553] Sea of Cortez Kayaking, Baja California, Mexico—April 2-9. *Leader, Harry Neal, 25015 Mt. Charlie Rd., Los Gatos, CA 95030. Cost: $780.* Espíritu Santo and Partida Islands lie in the Gulf of California north of La Paz. Explore sandy coves and inlets (excellent fishing and snorkeling), hidden canyons, fascinating geology, and spectacular desert vegetation. Spend a day snorkeling at Los Islotes (a sea-lion rookery). The trip is designed for inexperienced to expert paddlers. Instruction will be given and a support boat will accompany us to carry duffel, food, and fresh water. The trip begins and ends in La Paz.

[88555] North Island Bike Tour, New Zealand—April 10-23. *Leader, Don Lackowski, 2483 Caminito Vendo, San Diego, CA 92107. Cost: $2,315.* This moderate bicycle tour of two of New Zealand's most scenic and historic areas, the Volcanic Plateau and East Cape regions of North Island, features mountain lakes and sea shores, hot springs, world-class trout fishing, and Maori culture. Comfortable motel accommodations, meals served in dining facilities, and a van to carry our luggage

are included. Ample free time will also be provided.

[88560] Paris, France: A Different Perspective—April 21-30. *Leaders, Sidney Hollister and Sandy Tepfer, 42 August Alley, San Francisco, CA 94133. Cost: $1,905.* A Sierra Club premiere—the chance to celebrate April in Paris, when cafés put their tables out in the

BETTY POLLOCK

Xinjiang Province, China

sunshine, and the city's chestnut trees put out their blossoms. Meetings with Parisian environmentalists and French conservationists will help us understand the inner workings of Paris and its ecological ties to the country at large. And since any understanding of Paris includes eating in its colorful restaurants, visiting outdoor markets, and lingering over an espresso in a café, we'll do that, too. We'll also walk the boulevards and narrow streets of historic neighborhoods, sample the city's cultural events, take a boat ride on a tree-shaded canal, and stay in small hotels in the heart of this ever-changing yet magically timeless City of Light.

[88565] River Rafting, Jungle and Beach Adventure, Costa Rica—April 23-30. *Leader, Mary O'Connor, 2504 Webster St., Palo Alto, CA 94301. Cost: $1,255.* This one-week adventure provides a variety of fascinating activities and environments. We will begin by paddle-rafting on the Rio Pacuare River with a professional river guide for three exciting days. Here, we will experience the thrills of whitewater and the serene beauty of deep river canyons, jungle beaches, clear pools, and spectacular waterfalls. A short flight will then take us to Manuel Antonion National Park, one of Costa Rica's most beautiful areas, where jungle and beach intersect. A large variety of birds and wildlife can be seen on jungle hikes. The beach offers swimming, body surfing, and snorkeling. Marine life abounds. There will be two days in the historic city of San Jose, and optional tours will be available for further exploration. *The trip leader has changed since the original announcement.*

[88575] China, Tripping the Eastern Fantastic—April 28-May 17. *Leader, Dolph Amster, P.O. Box 1106, Ridgecrest, CA 93555. Cost: $2,970.* Come and experience a slice of today's metropolitan and rural, eastern China. From Beijing to Shanghai, we will explore cities and villages, communes and temples. We will do overnight ascents of T'ai Shan (5,000 feet) and Lotus Flower Peak (6,000 feet) in the Huang Shan (Yellow Mountains), go for a boat ride on Tai Lake, and stay with a farm family. Traveling by plane, train, and bus (plus doing some hiking), our accommodations will be the best available hotels or guesthouses. This is a moderate, easy-paced trip. Leader approval is required.

[88580] Flowers and Birds of the Middle Kingdoms, Bhutan and Sikkim—April 30-June 2. *Leader, Jane Edginton, 2733 Buena Vista Way, Berkeley, CA 94708. Naturalist, Hugh Braswell, M.D. Cost: $3,995.* We will explore exotic and little known Bhutan and Sikkim in the premonsoon rhododendron season, offering the opportunity to see the Himalayan bird population in spring plumage. The trip will include some cultural sightseeing but will emphasize natural-history treks in the central Bhutan Himalaya and near Kangchenjunga in Sikkim. The hiking, on average, is moderate but may be strenuous on any given day, depending on the weather, which can be damp, and the altitude, which will range from 4,000 to 14,000 feet.

[88590] The Garhwal Himal—Abode of the Gods, India—May 16-June 8. *Leader, David Horsley, 4285 Gilbert St., Oakland, CA 94611. Cost: $1,910.* The Garhwal, located in the northeast corner of India, is a part of the Himalayas that is little known to trekkers. Yet the mountains of this region are often described as the most interesting and impressive of the entire range. The trip begins in Delhi, where we take a private bus to Rishikesh and Hardwar, visiting Hindu temples on the banks of the Ganges River en route to our trailhead. Our trek encompasses the spectacular "Valley of Flowers" and Kuari Pass regions, taking us through beautiful forests and flowering meadows with the Himalaya Mountains (including India's highest peak, Nanda Devi) and their glistening glaciers always in view. The trails in the Garhwal rarely climb to more than 14,600 feet, but they can be steep and demanding. The rewards of this trek will be many. From our exalted vantage point it will be easy to see why the Garhwal is considered the Abode of the Gods.

[88595] Walks in Historic Portugal—May 22-June 9. *Leader, Joe Lee Brown, 1323 Brandy Ln., Carmichael, CA 94022. Cost: $1,895.* Our route combines walking excursions with visits to cultural and historic areas of Portugal. Mountain ridges, rising to 6,500 feet, offer panoramic vistas and easy to moderate walks following the pathways of the Romans, Moors, Spaniards, and Portuguese. Vans will transport our group, accompanied by our Portuguese guide, to accommodations at *pensions* and *estalagems*. Along the way we will visit historic towns and buildings of the 12th to the 14th centuries.

Note: Also see base camp/highlight trip #88047.

HAWAII

[88055] Spring in Hawaii—March 25-April 2. *Leaders, Ray and Lynne Simpson, 4275 North River Way, Sacramento, CA 95864. Cost: $595.* The Big Island of Hawaii is the perfect location to celebrate the coming of spring—in a land of tropical sunshine, balmy air, and warm, azure seas. Most of our

campgrounds are within sight and sound of the Pacific, on private land or in state beach parks. Cooks on Hawaii trips take pride in featuring favorite foods of the Pacific Basin, and each participant has the opportunity to assist in preparation. Snorkeling, day hikes, and possibly one overnight hike will be planned for those interested. However, participation is not required in these activities. One may choose instead to sit each day under the palms and count the coconuts.

[88056] Kauai Family Camping Trip—April 1-9. *Leader, Ned Dodds, 19 Erin Court, Pleasant Hill, CA 94523. Cost: adult, $595; child, $395.* Come car-camp with us on the Garden Isle, known for its lush vegetation, sheer cliffs, and some of the most beautiful beaches in the Hawaiian Island chain. We are currently contemplating three campsites around the island to allow exploration of all its major features. A selection of leisurely activities, suitable both for families and singles, will be available at each campsite. The list includes hiking, beach exploration, or just plain lounging.

[88057] Big Island Coasts, Hawaii —May 7-16. *Leaders, George Winsley and Lou Wilkinson, 241 Sequoia Dr., San Anselmo, CA 94960. Cost: $620.* Two backpack trips along the coasts of Hawaii's Big Island will allow us to visit both the wet, windward side of the island and the dry, leeward side. We will have the opportunity to swim under mountain waterfalls, frolic in the surf, and hike on remote black-sand beaches. Our second trip along the coast of Hawaii Volcanoes National Park is a unique experience in hiking across recent lava flows to remote bays and beaches. This trip may be combined with the Mauna Loa backpack trip (May 17-21), which will enable you to backpack from sea level to more than 13,000 feet. Leader approval required.

[88058] Mauna Loa Summit, Hawaii—May 17-21. *Leader, George Winsley, 241 Sequoia Dr., San Anselmo, CA 94960. Cost: $270.* The hike to the summit of Mauna Loa volcano is strenuous and challenging. From its base on the floor of the Pacific Ocean to its 13,000-foot summit, Mauna Loa is the largest single mountain mass in the world. Those who have made the hike remember the beauty of the shadow of the mountain on the clouds, the sense of accomplishment, and the hidden ice-cold water holes as some of the rewards. The everchanging forms and colors of its lava flows make this terrain unique. We will take our time on the hike to the summit. Two nights at the summit cabin provide the opportunity to explore the rim of the caldera and some of the volcanic steam vents. This trip may be combined with the Big Island Coasts backpack (May 7-16). Leader approval is required.

SERVICE

[88061] Superstition Wilderness Trail Maintenance, Arizona—April 3-10. *Leader, John Ricker, 2610 N. 3rd St., Phoenix, AZ 85004. Cost: $95.* The Superstition Wilderness is a 450-square-mile area situated 40 miles east of Phoenix. It is made up of rugged mountains, streams, and desert vegetation on the west, turning to pinyon, juniper, and some ponderosa pine on the east. Our trip will take us to the southeast corner, along the west fork of Pinto Creek. There will be a short backpack to base camp. The elevation will be 4,000 to 4,500 feet. Time will be available to explore the streams and to climb a nearby peak.

High Uintas Wilderness, Utah

[88062] Buffalo River Trail Building, Arkansas—April 17-23. *Leader, Ken Smith, 459 W. Cleburn St., Fayetteville, AR 72701. Cost: $120.* Enjoy springtime in the Ozarks while building a hiking trail in the Ponca Wilderness Area of the Buffalo River. This is rugged hill country along the river, with sheer bluffs 150 to 500 feet high. There will be time to hike, fish, and swim. The river, its side canyons, and the surrounding hardwood forest invite exploration and photography. We will work from a base camp that will be situated a mile from the nearest road.

[88063] Red Rock Trail Maintenance, Munds Mountain Wilderness, Coconino Forest, Arizona—April 24-30. *Leader, Jim Ricker, 1532-47th St., Sacramento, CA 95819. Cost: $80.* Located on the southern and eroding edge of the Colorado Plateau, this is a spectacular area of deep canyons, colorful rock formations, and pine-covered mountains. We will con-

tinue the trail started last year along the rim of Woods Canyon. Work consists of clearing brush, moving rocks, and building switchbacks. There will be ample time for day hikes, photography, and just loafing. Elevations range from 5,000 feet to 6,500 feet. Expect warm days and cool nights.

SKI

[88365] Adirondack Wilderness Ski Tour—January 30-February 5. *Leader, Larry White, RD #2, Tracy Creek Rd., Vestal, NY 13850. Cost: $495.* With an expert guide, we will traverse the Siamese Ponds Wilderness Area in five days. Our gear will be transported for us as we ski in one of the most remote sections of New York's Adirondack Park. Accommodations will vary from local inns to remote wilderness log cabins. The route will take us through virgin timber, across frozen lakes, and over a low mountain range. Distances will be eight to ten miles a day. This is a wonderful opportunity for the intermediate skier.

Note: See also foreign trips #88517, #88530, and #88540.

WATER

Water trips are a very special way of getting into wilderness physically and mentally. To become part of a river, flowing with it through time and space, is an unforgettable experience. Whether it's a whitewater adrenaline rush or a slackwater canoe trip, closeness to nature is a constant.

Canoe trips are graded as follows: Grade A: No canoeing experience required. Grade B: Some canoeing experience required. Grade C: Canoeing experience on moving water required. Grade D: Canoeing experience on whitewater required.

[88066] Okefenokee Swamp, Southeastern Georgia—March 14-18. *Leader, Marvin Hungate, 110 Koehler Ave., Apt. 5, Cincinnati, OH 45215. Cost: $285.* Canoe a true blackwater swamp and perhaps one of its historic rivers. This is the land of the "trembling earth." From the trailhead near Folkston, we'll paddle among the cypresses, in and out of the prairies and lakes, for approximately ten miles each day, and camp at a different site most nights. Experience is required. (Grade B)

[88067] Dismal Swamp Canoe Base Camp, Virginia/North Carolina—April 17-23. *Leader, Robert Holcomb, 819 Fairway Dr., Waynesboro, VA 22980. Cost: $280.* Southward from Norfolk, Virginia, into North Carolina, the Great Dismal Swamp is an area of lowlands, lakes, and rivers fed by tributaries of swamp origin. The swamp isn't really "dismal," and we should see budding flora, hear spring warblers, other birds, and frogs, and observe snakes. We should also beat the mosquito season. Our base camp will be near the Northwest River, where exploratory day trips to tributaries and backwaters are planned, along with trips to Lake Drummond, Merchants Mill Pond (with moss-draped cypress and tupelo), and the Outer Banks. This is a flatwater trip, but the possibility of high winds on open stretches requires some previous canoe experience. (Grade B)

[88068] San Juan River Paddle Raft Trip/Grand Gulch Backpack, Southeastern Utah—April 24-May 5. *Leader, Bert Fingerhut, 225 West 83rd St., New York, NY 10024. Cost: $1,535.* Our group of 14 experienced wilderness adventurers will first paddle two 16-foot rafts approximately 70 miles down the San Juan River from Bluff, Utah, to the mouth of Grand Gulch. This will take five days and will give us ample time to explore side canyons and to enjoy the river. We will then leave our rafts, hoist backpacks, and hike for seven days through the Grand Gulch drainage to the Kane Gulch ranger station (approximately 53 miles, excluding side canyons). The area is rich in Anasazi ruins and rock art, and the side canyons are spectacular. If you are comfortable in the water and are a reasonably good swimmer, no previous whitewater experience is necessary. The backpack portion of the trip is moderately strenuous.

[88069] Buffalo River, Arkansas—May 2-7. *Leader, Peter Bengtson, 8009 Chesterfield Dr., Knoxville, TN 37909. Cost: $235.* We will start our leisurely canoe trip as far upstream as possible to see the smaller, more intimate sections of the river. We will cover about 60 miles as the river cuts through the Boston Mountains, which are the most rugged part of the Ozarks. This section includes clear, dark pools separated by riffles and easy rapids. There are "fern falls," wildflowers, and an opportunity to see wildlife such as deer, bear, blue heron, green heron, and red-tailed hawk. There will be time for swimming, short hikes, fishing, and relaxing. (Grade A)

[88070] Ozark Spring Tour, Ozark National Scenic Riverways, Missouri—May 8-14. *Leaders, Sarah Rust and Anne Knott, 1282 Reaney Ave., St. Paul, MN 55106. Cost: $335.* Come paddle across the Ozark plateau through a land of bluffs, springs, and caves, while spring wildflowers are still blooming and summer tourists are still hibernating. The Ozark Scenic Riverways will offer us a corridor of wild land through an otherwise cultivated countryside. We will paddle every day, allowing plenty of time for swimming and side hikes up spring branches. Try an Ozark gravel bar campsite and fall asleep (if you can!) to a whippoorwill lullaby. Ozark streams are generally forgiving to novices but can be temperamental: Some canoeing experience is needed. (Grade B)

RESERVATION AND CANCELLATION POLICY

Eligibility: Our trips are open to Sierra Club members, applicants for membership, and members of organizations granting reciprocal privileges. You may include your membership application and fee with your reservation request.

Children must have their own memberships unless they are under 12 years of age.

Unless otherwise specified, a person under 18 years of age may join an outing only if accompanied by a parent or responsible adult or with the consent of the leader.

Applications: One reservation form should be filled out for each trip by each person; spouses and families (parents and children under 21) may use a single form. Mail your reservation together with the required deposit to the address below. No reservations will be accepted by telephone.

Reservations are confirmed on a first-come, first-served basis. However, when acceptance by the leader is required (based on applicant's experience, physical condition, etc.), the reservation is confirmed subject to the leader's approval, for which the member must apply promptly. When a trip is full, later applicants are put on a waitlist.

Give some thought to your real preferences. Some trips are moderate, some strenuous; a few are only for highly qualified participants. Be realistic about your physical condition and the degree of challenge you enjoy.

The Sierra Club reserves the right to conduct a lottery to determine priority for acceptance in the event that a trip is substantially oversubscribed shortly after publication.

Reservations are accepted subject to these general rules and to any specific conditions announced in the individual trip supplements.

Deposit: A deposit is required with every trip application. The amount of the deposit varies with the trip price, as follows:

Trip Price per person	*Deposit per person*
Up to $499	*$35 per individual (with a maximum of $100 per family on family trips)*
$500 and above (except Foreign Outings)	*$70 per individual*
All Foreign Trips	*$100 per individual*

The amount of a deposit is applied to the trip price when the reservation is confirmed. All deposits and payments should be in U.S. dollars.

Payments: Generally, adults and children pay the same price; some exceptions for family outings are noted. You will be billed upon receipt of your application. Full payment of trip fee is due 90 days prior to trip departure. Trips listed in the "Foreign" section require additional payment of $200 per person six months before departure. Payments for trips requiring the leader's acceptance are also due at the above times, regardless of your status. If payment is not received on time, the reservation may be cancelled and the deposit forfeited.

No payment (other than the required deposit) is necessary for those waitlisted. The applicant will be billed when placed on the trip.

The trip price does not include travel to and from the roadhead or specialized transportation on some trips (check trip supplement). Hawaii, Alaska, foreign, and sailing trip prices are all exclusive of airfare.

Transportation: Travel to and from the roadhead is your responsibility. To conserve resources, trip members are urged to form carpools on a shared-expense basis or to use public transportation. On North American trips the leader will try to match riders and drivers. On some overseas trips you may be asked to make your travel arrangements through a particular agency.

Confirmation: A reservation is held for a trip applicant, if there is space available, when the appropriate deposit has been received by the Outing Department. A written confirmation is sent to the applicant. Where leader approval is not required, there is an unconditional confirmation. Where leader approval is required, the reservation is confirmed, subject to the leader's approval. Where there is no space available when the application is received, the applicant is placed on the waitlist and the deposit is held pending an opening. When a leader-approval trip applicant is placed on the waitlist, the applicant should seek immediate leader approval, so that in the event of a vacancy we can confirm reservations of applicants who have leader approval.

When a person with a confirmed reservation cancels, the person at the head of the waitlist will automatically be confirmed on the trip, subject to leader approval on leader-approval trips. The applicant will not be contacted prior to this automatic reservation confirmation, except in the three days before trip departure.

Refunds: You must notify the Outing Department directly during working hours (weekdays, 9–5) of cancellation from either the trip or the waitlist. The amount of the refund is determined by the date that the notice of cancellation by a trip applicant is received at the Outing Department. The refund amount may be applied to an already confirmed reservation on another trip.

A cancellation from a leader-approval trip, when the Outing Department has confirmed the reservation subject to leader approval, is treated exactly as a cancellation from any other type of trip.

River-Raft, Sailing, & Whalewatching Cancellation Policy

In order to prevent loss to the Club of concessionaire cancellation fees, refunds on these trips might not be made until after the departure. On these trips, refunds will be made as follows:

No. of days prior to trip	Amount of trip cost refunded
45 or more	90% refunded
30–44	75% refunded*
14–29	50% refunded*
0–13	No refund*

*If the trip place can be filled by a full-paying member, then the cancellation fee shall amount to the nonrefundable deposit or 10% of the total trip cost, whichever is greater.

whether the leader has notified the applicant of approval or not.

The Cancellation Policy for River-Raft and Sailing Trips is separately stated.

The Outing Committee regrets that it cannot make exceptions to the Cancellation Policy for any reason, including personal emergencies. Cancellations for medical reasons are often covered by traveler's insurance, and trip applicants will receive a brochure describing this type of coverage. You can also obtain information from your local travel or insurance agent.

Trip leaders have no authority to grant or promise refunds.

Transfers: For transfers from a confirmed reservation made 14 or more days prior to the trip departure date, a transfer fee of $35 is charged per application.

Transfers made 1–13 days prior to the trip departure date will be treated as a cancellation, and the Cancellation Policy will apply. No transfer fee is charged if you transfer from a waitlist.

A complete transfer of funds from one confirmed reservation to another already-held confirmed reservation will be treated as a cancellation, and will be subject to cancellation fees.

Medical Precautions: On a few trips, a physician's statement of your physical fitness may be needed, and special inoculations may be required for foreign travel. Check with a physician regarding immunization against tetanus.

Emergency Care: In case of accident, illness, or a missing trip member, the Sierra Club, through its leaders, will attempt to provide aid and arrange search and evacuation assistance when the leader determines it is necessary or desirable. Costs of specialized means of evacuation or search (helicopter, etc.) and of medical care beyond first aid are the financial responsibility of the ill or injured person. Medical and evacuation insurance is advised, as the Club does not provide this coverage for domestic trips. Participants on foreign outings are covered by limited medical, accident, and repatriation insurance. Professional medical assistance is not ordinarily available on trips.

The Leader Is in Charge: At the leader's discretion, a member may be asked to leave the trip if the leader feels the person's further participation may be detrimental to the trip or to the individual.

Time or Event of Cancellation	Amount forfeited per person	Amount refunded per person
1) Disapproval by leader (once leader-approval information has been received) on leader-approval trips	None	All amounts paid toward trip price
2) Cancellation from waitlist, or the person has not been confirmed three days prior to trip departure	None	All amounts paid toward trip price
3) Trip cancelled by Sierra Club	None	All amounts paid toward trip price
4) Cancellation from confirmed position or confirmed position subject to leader approval		
a) 60 days or more prior to trip departure date	$35	All amounts paid toward trip price exceeding forfeited amount
b) 14–59 days prior to trip departure date	10% of trip fee, but not less than $35	As above
c) 4–13 days prior to trip departure date if replacement can be obtained from waitlist	10% of trip fee, plus $35 processing fee, but in no event more than 50% of total trip fee	As above
d) 4–13 days prior to trip departure date if replacement *cannot* be obtained from waitlist (or if there is no waitlist at the time of cancellation processing)	40% of trip fee, plus $35 processing fee, but in no event more than 50% of total trip fee	As above
e) 0–3 days prior to trip departure date	Trip fee	No refund
f) "No-show" at the roadhead, or if participant leaves during trip	Trip fee	No refund

Please Don't Bring These: Radios, sound equipment, firearms, and pets are not allowed on trips.

Mail checks and applications to:
Sierra Club Outing Department
Dept. #05618, San Francisco, CA 94139

Mail all other correspondence to:
Sierra Club Outing Department
730 Polk St., San Francisco, CA 94109
(415) 776-2211

For More Details on Outings

Outings are described more fully in trip supplements, which are available from the Outing Department. Trips vary in size, cost, and the physical stamina and experience required. New members may have difficulty judging which trip is best suited to their own abilities and interests. Don't sign up for the wrong one! Ask for the trip supplement before you make your reservations, saving yourself the cost and inconvenience of changing or cancelling a reservation. The first three supplements are free. Please enclose 50 cents apiece for extras. Write or phone the trip leader if any further questions remain.

Clip coupon and mail to: **Sierra Club Outing Department** 730 Polk St., San Francisco, CA 94109

Sierra Club Member: Yes_____ No_____

Send supplements:

#_____ #_____ #_____

(BY TRIP NUMBER)

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

Enclosed is $_____ for extra supplements at 50 cents each. Please allow 2–4 weeks for delivery. **Please do not mail cash.**

MEMBERSHIP NO.	TRIP NO.	TRIP NAME	DEPARTURE DATE

YOUR NAME	HAVE YOU RECEIVED THE TRIP SUPPLEMENT? YES ☐ NO ☐
STREET ADDRESS	YOUR HOME PHONE ( )
CITY STATE ZIP	YOUR WORK PHONE ( )

PLEASE PRINT YOUR NAME AND THE NAMES OF OTHER PEOPLE IN YOUR PARTY	MEMBERSHIP NO.	AGE	RELATIONSHIP	NO. OF OUTINGS YOU'VE BEEN ON: CHAPTER	NO. OF OUTINGS YOU'VE BEEN ON: NATIONAL	YEAR OF LAST NATIONAL OUTING
1.			SELF			
2.						
3.						
4.						

PER PERSON COST OF OUTING:	TOTAL COST THIS APPLICATION:	DEPOSIT ENCLOSED:	FOR OFFICE USE ONLY:

I WOULD LIKE TO HELP THE SIERRA CLUB CONTINUE ITS WORK! HERE IS MY CONTRIBUTION OF: M001

☐ $15 ☐ $25 ☐ $50 ☐ $100 ☐ OTHER $ _____

PLEASE MAKE CHECK PAYABLE TO SIERRA CLUB
MAIL TO: SIERRA CLUB OUTING DEPT., DEPT. #05618, SAN FRANCISCO, CA 94139

OUTING RESERVATION FORM

MEMBERSHIP NO.	TRIP NO.	TRIP NAME	DEPARTURE DATE

YOUR NAME	HAVE YOU RECEIVED THE TRIP SUPPLEMENT? YES ☐ NO ☐
STREET ADDRESS	YOUR HOME PHONE ( )
CITY STATE ZIP	YOUR WORK PHONE ( )

PLEASE PRINT YOUR NAME AND THE NAMES OF OTHER PEOPLE IN YOUR PARTY	MEMBERSHIP NO.	AGE	RELATIONSHIP	NO. OF OUTINGS YOU'VE BEEN ON: CHAPTER	NO. OF OUTINGS YOU'VE BEEN ON: NATIONAL	YEAR OF LAST NATIONAL OUTING
1.			SELF			
2.						
3.						
4.						

PER PERSON COST OF OUTING:	TOTAL COST THIS APPLICATION:	DEPOSIT ENCLOSED:	FOR OFFICE USE ONLY:

I WOULD LIKE TO HELP THE SIERRA CLUB CONTINUE ITS WORK! HERE IS MY CONTRIBUTION OF: M001

☐ $15 ☐ $25 ☐ $50 ☐ $100 ☐ OTHER $ _____

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Important Information On Sierra Club Outings

Mail To:
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Dept. #05618
San Francisco, CA 94139

1. Refer to the Reservation/Cancellation policy page for important payment information and instructions for filling out this application.
2. Deposits are nonrefundable, from a confirmed trip space.
3. All participants age 12 and over must be Sierra Club members to attend an outing.
4. Your address may be released to other trip participants for purposes of ride-sharing or other trip-related purposes.
5. Not all trips can accommodate special dietary needs or preferences. Contact the leader for this information before applying.
6. Applications for trip space will be accepted in the order that they are received at the following address:

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   Dept. #05618
   San Francisco, CA 94139

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   Dept. #05618
   San Francisco, CA 94139

Two Iowa Farmers Sow the Seeds of Change

Charles Isenhart

IN THE FLAT central-Iowa countryside, where row after straight row of tall corn and bushy soybeans make the landscape look monotonous, Dick and Sharon Thompson's farm is definitely different. The signs are everywhere—literally. Along the road in front of the house is one proclaiming "Thompson On-Farm Research." The fences are loaded with notices describing field experiments: "conventional till," "ridge till," "ridge till, no herbicide." A building out back is labeled "media barn."

The other signs aren't literal, but they're obvious if you're the typical farmer who pays close attention to the neighbors' fields. The Thompsons' farm offers the unusual sight of oats, hay, and (a rarity in Iowa) pastureland. Even their corn and soybean fields don't look the same as their neighbors'. The Thompsons' rows aren't "clean"; they have cover crops in them. The Thompsons' cattle are out in the pasture, and the manure produced by the operation's livestock is carefully banked in a concrete trench built into a low hill.

In a day when most midwestern farmers are specialists who try to produce one crop efficiently, Dick and Sharon are generalists—highly diversified farmers who practice what they call "regenerative agriculture." They are part of an agricultural reform movement that is sometimes known by other names: organic, sustainable, ecological, alternative, or biological farming.

Skeptics usually dismiss this movement as a throwback to the days of horse-drawn plows. Most farmers feel they can't produce enough to stay in business without herbicides, insecticides, artificial fertilizers, and animal antibiotics. But the Thompsons are proving that a commercial farm can make a profit and protect the environment at the same time.

In fact, the Thompsons have turned their 300-acre operation just east of Boone, Iowa, into a laboratory and classroom. They are working to make it a "closed-farming system," producing 1,300 hogs a year (without antibiotics) and just enough beef cattle to eat the hay grown in their crop rotations. Their grain crop is used to feed the livestock, and animal manure is combined with sludge from a nearby water-treatment plant to be used as fertilizer. The system depends on few, if any, high-cost, artificial fertilizers. Rotating their crops eliminates much of the need for insecticides.

Every September the Thompsons hold a "field day" to share the data from their experiments. This year, 550 people came from 16 states and two foreign countries to stand on the hayracks and sit in the media barn to listen to Sharon narrate a slide show illustrating alternative-farming methods. Agriculture must change, she tells them: "And if we are really going to be serious about the problems of erosion, pollution, and the high costs of farming, the change must come from within the farming community."

The Thompsons talk about rebuilding natural soil fertility without ruining wildlife habitat, contaminating groundwater, or polluting waterways with pesticides, nitrates, and soil runoff. "We've taken and taken and taken," Dick says, "and that can go on only so long—then the land can't give anymore."

Dick has a friendly, toothy grin and speaks thoughtfully in a voice that's prone to hoarseness. He is tall and slender and neatly dressed. He often admits that he doesn't have all the answers.

"The Thompsons don't try to impose their views on anybody," says Garth Youngberg, director of the Alternative Agriculture Institute in Greenbelt, Maryland. A gentle approach to agricultural activism makes Dick and Sharon Thompson adept at breaking down attitudinal as well as informational barriers to alternative farming.

During the fall field day, and on the many occasions when Dick speaks in public, he tells the story of his conversion to regenerative agriculture. After

"You can't sell recipes in farming. It didn't work chemically, and it won't work biologically."

Air Force duty in Japan in the 1950s, he earned a master of science degree in animal husbandry from Iowa State University, just down the road from his parents' farm. When he took over the family operation in 1957, Thompson pursued the vision of farming his professors were advocating: Take out the fences, expand, and specialize. Most midwestern farmers followed that advice, and many of them have since gone bankrupt.

"We did that for ten years," Thompson says. "We grew nothing but corn, using a lot of fertilizers and pesticides. But a nagging voice inside was saying there had to be something better. Things weren't working. The cattle were sick. The hogs were sick. We were hungry for change.

"During that time, a minister told us that God was going to teach us how to farm. Here I had two degrees in agriculture, and I had lived on a farm all my life, and a minister was telling me it's going to be different! Well, within a couple of weeks, a friend came along and took us to a meeting on natural farming. The speaker said we were going down a blind alley. It was like he hit me over the head with a two-by-four. So we quit using chemicals cold turkey."

That was 1967. Over the years, using what he calls the "faith factor" and "heeding hunches," Thompson developed a combination of new and traditional farming practices to maintain profitable yields and reduce soil erosion. But though Dick is obviously deeply religious—and frankly feels that God had a hand in his conversion to regenerative agriculture—he rarely speaks of his religious beliefs unless specifically asked to do so.

According to Youngberg, Thompson's spiritual motivation for being a steward of the land and natural resources isn't what makes him so unusual, anyway. "I've hardly ever talked to an organic farmer who doesn't feel that way," Youngberg adds. "What's unique about Dick is his ability to talk to both scientists and fellow farmers, bridging that gap between them. He's dedicated to finding scientific explanations for what's happening on his farm."

"I can govern my life by faith and hunches," Thompson says, "but that doesn't mean anything to other people. I need to understand what's going on, so I can explain it to somebody else."

The experiments that Thompson conducts on his farm explore the transition stages between conventional and alternative farming methods and are designed to find ways to eliminate or minimize the use of toxic substances. "Years ago I would stand up, and the first thing out of my mouth was 'I don't use chemicals,'" Thompson recalls. "And 95 percent of the audience was turned off. Now we take people from step A to step B to step C, rather than going straight from A to Z. Before, they couldn't see how to get across the gulf."

Thompson has become expert at ridge-tilling without herbicides. Using tailored equipment, he turns the ground into rows of tiny hills and valleys. The soil is protected through harsh winters by oats, hay, or hairy vetch—all of which inhibit weed seeds—planted before harvest. In the spring, the crops are planted on the ridges after the cover crops have been uprooted and pushed into the valleys. Any weeds in the valleys are left alone, where for a time they

are put to use as a ground cover. (Later, the weeds can be easily removed with a cultivator.)

Unlike his neighbors, who typically leave the soil exposed, Thompson doesn't plow up the soil in the fall. Plowing promotes weed growth, Thompson has found, requiring increased use of herbicides. According to Hal Cosby, Soil Conservation Service director for Boone County, Thompson loses one half as much soil to erosion as the average farmer in the area.

With some financial support (mostly for testing) from the Robert Rodale Regenerative Agriculture Association in Emmaus, Pennsylvania, Thompson began an ambitious variety of experiments

BILL WITT

Field days draw the whole family.

four years ago to answer questions like these: What kind of crop rotation is needed when chemical use is limited or eliminated? What's the best way to handle human and livestock wastes? Does loosening up the soil in the fall and packing it back down in the spring promote or inhibit weeds? Thompson has since planted more than 200 experimental plots.

"Testimonials go just so far," says Warren Sahs, an agronomist and superintendent of the Agriculture Research and Development Center in Mead, Nebraska. "Eventually you have to weigh it in, weigh it out, and get it down in hard facts. That's when people will pay attention."

Thompson has established his credibility with universities by setting up his experiments to meet strict scientific standards. But he still works "farmer style" to satisfy his peers. His crops are machine-harvested, not handpicked.

"Dick Thompson is a pioneer in on-farm research," says Bill Leibhart, former director of research at Rodale. "It's one thing for researchers like me to say, 'If you do it this way, it'll come out so-and-so.' Farmers are very skeptical of that. But the fact that they can come out and see Dick doing these things on his own farm in ways that they would do it is very convincing."

Thompson is one of a dozen or so Rodale-funded farmer-experimenters from Ohio to Minnesota. He is president of Practical Farmers of Iowa, a 110-member organization formed to research and disseminate information about alternative farming practices. According to the United States Department of Agriculture (USDA), the slow spread of new knowledge is a prime reason why organic farming methods have not been adopted until now.

"Conventional farming methods just aren't working, economically or environmentally," says Youngberg. "And it's not just a few people who believe that anymore. Farmers are increasingly concerned about groundwater contamination. They want answers to the question, 'How do I do things differently so that I won't contribute to the pollution of this resource?' You didn't hear that ten years ago."

Leibhart adds that the economic, environmental, and health problems that farmers are now facing are a kind of three-pronged attack pushing the whole alternative movement along.

"A few years ago, farmers were saying, 'We can't pay attention to alternative methods. We've got to produce. We've got to make a profit,'" Thompson says. "Since the economic crisis, and all the health and pollution problems we've been having, farmers are starting to pay attention to environmental concerns."

Studies conducted by the USDA have suggested that organic methods are more energy efficient. Thompson feels that alternative farming benefits wildlife as well. To gauge soil fertility, he counts

earthworms. He has noted that the reappearance of worms in the soil is bringing back some birds, even though central Iowa is largely denuded of wildlife habitat. "Last year I was one of the first farmers out in the fields because I was planting oats," he says. "And the gulls came. We had never seen them before, but the minute we stirred that ground they could smell the worms."

Despite Thompson's successes, skeptics still question the feasibility of regenerative agriculture. Glen Anderson, Boone County's extension director, calls Thompson "a little far-out" and adds, "He's doing some things on his farm that may or may not work in other cases."

Thompson freely admits that his methods may not be applicable to every agricultural operation: "You can't sell recipes in farming. It didn't work chemically, and it won't work biologically."

At the Thompsons', farmers gather to trade ideas.

Even without recipes, things are starting to cook in regenerative agriculture. Institutional research is moving from the back to the front burner. In December 1986, Iowa State University announced a five-year project that embraces some of the ideals held by the Practical Farmers. Thompson was named to the project's advisory board.

The USDA also thinks Thompson has come up with some of the right ingredients. "How can you criticize success?" asks Peter Myers, deputy secretary of the agency and formerly head of the Soil Conservation Service. He has visited the Thompson farm and, in the spring of 1986, invited Thompson to Washington for a three-hour presentation to USDA researchers. "I wanted them all to hear that the various practices they knew about were being put together in a successful commercial operation," Myers says.

Thompson showed the USDA experts the same homemade charts and slides that he shows to farmers. Along with the environmental benefits, his data showed that regenerative agriculture reduces the cost of production. The agency subsequently convened a group of government and university researchers to promote more study of these cost-effective farming methods.

These days, though, Dick and Sharon are learning as much about teaching as about regenerative farming. They speak publicly about 40 times a year, addressing a growing rural audience interested in their message. "Our vacations are spent going out to do these presentations," Dick says. "But meeting new people has been a nice experience that's been worth it all."

The Thompsons hope their audiences develop a sense of land stewardship because of ethical commitment, not economic emergency. Otherwise, Sharon says, "When the economics change again, they'll go the same way the wind's blowing." They're happy to see that "children and grandchildren" in the regenerative movement are experimenting on other farms in different soil and weather conditions.

The Sierra Club's Iowa Chapter honored the couple in 1985 for what the Thompsons call their "public ministry." In presenting the chapter's first-ever Steward of the Land Award, Mark Henderson, then cochair of the chapter's agriculture committee, said: "Dick and Sharon have proved that it's possible to get high yields without chemical fertilizers, without pesticides, and without weed problems. People from around the United States, and now from around the world, are seeking information from these two agricultural pioneers. We should all be thankful for people like them." ■

CHARLES ISENHART, *a freelance writer from Dubuque, Iowa, specializes in agricultural issues.*

Eighteen Holes at the Oasis

PALM SPRINGS, CALIFORNIA

JUST OUTSIDE of Palm Springs, where the foothills of California's San Jacinto Mountains meet the desert, three canyons shelter the most spectacular palm oases to be found in the United States.

Each spring the Paniktum hemki people, ancestors of the present-day Cahuilla Indians, used to walk through this area to gather acorns in the San Jacintos. Signs of their campsites remain near the canyons' turquoise pools. Throughout the canyons, pottery shards, grinding holes, and well-defined footpaths remind visitors of the past.

Now the alluvial fan that serves as the entrance to these canyons is in imminent danger of being carpeted with hybrid grass and paved with colored cement. Like the canyons, the fan was once protected as part of the Cahuillas' Agua Caliente Tribal Reserve but has since been allotted to individual Indian families. These families have agreed to lease the land to a developer who intends to construct a golf course, a multistory clubhouse, 295 homes, and a 250-room hotel on the 450-acre site.

Tribal members are divided on the issue, and the Agua Caliente tribal council has taken no stand. The Sierra Club's San Gorgonio Chapter is trying to convince the Riverside County board of supervisors to reject the development proposal. At hearings in September chapter representatives argued that the project is incompatible with provisions in the county's general plan that call for preservation of important open space. The group also pointed out that golf courses are common (Palm Springs already has more than 60), while the palm oases in these canyons are unparalleled in the nation.

FRANK S. BALTHIS

More than 6,000 native fan palms line the creeks of the Indian Canyons. The area's diverse streamside and desert sites host some 200 other plant species as well.

The Indian Canyons are also well known for their archaeological riches. One large boulder contains eighteen bedrock mortar holes and seven milling sites where generations of women have prepared food. Remnants of a water-control system that was begun as early as A.D. 900 can also be found.

"I don't know of any other place where you have such fine natural resources and historical resources blended together," says Pete Dangermond, the former California state parks director who is now working as a consultant to a local group called the Friends of the Indian Canyons. "I know of no better

place in all of California to explain Indian heritage."

The group has proposed an alternative to development: establishing an 18,000-acre Indian Canyons Heritage Park. Nineteen million dollars would be available to buy lands for the park if the California Wildlife, Coastal, and Park Land Conservation Act qualifies for the June 1988 state ballot and is approved by the voters. Under the Friends' plan, lands now protected as part of the Tribal Reserve would remain under Indian control, lands purchased from individual Indians would be added to the reserve, and lands purchased from non-Indians would either be leased to the tribe or managed by the state.

Senator Alan Cranston's California Desert Protection Act (S.2061) would also help preserve the area by setting up a 490-acre Indian Canyons National Historic Site at the gateway to the oases, on the very lands where development is now proposed by members of the tribe. Under the bill, acreage purchased from these Indian families would be placed in the Tribal Reserve under the supervision of the tribe.

Conservationists hope that the Riverside County supervisors can be convinced to reject the developer's plan, or at least to postpone their decision until voters have a chance to determine the fate of these unique canyons.

—Olivia Redwine

The House Abandons a Desert Dam

VERDE RIVER, ARIZONA

The Verde River's yearly rise and fall, which nourishes a rare strip of green in the Arizona desert, will remain undisturbed if a recent agreement between environmentalists and members of Congress holds firm.

Cliff Dam, proposed to control flooding in an area northeast of Phoenix, would have inundated a ten-mile stretch of the Verde, threatening a population of rare desert-nesting bald eagles. In June the state's congressional delegation unanimously agreed to stop seeking funds for the dam in return for an end to environmentalists' opposition to Plan 6, the last leg of the $3.32 billion Central Arizona Project. The House approved the deal later that month and at presstime it was under consideration by the Senate.

"Both sides got what they needed most in the House," says Rob Smith, the Sierra Club's Assistant Southwest Representative in Phoenix. "Supporters of Plan 6 got the other dams they wanted. Environmentalists got an assurance that this threat to nearly 10 percent of the streamside habitat in Arizona's desert will be dropped once and for all."

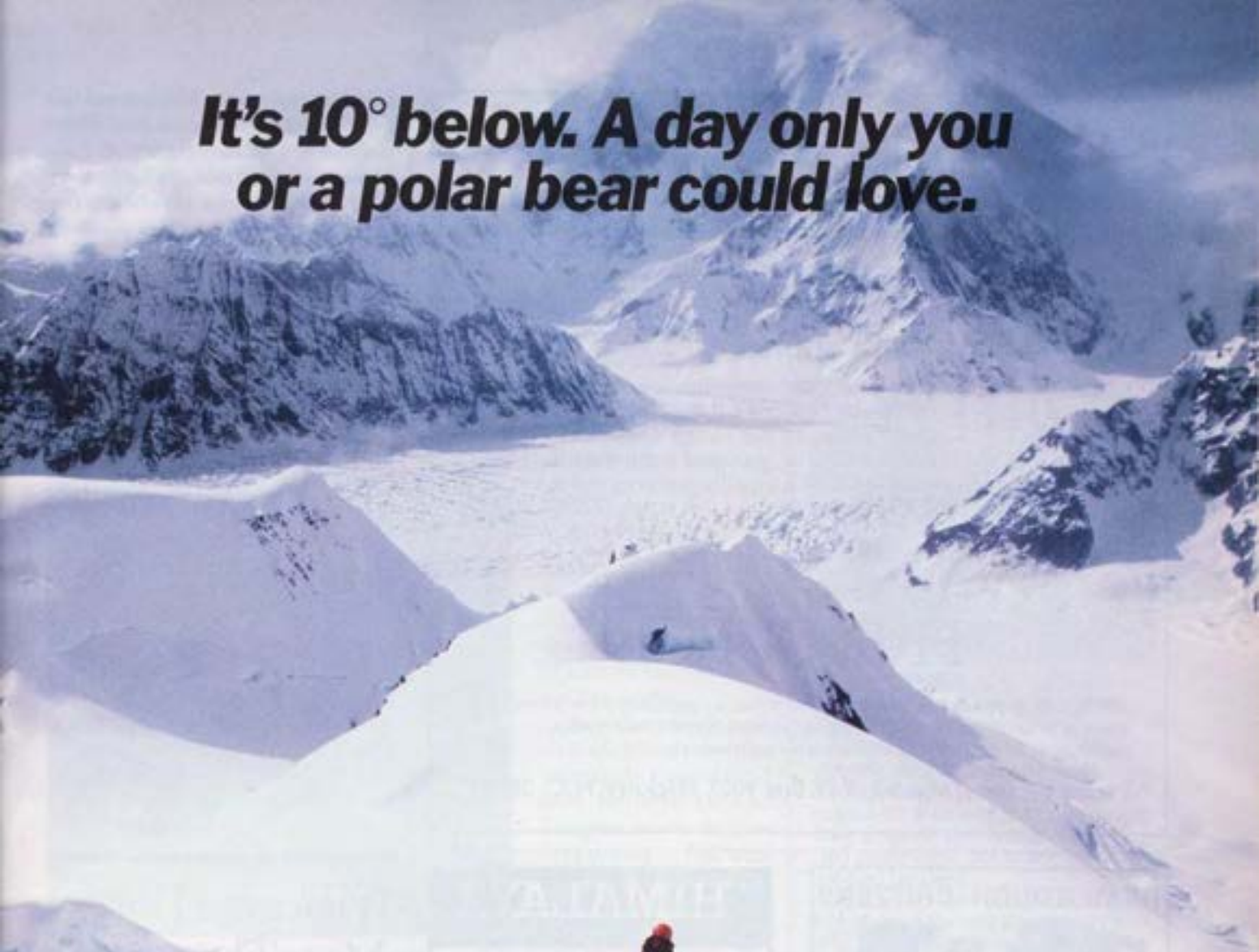
Smith says that what remains in Plan 6 involves mostly modifications of existing dam sites. The plan now calls for raising Roosevelt Dam and reconstructing Stewart Mountain Dam—both on the Salt River. It also includes safety improvements on two existing Verde River dams and construction of a new dam near the existing Waddell Dam site on the Agua Fria River, also in the Salt River drainage.

Several factors made the original Plan

ART WOLFE

A rare desert-nesting population of bald eagles could have been decimated by the Corps of Engineers' plan to build Cliff Dam on the Verde River in Arizona.

It's 10° below. A day only you or a polar bear could love.



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6 package vulnerable. The cost had ballooned to $1.1 billion—a tenfold increase over 1968 figures even after adjustments for inflation. A 1986 Army Corps of Engineers study showed that Cliff Dam wasn't necessary for flood control and didn't significantly enhance the safety of downstream dams. A coalition that included the Sierra Club, the Audubon Society, Friends of the Earth, and the National Wildlife Federation added to the project's troubles by challenging Cliff Dam in court.

Then Rep. Lawrence Coughlin (R-Pa.) threatened to offer an appropriations-bill amendment that would have cut off all funds for Plan 6. At that point members of the Arizona delegation were ready to compromise. "Had the battle gone to the House floor," says Rep. Jon Kyl (R-Ariz.) "we risked losing the entire Plan 6."

Bob Witzeman, who as conservation chair of the Maricopa Audubon Society spearheaded the fight against the dam, is pleased with the recent compromise. He calls it "a victory for Arizonans—and for all people who enjoy the beauty of a wild desert river."—*Dan Dagget*

Wilderness Worth More Than Gold

ARC DOME, NEVADA

Quick legal action has stopped two gold miners from bulldozing a road three and a half miles into one of Nevada's most popular and spectacular unprotected wilderness areas.

The miners have claims that lie in the heart of the 225,000-acre Arc Dome roadless area, where granite peaks straddling central Nevada's Toiyabe Range soar 6,000 feet above the surrounding desert. Twenty-five inches of rain a year sustain conifers and aspen, a thriving trout fishery, and habitat for eagles, mountain lions, and bighorn sheep.

The area is so wild that the management plan for the Toiyabe National Forest recommends that much of it be protected as wilderness. In 1986 the House of Representatives approved a Nevada wilderness bill that would have preserved a large portion of the area, but the

legislation stalled and died in the Senate.

Meanwhile, in September of that year, the Toiyabe National Forest supervisor issued a permit to the two miners to rebuild a washed-out road in the South Twin River canyon. He claimed that because of the 1872 Mining Law he was powerless to block access to a mining claim.

GLENN C. MILLER

Hikers explore Nevada's South Twin River drainage, where a gold mine threatens a scenic roadless area. Congress may soon take action to resolve the conflict.

Conservationists countered that pack animals or new balloon-tired all-terrain vehicles could carry the necessary equipment without scarring hillsides and meadows with a permanent road. Furthermore, they said, the Forest Service had failed to require a bond or reclamation plan from the miners before authorizing the construction project.

In early June of this year the miners announced that they were ready to bulldoze the road, a job they could have finished in a couple of days. With the help of the Sierra Club Legal Defense Fund (SCLDF), the Club's Toiyabe Chapter immediately appealed to Forest Service Chief F. Dale Robertson, asking him to suspend the road-building and review the forest supervisor's decision. Robertson refused.

"It was an outrageous decision," says SCLDF attorney Julie McDonald. "The Forest Service had decided to sacrifice the wilderness without even requiring proof that there was enough gold there to warrant the cost of road construction."

The Toiyabe Chapter then filed suit in U.S. District Court in Reno. Seventy-two hours before the agency was to appear before the judge, Robertson caved in and ordered the miners to halt. A few weeks later he asked the Toiyabe forest supervisor to reconsider his decision to issue the miners a road-building permit.

With the permit now on hold, Nevada environmentalists have shifted their attention back to Congress, where they are supporting a bill that would protect 1.4 million acres of wilderness, including 146,000 acres surrounding Arc Dome. The legislation was introduced in the House by Reps. Richard Lehman (D-Calif.), Peter Kostmayer (D-Pa.), and George Darden (D-Ga.).

Nevada's new senator, Harry Reid (D), has dropped the heart of Arc Dome from a wilderness bill he introduced, citing conflicts with mining. Nevada environmentalists, many of whom enthusiastically supported his campaign last year, are very disappointed. "Dropping the most spectacular parts of Arc Dome was a gross error by Senator Reid," says Glenn Miller, chair of the Toiyabe Chapter's mining subcommittee. "We are hopeful they will be included in the final bill." Reid's legislation would designate as wilderness only about one third, or 82,000 acres, of the Arc Dome roadless area.

To help win public support, environmentalists have prepared a five-minute

videotape of the Arc Dome wilderness. It is available from the Northern California/Nevada office of the Sierra Club, 5428 College Ave., Oakland, CA 94618; (415) 654-7847. —*Tom Turner, Sierra Club Legal Defense Fund*

Citizens Douse a Hazardous Burn

GRAND FORKS, NORTH DAKOTA

After several years in urban areas, 36-year-old Kathy Williams decided to go home to Grand Forks, North Dakota, to earn a degree in sociology.

She soon found that the town was not the quiet, safe place that she had envisioned, however. Just a block away from her house, the University of North Dakota's Energy Research Center was planning to incinerate cancer-causing PCBs (polychlorinated biphenyls). The experiment, funded by the Union Carbide Corporation, was designed to test a new PCB-disposal technique.

Williams and her mother, Mary, sent a letter to the university researchers, asking if the experiment was safe. They received a two-sentence reply telling them to hold their questions until the university held a public meeting.

"That frustrated us," Williams told the *Grand Forks Herald.* With the support of local Sierra Club activists, the two held a meeting for concerned citizens in the public library. Later, with funding from some of the people who attended that meeting and the Sierra Club's Agassiz Basin Group, Williams set up an organization called Citizens Concerned About Toxic Hazards (CCATH).

At first the group gathered information about the hazards involved in burning PCBs. They found that, when burned, PCBs can produce an even more potent carcinogen called dioxin. While the university's researchers said that temperatures in the PCB furnace would be too hot to produce dioxin, CCATH found other experts who questioned that claim or who were concerned about the substances that would form in diox-

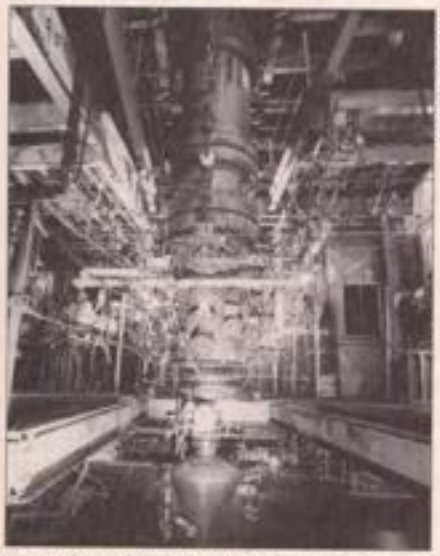
in's place. Recalling past accidents at the site, former Research Center safety officer Phillip Freeman cast doubt on the furnace's reliability.

For weeks residents, researchers, and outside experts debated the issue in the press. Then, in November 1986, after talking with CCATH members, University President Thomas Clifford suspended the tests. Soon afterward the North Dakota State Health Department announced a February hearing to review the project's permit.

Many residents spoke at the three-day hearing about the inappropriateness of the site. Other opponents, including CCATH's attorney, David C. Thompson, argued against the plan on technical grounds. Thompson said the plan was fraught with "incompetent management and faulty scientific theory, mechanical design, and operation."

In the end North Dakota's state health officer, Robert Wentz, revoked the permit for the project, saying he could not adequately assess its risk. He also said he would discourage further hazardous-material research in populated areas.

When she heard the news, Williams felt she had finally come home again. Members of CCATH were both proud and surprised. "In North Dakota, environmentalists often rally to a cause only to lose in the end," says the Sierra Club's Dacotah Chapter chair, Dexter Perkins. "This time, a concentrated effort paid off."—***Joan Hamilton***



COURTESY UND/EMRC

The University of North Dakota's aging coal gasifier. State officials have decided that it is not the place to burn PCBs.

SIERRA NOTES

The National News Report, published about 28 times each year (weekly when Congress is in session), is the Sierra Club publication designed to help activists stay on top of the latest in environmental legislation. Conservation Editor Anthony Antico in San Francisco and Washington, D.C., Editor Melanie L. Griffin gather and print summaries of the news as it breaks, listing the names and telephone numbers of people to contact for further information.

Now in its 18th year, the concisely written *NNR* is an insider's look at the workings of the environmental movement and a way for activists to keep up-to-date on national and regional campaigns. A one-year subscription costs $15 ($30 outside the U.S.). Checks should be mailed to *Sierra Club National News Report*, 730 Polk St., San Francisco, CA 94109. A free sample copy is available on request.

Sierra Club Books ushers in the holiday gift-giving season this year with the publication of *The Sierra Club Mountain Light Postcard Collection*, a portfolio by Galen Rowell ($8.95, paper). Included among the 30 selections from Rowell's seventh book, *Mountain Light*, are such famous images as "Cloud Cap on K2, the Himalayas," "Yosemite Valley in Winter," and "Vermillion Lakes, Canadian Rockies."

A blend of travel and natural-history writing, *Shark: A Photographer's Story* ($19.95, cloth) is marine explorer Jeremy Stafford-Deitsch's recounting of his three-year global odyssey to study and photograph these fascinating and much-feared predators. The book is illustrated with 130 full-color action photographs. In *The Whale War* ($19.95, cloth; $9.95, paper), David Day chronicles the continuing worldwide struggle to save whales. Recounting events in dozens of "theaters of war," Day examines the intrigues, conspiracies, and cover-ups that allow the whaling industry to continue its slaughter.

Backpacking, rock climbing, and fossil identification are a part of *Adventuring in the California Desert: The Sierra Club Travel Guide to the Great Basin, Mojave, and Colorado Desert Regions of California* by Lynne Foster ($12.95, paper). Everything from natural history to appropriate clothing is covered in this guide to a 25-million-acre region that is visited by more than 8 million people each year.

Now in paperback, William H. Calvin's *The River That Flows Uphill* ($12.95) is an account of a 225-mile raft tour of the Grand Canyon—as well as a journey of the imagination.

These books may be ordered from the Sierra Club Store, Dept. T-150, 730 Polk St., San Francisco, CA 94109. Include $3 per order for shipping and handling. California and Arizona residents should also enclose sales tax. Members may subtract a 10-percent discount. Allow four weeks for delivery.

"Outside in Hawaii" is the nation's first environmental video series designed for public broadcast, according to Gary Anderson, chair of the Sierra Club's Hawaii Chapter. The chapter's Honolulu Group has been training a team of environmentalists to produce these videos as "an alternative to the exploitative imagery generated by commercial television," which urges viewers to consume, Anderson says. "Instead of blood, guns, crashing cars, and bouncing bosoms, there are waterfalls, rainbows, and birdsongs." Each of the 29-minute films features footage of Hawaii's scenic grandeur accompanied by a "new age" soundtrack. The producers believe that the programs subtly suggest conservation.

Anderson hopes that other Sierra Club groups will develop similar series for placement on local public-access television stations. For a handling fee of $2.50 he will send a sample video to any group requesting it, along with information about effective video production. Write to Gary Anderson, Sierra Club, P.O. Box 11070, Honolulu, HI 96828; (808) 946-8494.

The California Coastal Trails Foundation has produced a four-color map, "Trails of the Lost Coast," depict-

ing what it calls "60 miles of the wildest coast in California." The areas mapped are primarily within the Bureau of Land Management's King Range National Conservation Area and the Sinkyone Wilderness State Park in northern Mendocino and southern Humboldt counties. The Foundation undertook the project because it felt a new map was needed to help make critical land-use decisions in the area.

For a copy of the map, send your name, address, and a check for $2.50 to the California Coastal Trails Foundation, Attn.: Lost Coast Map, P.O. Box 20073, Santa Barbara, CA 93120.

Restoring the Earth, 1988, a conference to be held January 13–16 at the University of California at Berkeley, will focus on ways to rebuild coastal ecosystems and estuaries, rivers and lakes, rangelands, prairies, mined lands, forests and wildlife, and other types of natural-resource areas. Participants will also explore new visions for structuring human settlements. The conference is being organized by the Restoring the Earth project of The Tides Foundation in San Francisco and cosponsored by the Center for Environmental Design Research at the university. Information is available from Restoring the Earth Conference, 1713-C Martin Luther King, Jr., Way, Berkeley, CA 94709; (415) 843-2645.

The Buckeye Trail, which makes an 1,100-mile circuit of the Ohio countryside, is being planned, marked, mapped, and maintained by the volunteers of the Buckeye Trail Association in cooperation with the Ohio Department of Natural Resources and the U.S. Forest Service, among other agencies. The trail follows woodland paths, back roads, and a canal towpath, linking parks, forests, wildlife refuges, reclaimed mines, wayside inns, and mills. Bicycles are allowed only where the trail follows public roads. Backpacking is encouraged, though approved campsites are still few and far between.

Maps and trail guides are available from the Buckeye Trail Association, P.O. Box 254, Worthington, OH 48085. For a brochure, send a stamped, self-addressed envelope. ■

Reading the Rocks

ROCKS, DESPITE THEIR SILENCE, tell fascinating stories. A rock's colors, patterns, and shape give us clues about the history of an area's landforms, its plants and animals, and its climate.

A geologist looks at a beachfront cliff, a mountaintop, or a stream rushing through a V-shaped valley and asks, "Why is this here?" But while a geologist studies rocks for years, the casual rockhound can learn fairly quickly to "read" rocks for important clues to an area's past. All it takes is the desire to observe the geologic activities occurring in an area, some knowledge of common geologic processes, and an active imagination to piece the evidence into sketches of possible past and future geologic events.

The most important clue to unraveling the puzzle is the principle that the ancient forces that created the landscape are basically similar to the processes going on today. It's exciting to think of earthquakes and floods suddenly creating jagged mountains and rugged coastlines, but the fact is that the landmarks were more likely created by slow but continual natural processes over millions of years. The land subjected to these forces may have been slowly raised above and lowered below sea level many times over millions, and sometimes billions, of years.

Studies of rocks as old as Earth (about 4.6 billion years) tell us that the atmosphere once differed from today's and that the world's volcanoes were once more active. Studies of newer rocks, however, show that Earth's geologic events and its climate (temperature, rainfall, wind conditions) were much like those we know today, even as far back as 600 million years. If you slow down and think in geologic time, it becomes easy to understand how 10 million years ago an ancient but persistent stream flowing over a dry sea floor could eventually become the Colorado River carving its way through the Grand Canyon.

Because they are the most common rocks near Earth's surface, sedimentary rocks are usually the easiest to read. They are formed when loose layers of dirt and other material created by erosion or chemical processes are packed into a hard, solid material. These rocks are also often the most interesting to study because you find fossils in them. Fossils are animal and plant remains, or traces of life such as footprints or trails.

About 75 percent of Earth, including most of the ocean floor, is covered with sedimentary rock. When you walk along a sandy beach or a muddy riverbank you are probably walking on sediments. These sediments may have once been part of huge rocks that were subjected to weathering and erosion. Weathering occurs when contact with water, oxygen, and natural acids that exist in the atmosphere wears away a rock over many years. During erosion, a more active process, wind, waves,

KENT & DONNA DANNEN

A 40- to 65-million-year-old fossil fish in Wyoming. A fossil usually forms when a plant or animal dies and is covered with sediments. When any living thing dies, it decays or is eaten by an animal. The harder parts—bones, teeth, shells—last longer, so they stand a chance of being preserved.

Waves pound at the base of a cliff, spreading eroded sediment over a broad underwater slope. This marine terrace on the California coast was once the offshore slope, now exposed because geologic forces slowly lifted the land above the sea.

LARRY ULRICH

BACKGROUND: LARRY ULRICH

While mountains, seashores, and other large geologic wonders are the most obvious places to study geologic history, sedimentary rocks can be read anywhere they are exposed. Cuts made in hillsides for highways (such as this one in Wyoming's Big Horn National Forest) are good places to investigate. These sedimentary beds have been deformed by folding.
KENT & DONNA DANNEN

Cross-bedding formed by ancient sand dunes in Zion National Park. When streambeds, raindrop impressions, and ripple marks fill with sand or mud and become compacted and cemented, the patterns give us valuable clues to the history of a region's climate.
KENT & DONNA DANNEN

DAVID MUENCH

Seneca Rocks in West Virginia is typical of the Appalachian Mountains' widespread sedimentary formations. Here, horizontal beds have been uplifted and tilted. The layers of soft rock (shale) have been eroded by streams, creating parallel valleys, while the harder rock layers (sandstone and limestone) have remained as a series of parallel ridges. The Appalachians' even-topped ridges sometimes extend for hundreds of miles.

LARRY ULRICH

Coal Canyon, 45 miles east of the Grand Canyon, is an excellent example of undisturbed horizontal beds formed at the bottom of an ancient, shallow sea. As water freezes into ice, its expansion breaks up the rock beds, eventually sculpting the canyon's spires and pinnacles. Minerals lend brilliant colors to the layers, or strata. For example, iron oxide—iron combined with oxygen from the air—provides red and yellow tones.

glaciers, and especially flowing streams attack rocks and move weathered fragments from high areas to low ones—sometimes only a few feet, sometimes hundreds of miles.

As wind, ice, or water drop their eroded pieces of rock, sediments build up in layers. Over time the weight of the top layers puts pressure on the lower layers, compacting them and squeezing out the water in them. This water dissolves some of the sediments' minerals. Later, when conditions are right, these minerals are deposited as "cement" that holds the particles together, turning soft sediment into hard rock.

Sedimentary rocks can also form from chemicals dissolved in water. When the water evaporates, minerals are left behind. A good example of this is rock salt, which forms when a concentrated brine evaporates. The Great Salt Lake is the remainder of a larger lake that once covered much of the northwestern part of Utah, and which slowly disappeared as the climate grew drier.

Fossils are the most fascinating entries in a sedimentary rock's journal. Fossils found in sedimentary rocks can be arranged in sequence—those from older rocks differ more from modern life forms than do those from younger rocks. This fact is the heart of the theory of organic evolution, the idea that living species have changed over time.

Palm-tree fossils in Greenland tell us the area once had a warm, humid climate. Clam shells and other marine fossils indicate that much of the western United States was once covered by a shallow sea. In South Dakota's Badlands National Park, fossils of large sea turtles also point to a maritime past. On the other hand, bones of giant reptiles preserved in the sandstone of Dinosaur National Monument in Utah and Colorado indicate that this area must have once been a sandy flat on a river plain, perhaps next to a watering hole.

Whether you study sedimentary rocks for evidence of Earth's early life forms or for clues to the development of its landforms, your approach should be the same: Think of the landscape changing slowly and continually over thousands and millions of years. ■

Kathleen Almy is a naturalist and freelance writer living in Fort Collins, Colorado.

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7,300 Days...and Counting

Marty Olmstead

TWENTY YEARS AGO, if you wanted to tack a calendar onto your wall to keep tabs on appointments, birthdays, and family activities, you had to choose between the one handed out at your neighborhood cleaners or the one sent to you in the mail by your insurance company. There simply were few appealing options.

That was before Ian Ballantine (who pioneered paperback book publishing in this country) persuaded David Brower, then Executive Director of the Sierra Club, to copublish the first Sierra Club calendar with him. It was a novel idea for the Club, and the ensuing collaboration, which tapped into the public's love of wilderness and its increasing environmental consciousness, became the most profitable fundraising enterprise in the Club's history.

Brower and Ballantine produced the first calendar from photographs published in Sierra Club books, including *Galápagos: The Flow of Wildness*, Eliot Porter's two-volume set on the Galápagos Islands.

"We thought of the calendar simply as a way of promoting the books," recalls Ballantine, now with Bantam Books in New York. "Ballantine Books had been doing paperbound editions of wonderful hardcover books that David Brower published for the Sierra Club. We thought it would be a good thing if we could sell the promotional materials—the calendars—to the public, and that it would be even nicer if people would put them on their walls."

Ballantine and Brower met with some initial resistance to their publishing idea. People in the business told them, "You can't *sell* calendars, because all people have to do is walk down to the corner drugstore and get one free." But the two were confident their Sierra Club calendar was more attractive and would have greater public appeal. The first printing, a limited edition of 15,000, met with such instant success that the following year the printing was quintupled to 75,000 copies. "For one thing, the beauty of the Sierra Club Exhibit Format books spoke for itself," Ballantine says. "And I believe the calendars they spawned gave people a polite way to express their sensibilities and beliefs."

That the early calendars simply reproduced photographs from the Exhibit Format books was of little concern to those who bought them. "No one seemed to mind," writes Brower in his introduction to the 1988 *Sierra Club Wilderness Calendar*, "because the purpose of our books and the calendars was to reveal and interpret the natural laws governing wildness. Wildness was something that the ages had made perfect, we said. It was something quite beyond our ability to create, but not beyond our ability to preserve."

Twenty years later, the process of selecting photographs is more complex. For one thing, there are now five—not just one—distinct Sierra Club calendars published each year: the Wilderness Calendar; the Trail Calendar; the Wildlife Calendar; the Engagement Calendar; and, introduced just this year, the "Nature in Close-up" Pocket Calendar. And very few photos are borrowed from books published by the Sierra Club anymore. In the early 1970s, the competition for inclusion in the calendars was opened to amateur and professional photographers alike. Probably every landscape photographer in the country is aware of the August 1 deadline for submissions for the calendars scheduled to come out 16 months later.

Last year, calendar editor James Cohee and his colleagues at Sierra Club Books in San Francisco—including special projects editor Linda Gunnarson and production designer Eileen Max—were inundated with 65,000 slides, only 140 of which were destined to be published in 1988. The selection of photos is one of the most arduous tasks in the production process, and leads to some

lively debates as Cohee and his team cull their choices from stacks upon stacks of candidates.

The ritual begins in early spring, after hundreds of photographers write in requesting specifications and guidelines for the upcoming calendars. When librarian and calendar coordinator Frances Spear reports to work in April, her first task is to send out some 2,000 copies of the guidelines detailing the submission rules and regulations. In them, photographers receive a bare-bones description of the requirements for the various calendars. But those specifics barely hint at the complex criteria for selection, which can change every year and depend on the editors' tastes, previous choices, and the current crop of submissions.

"For the wall calendars," says Sierra Club Books Publisher Jon Beckmann, "we look for the most posterly, painterly pictures—ones that can be seen from across the room, that are easily readable, and that have a strong composition." His editors look for richness in color and texture; the images must "satisfy the eye just as an oil landscape painting does."

Trail Calendar photographs, Beckmann says, must explore the relationship between human beings and nature, avoiding close-ups of people. "We occasionally like a certain kind of quiet mood," he adds, "an activity that everyone can relate to, such as a child running on the beach."

Wildlife Calendar images must be of animals people can respond to warmly, such as the orangutan or the snow monkeys of Japan (featured in the 1988 edition). One or two close-ups of an animal are normally included, Beckmann says, and must "bring out the animal's personality."

The transparencies begin arriving in San Francisco around May 15. "But about half of them arrive in the final week before deadline," says Spear, who logs them in and passes them along to freelance photo editors who weed out transparencies that are blatantly out of focus or otherwise inappropriate. (Over the years, photographers have submitted pictures of stuffed and mounted animals, freeways and urban landscapes—even shots of human nudes in nature.)

Once the slides are labeled and sorted, a team of freelance photographers makes the "first-round cut," eliminating 75 percent of the total. Then Sierra Club Books staffers wade in, selecting their candidates and trying to decide which calendar a close-up of a baby racoon should go into, and whether a field of contoured snow would work better in January or February.

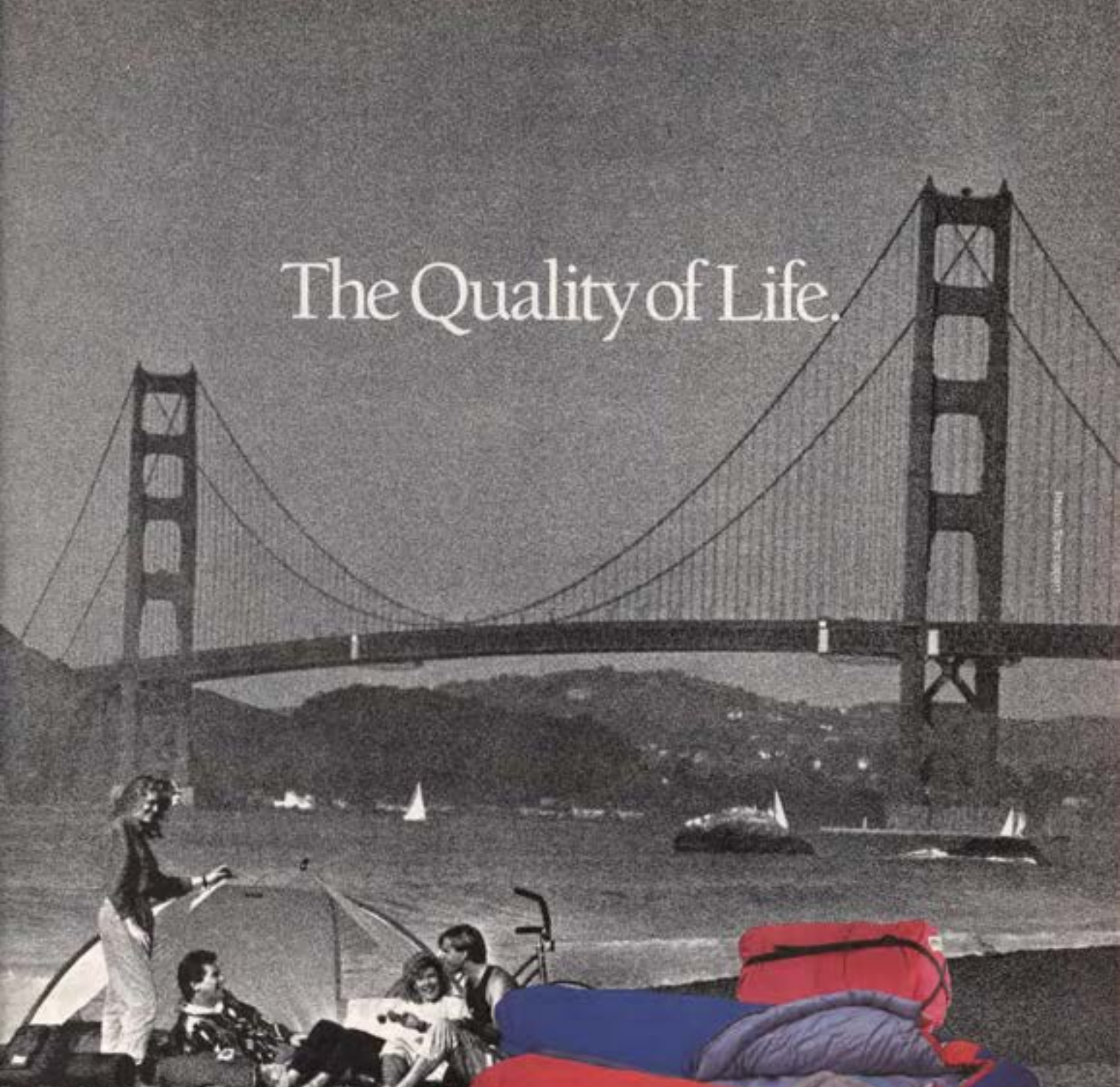
The editors have learned what the public responds to favorably. The formula for the Wall and Engagement calendars is tried and true and is not likely to undergo any major revision in years to come. Photograph requirements for the new Pocket Calendar, however, are different and still experimental. "The traditional distant landscape photography that the Sierra Club has been associated with for so long doesn't work on the scale of the pocket calendar," says James Cohee. Big landscape photos, he adds, "begin to look like postage stamps at that size."

Finding photographs that are both attractive and seasonally relevant is the editors' greatest challenge. They look for variety of subject matter, location, color, scope, and format. "Choosing among all these excellent transparencies is an art," says Beckmann. "Everybody is trying to find the right combination out of the many boxes of slides." His editors, he says, try to find *calendars*, not pictures. "The result is not necessarily a calendar of the best images, but 14 photographs [for wall calendars] that fit together as a concept."

The submissions that make the cut—after being examined on a light table by loupe-wielding editors who inspect them for design, color, and composition—are set aside to be considered for particular calendars. Keeping track of the dozens of candidates throughout the months is a major organizational problem; each editor must sign out every slide taken from the boxes lest a single one be misplaced.

For a few months each summer, the Sierra Club Books department becomes chaotic, a Babel of opinionated editors arguing the merits of their chosen slides. "Everyone is trying to find the right combination out of the boxes of transparencies," says Beckmann. "It's democratic." Before it's over, dozens of calen-

The Quality of Life.



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The Business of Quality

dars will have been created, criticized, torn apart, and re-created.

"In the final rounds," says Cohee, "we never look at the images separately, but only as part of the complete calendar, laid out in order. That's the way we find 'accidents,' such as a number of photographs of fallen trees in the Southwest, or some other repetition."

While all of this is occurring, Random House, the New York publisher, is playing a major role. The Sierra Club licensed Random House in 1982 to publish the calendars—the Club serving, in effect, as author. Together they developed the promotional materials for the calendars' 20th-anniversary celebration, and Sierra Club Books' marketing director, Peter Beren, expects that the nationwide publicity campaign "will provide a platform for a record sales year."

After Cohee and his colleagues have made their selections, a Random House production editor arrives from New York to review them and to assess which ones may or may not reproduce well enough for inclusion in the four-color calendars.

Candidates for next season's calendars cover the light table at Sierra Club Books.

At this point Eileen Max sits down and writes detailed instructions for color separation, much as an art historian would. "The images must be separated on a laser scanner," she says, "which reads every millimeter of the transparency and transfers the information electronically onto the film."

By October, Spear is sending letters of congratulation to the photographers whose work has been selected, along with contracts specifying the Sierra Club's right to one-time use of the transparencies. (After that, the photographers are free to re-sell the images as posters or in whatever other form they choose.)

Meanwhile, Max travels to New York to meet with a Random House editor and production supervisor. She also meets with the printers who will do the exacting work of reproducing the images. Before signing off on them she will review three sets of proofs, an uncommon effort since most publishers insist on seeing only one set.

Sixteen months later the completed calendars are en route to the Random House warehouse in Maryland, just in time for distribution in July.

When at last they are in bookstores around the world, they face stiff competition. Buyers are presented with a seemingly infinite number of calendar choices for the upcoming year. Waldenbooks, which has some thousand stores in the United States, buys more than a hundred types a year. As usual, all the Sierra Club versions are on the list again. "If I hadn't already put in a buy order," says Beryl Needham, Waldenbooks' buyer, "I'd get phone calls from each of our stores. People come in looking for these items year after year. If we didn't stock them, it would be like failing to have Mark Twain in a bookstore."

By Christmas, the photographers whose work appears in the calendars will be receiving calls from editors and other admirers who have seen their images in them. At least four or five will be first-time contributors who will find

that Sierra Club calendars make it possible for relatively unknown photographers to establish a national reputation. "One of our special joys," says Beckmann, "is to discover someone new to us who is very, very good and to publish them first. It's a great satisfaction."

Renowned wilderness photographer Galen Rowell, whose seventh book, *Mountain Light*, was recently produced by Sierra Club Books, claims being published by the Sierra Club had a real influence on his photographic career. "It has made a big difference, since people now instantly recognize my name from the calendars," Rowell says.

Freelance photographer Willard Clay of Ottawa, Illinois, agrees: "To be published by the Sierra Club is very prestigious. It's something every landscape photographer wants." The first shot of Clay's to be accepted for a calendar was taken at Saguaro National Monument in Arizona. "It was a sunset with a lightning bolt," he recalls, "one of those lucky shots. I was in the right place at the right time with the camera pointed in the right direction."

Many professional photographers, including Jeff Gnass of Oroville, California, spend months in the field working diligently and hoping to get lucky. "We photographers sometimes meet in the field and shoot together," says Gnass. "Sometimes we'll have a great sunrise or sunset, and someone will always say, 'Wow, I got a couple of Sierra Club calendar shots!'"

Photographer Gail Shumway, based in Sarasota, Florida, will have her first submission published in the 1988 Wildlife Calendar: an image of a South American green snake she saw while on a photographic expedition in Peru in the summer of 1986. "I had just started taking pictures," she says, "and I was shocked to be accepted."

While most photographers probably do not try to get shots directly related to the Sierra Club's environmental concerns, no doubt more than a few are aware of current issues—and many are often actively involved in conservation efforts. For instance, John Hendrickson of Clipper Mills, California, says he spent a good deal of time shooting spotted owls a couple of years ago. (His photograph of a barn owl was one of the

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big successes of last year's Wilderness Wall Calendar.) "They are a species that requires old-growth forest habitat," he says, "and the controversy over how much valuable forest land is needed for their survival is still not resolved."

It is hoped that, over time, the images conveyed through the Sierra Club calendars will have a profound, positive effect on the effort to conserve our natural heritage. David Brower, in his introduction to the 1988 Wilderness Calendar, writes: "It would be great if the places and shapes revealed here for 1988 were just as unmarred by human hands on down the river as they are now. Wilderness could then be carrying out its magic, spilling a little on us, keeping the world from being a cage, and providing answers, as Nancy Newhall pointed out, to more questions than we have yet learned how to ask."

MARTY OLMSTEAD *is a freelance writer based in San Francisco.*

"Security" and Social Change

Bordering on Trouble: Resources & Politics in Latin America
Edited by Andrew Maguire and Janet Welsh Brown
Adler & Adler, 1986; $24.95, cloth.

Joshua Karliner

THIS IS THE FIRST major effort by a mainstream U.S. environmental organization to address the intimate relationship between ecology and politics in Latin America. Edited by World Resources Institute Vice-President Andrew Maguire and Senior Associate Janet Welsh Brown, *Bordering on Trouble* stresses that long-term solutions to political problems south of the border must be both environmentally sound and socially equitable. A recurring theme in the book is that poverty and environmental destruction are at the root of rebellion in Latin America.

The anthology is a smorgasbord of interesting essays, including a critique of Mexico's development policies (which have triggered massive migrations to the capital, now one of the most polluted

cities on Earth). It contains a thought-provoking analysis of the relationship among unequal land distribution, environmental destruction, and political turmoil in Central America. There's also an overview of the negative social, economic, and ecological consequences of building high dams on South America's major rivers.

The book's 11 chapters continually point out that by defining our national-security interests in narrow military and shortsighted economic terms, the United States winds up supporting governments "whose power rests on deep social inequity, poverty, and patterns of resource degradation." Many of the authors note that revolutionary turmoil in Latin America is primarily due to the fact that a mere 7 percent of the region's landowners control 93 percent of the arable land. While this tremendously unequal distribution of natural resources allows for the profitable production of crops (such as coffee, cotton, cattle, bananas, and sugar) for North American and European markets, it impoverishes the majority of Latin American peasants, forcing them onto marginal lands. There they practice slash-and-burn agriculture, cause deforestation and soil erosion, and degrade the region's natural-resource base.

Bordering on Trouble does a fine job of explaining most of the important environmental issues in Latin America. It analyzes rainforest destruction, environmental health, population growth, the contamination of the Caribbean Sea, the role that multilateral development banks play in the region's environmental problems, and much more. The book gives one a sense of the complexity and magnitude of these challenges even as it searches for solutions that will serve both Latin and U.S. interests.

One glaring omission, however, is the absence of any information on pesticide problems. The book contains only one reference to the ill effects of pesticides, despite the fact that the United States imports agricultural products from Latin America laden with chemicals that have been banned here. While the book's editors call for liberalized trade (which would supposedly benefit both U.S. corporations and Latin countries), they ignore the U.S. gov-

ernment's failure to regulate pesticide exports. Our corporations continue to manufacture and profit from hazardous chemicals such as DDT, endrin, and dieldrin, which are sold to our southern neighbors.

The environmental impact of this practice is severe. Some 19,000 pesticide poisonings were recorded between 1971 and 1976 in Central America alone, while average DDT levels in cow's milk in Guatemala are 90 times higher than U.S. standards permit.

The editors of *Bordering on Trouble* come to some strong conclusions, declaring that "the current system increases inequity between rich and poor, foments political revolutions, and despoils the environment." They contend that U.S. support for "programs of real structural reform could be one of our most important contributions to long-term, ecologically sound development in the region." But they leave the reader wondering how the U.S. government might help implement such structural changes, given what the editors recognize as our history of "doggedly placing America's drive for regional security above Latin America's need for dynamic social change."

It is curious that *Bordering on Trouble* does not examine U.S.–Nicaragua relations in this context. The Nicaraguan revolution would not have occurred if not for the extreme inequality, repression, and disregard for the people and their land that existed under the Somoza dictatorship—faithfully supported by the U.S. for 40 years. The Sandinistas, who came to power in 1979, have implemented structural reforms that the U.S. government finds ideologically repugnant. Yet these changes include a progressive environmental policy that is now under fire from U.S.–supported contras. The contras directly attack environmentalists and their projects as part of a coordinated strategy to disrupt government programs. Benjamin Linder, whom the contras targeted and murdered in April 1987, was working as a volunteer engineer on an environmentally sustainable small-scale hydroelectric dam for a U.S. citizens' group called Nicaragua Appropriate Technology. In the last five years the contras have either assassinated or kidnapped more than 75 government environmental and natural-resource employees. They have burned reforested areas and destroyed nurseries. Nicaragua's new environmental agency, IRENA, closed the country's only tropical rainforest national reserve, the Saslaya National Park, in 1983, when contras kidnapped the park's administrator and two rangers.

The contradictions between ecologically sound development and a U.S. military intervention are clear. Yet the editors sidestep the environmental implications of the contra war and the Nicaraguan revolution, leaving them "to other analysts."

What the editors do note, however, is that "no matter how powerful, the United States cannot find lasting security in a hemisphere of impoverished, hostile states whose citizens all have automatic anti-American reflexes." They suggest that true security lies in reforms that help ameliorate poverty and halt environmental destruction, and thus create healthier and more stable societies south of the border.

Yet until our government reverses its

current policies, and until we as environmentalists can directly address the ecological impacts of social change when we talk about resources and politics in Latin America, the United States won't even have the luxury of "bordering" on trouble. Rather, we'll continue to fall headlong into its tumultuous grip.

Joshua Karliner is policy director of Earth Island Institute's Environmental Project on Central America.

BRIEFLY NOTED

Two major releases from the University of Wisconsin Press this November aptly coincide with the 1987 centennial celebration of Aldo Leopold's birthday. ***Aldo Leopold: His Life and Work*** ($29.50) by Curt Meine is a full-scale biography, while ***Companion to* A Sand County Almanac: *Interpretive & Critical Essays*** ($22.50), edited by J. Baird Callicott, is "a book about a book," tracing the evolution and impact of the most famous of Leopold's writings. The essays are first rate. . . . At the outset of ***Wilderness Sojourn*** (Harper & Row; $11.95), Santa Fe, New Mexico, writer David Douglas asks "Why go into the wilderness?" He finds the answers during seven days in the desert and presents them in this slim volume of musings on the links that join man, Christianity, and wilderness. . . . The most inspiring publication for planning backcountry treks in California is Stuart Weiss' bimonthly newsletter, ***California Explorer*** (238 Francisco St., San Francisco, CA 94133; $20 per year). Each issue focuses on several different seasonal hikes, cross-country ski routes, or river trips in the state, and includes locator maps, specific details on how to get to trailheads and put-ins, and clear descriptions of what each area has to offer. . . . ***Hatteras Journal*** ($15.95 from Fulcrum, Inc., 350 Indiana St., #510, Golden, CO 80401) is Jan DeBlieu's evocative account of the changes overtaking the fragile ecosystem and traditional ways of life on Hatteras Island off the North Carolina coast. . . . Clear, philosophical prose and outstanding black-and-white photography distinguish Steven J. Meyers' ***On Seeing Nature*** (Fulcrum; $15.95), a perfect book to relax with on the front porch of a mountain cabin. ■

Two-Wheeling in the Urban Jungle

Many bicycles designed for mountain trails are right at home on city streets.

Reed McManus

AMID THE CONTINUING controversy surrounding the influx of mountain bicycles onto forest trails, often overlooked is the fact that most of these bikes are rarely, if ever, ridden off paved roads. Many people buy these "all-terrain" bikes (ATBs) not because they want to become mountainside Rambos, or even for weekend trail riding, but because they've discovered that bikes built for the rigors of off-road trips are well suited to life among the potholes and railroad tracks of the less-than-forgiving urban jungle. For bicycle commuting and around-town use, ATBs are generally more durable, more comfortable, and more stable than the familiar dropped-handlebar ten-speed.

An all-terrain bike's upright handlebars provide a comfortable riding position, as many as 18 gears help riders up the steepest streets while loaded down with groceries, wide tires offer more stability than road-racing tires, a strong frame and components withstand urban abuses, and heavy-duty brakes are right at home when needed to avoid unwanted contact with errant motorists.

Because top-of-the-line mountain bikes are equipped to withstand more punishment than even the most brazen city biker will encounter (or want to encounter) on paved streets, it's wise to look first at the least expensive models in a manufacturer's mountain-bike line and then work your way up—to avoid buying more of a bike than you need. Cream-of-the-crop mountain bikes cost from about $400 to $1,800, while a perfectly adequate city bike can be snatched from the bottom rungs of a bicycle manufacturer's ATB lineup for $250 to $400. Bicycle manufacturers now tailor their inexpensive ATBs to urban softies. Among the mountain-bred "Stump-jumpers" and "Ridge Runners" you'll find more sedate models such as the "City Express," "CitySport," and "Uptown." (If you must carry vehicular aggression with you at all times, there's even one model called the "Streetstomper.")

Armed with a mountain bike and a good helmet, an alert cyclist hits the street.

From about $400 on up, ATBs tend to come equipped with components that aid off-road riding but are not essential for most city pedalers. These include sealed hubs to keep mud from damaging bearings, extra-strong frames made from aluminum or double-butted alloy tubing, wide "knobby" tires, and "bomb-proof" derailleurs, brakes, and other parts designed to endure repeated bashings into rocks and logs. The urban rider should consider the stronger frames and components that come with the more expensive ATBs, but they are not as critical for a bike that will be ridden solely on pavement. However, some top-of-the-line off-

road equipment (such as heavy-duty brakes) may appeal to city riders who want all the protection they can get, and sealed bearings should be considered by riders who anticipate leaving their bikes outdoors in bad weather.

Other mountain-oriented cycling equipment suffers in an urban setting. The removable accessories and "quick-release" wheels and seats that are standard on many mountain bikes tend to invite thieves.

Some off-road designs are simply inappropriate for city riding. A top-notch mountain bike is not as easy to control as a city bike. Its steeply angled frame positions the rider over the cranks (the arms connecting the pedals to the bike) for maximum power and directs much of the rider's weight over the rear axle to help when climbing steep grades. Furthermore, most mountain riders buy frames slightly smaller than they would use for city riding so that they can dominate the bike. This compact frame and flat, narrow handlebars make an ATB as nimble as a goat. Riding one, however, can be a lot like riding a bronco. Most casual cyclists prefer the greater comfort provided by the slightly less efficient, but larger and less expensive city models.

Urban ATBs also won't replace touring bikes (the familiar 10- or 15-speed) on medium- to long-distance rides. An ATB's upright riding position is comfortable, but it creates more wind resistance than the touring biker's back-breaking but efficient hunched-over posture. And the rolling resistance of the ATB's wide tires, along with the weight of a heavy-duty frame and parts (a mountain bike usually weighs five to seven pounds more than a touring bike), amount to a regrettable choice for a 50-mile ride.

But tamed mountain bikes have found a niche in concrete canyons and on suburban streets. Built to dodge rocks and trees, they're just as adept at avoiding taxis and sewer grates. Whether you then make the decision to venture off the pavement and onto designated mountain trails (and into the jaws of the mountain bike controversy) is up to you. ■

Reed McManus is an associate editor of Sierra.

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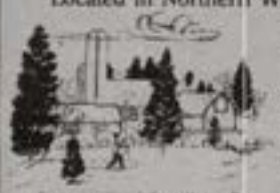

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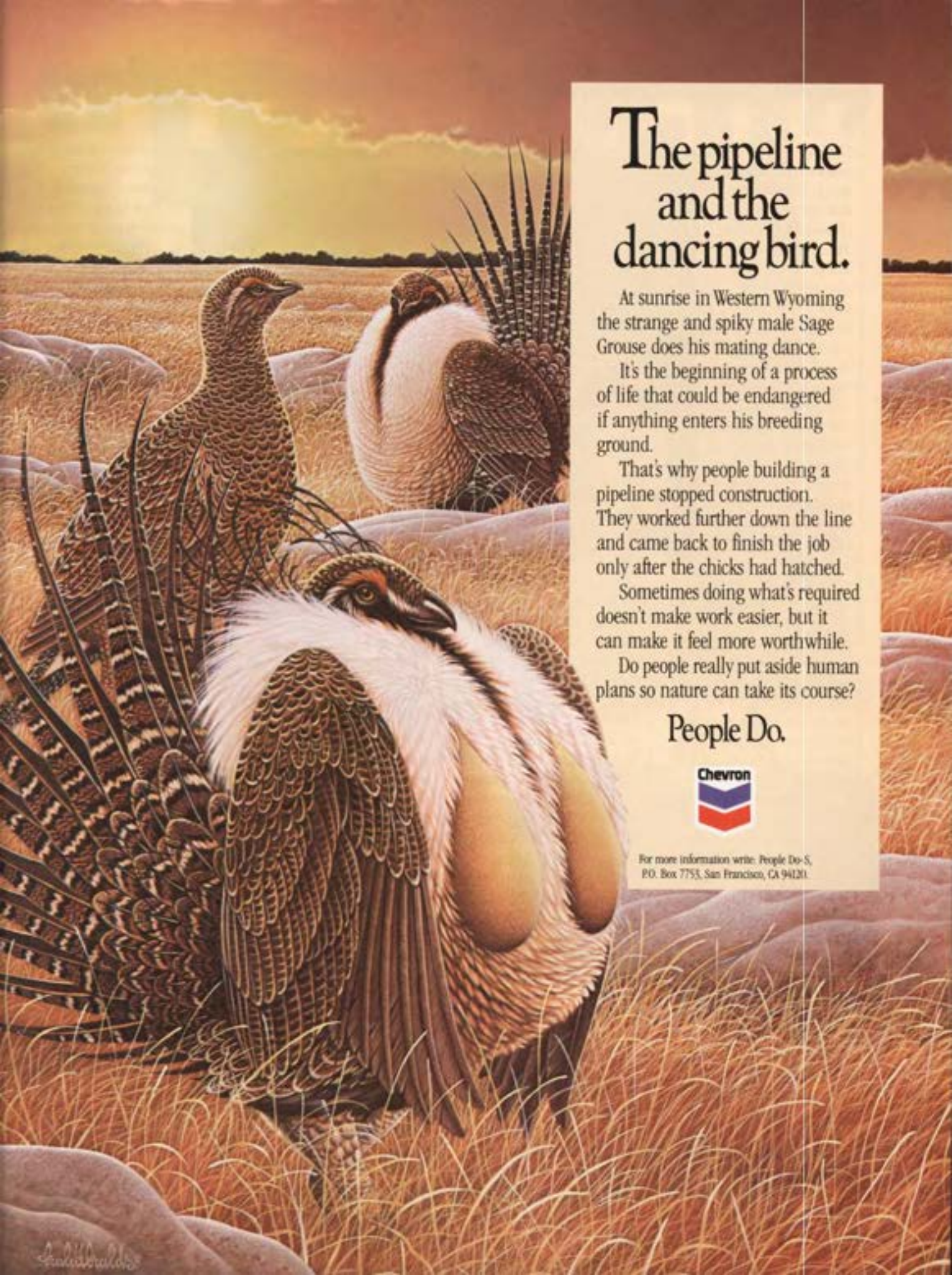

The pipeline and the dancing bird.

At sunrise in Western Wyoming the strange and spiky male Sage Grouse does his mating dance.

It's the beginning of a process of life that could be endangered if anything enters his breeding ground.

That's why people building a pipeline stopped construction. They worked further down the line and came back to finish the job only after the chicks had hatched.

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QUESTIONS & ANSWERS

Can you recommend a household cleaner that is nonpolluting and safe to use? (James McCormick, Tulsa, Oklahoma)
Those commercial cleaners that "eat away" dirt are also usually caustic or corrosive, which means they can cause severe eye and skin injuries.

A number of alternatives exist that are both simple and cheap. To wash windows and mirrors, spray a mixture of two teaspoons of vinegar and one quart of water on the glass, and rub with crumpled newspaper. Baking soda dissolved in water works well as a substitute for scouring powder in the bathroom and on coffee pots, chrome, copper, and tile. It also works for oven-cleaning—try a mixture of three tablespoons of soda and one cup of water. To keep drains from clogging, pour boiling water down them twice weekly.

More ideas are listed on "A Household Hazardous Waste Reference Chart" (reprinted from *Sierra*'s September/October 1986 issue), available for 55 cents (40 cents for Sierra Club members) from Sierra Club Public Affairs, 730 Polk St., San Francisco, CA 94109.

Clean often, so tough dirt doesn't build up. If the grime gets ahead of you, add elbow grease.

KEN BOTTO

Some people think that the 4.5 million acres proposed for protection as wilderness in Sen. Alan Cranston's California Desert Protection Act is too much. Can you put the figure in perspective? (Maurice and Betty Curtis, Ridgecrest, California)
The Act's 4.5 million acres are about 0.2 percent of the United States' and 4 percent of California's total acreage. In either case, the desert wilderness represents merely a few empty spots on a huge, highly developed map.

On the other hand, these outstanding desert lands could give a big boost to the National Wilderness Preservation System. They would enlarge the system, which now includes 89 million acres, by 5 percent. In California, passage of the bill would increase federal wilderness acreage by 75 percent, from 6 million to 10.5 million acres.

More important than any of these numbers, however, is the quality of the California Desert's roadless lands. They deserve wilderness status for the beauty and the solitude they offer—and because they are among the rare places left on the planet where nature still prevails.

I've been reading about the dangers of radon gas in homes. How do I find out if my house has a problem? (Carla Hansen, Toledo, Ohio)
Radon, a naturally occurring radioactive gas, is formed wherever there's uranium. Regions with the most radon are those that contain the most granite, since uranium and granite were formed during the same geologic period. Huge granite deposits underlie most of New England and the mid-Atlantic states as well as parts of the Great Lakes region, California, Eastern Canada, and the Appalachian and Rocky mountains.

Since radon is invisible, odorless, and tasteless, only a scientific test for the presence of the gas can assess the safety of your home. For a preliminary screening, the EPA recommends using a charcoal-type detector; its fast response gives the earliest warning to people in high-risk situations. Manufacturers' addresses are available from the EPA (401 M St., S.W., Washington, DC 20460; [202] 382-2090) and in the July 1987 issue of *Consumer Reports*, which evaluated five types of activated-charcoal detectors.

In recent issues you've asserted that both Hells Canyon in Oregon and Kings Canyon in California are the nation's deepest. Please clarify. (Steve Leupp, Davis, California)
Both canyons offer an impressive mile-and-a-half plunge, and local literature proclaims each the deepest. But which really deserves the superlative?

A Hells Canyon National Recreation Area spokesperson told us that the Hells drop measures 7,900 feet. The official figure at Kings Canyon is 8,200 feet.

That would seem to make Kings the winner, but Kings' Ranger-Naturalist Chris Durniak is wary of making such statements. "We call it *one* of the deepest canyons in the nation," she says, warning us that Alaska may have some abysses as deep as or deeper than any of the Lower 48's. ■

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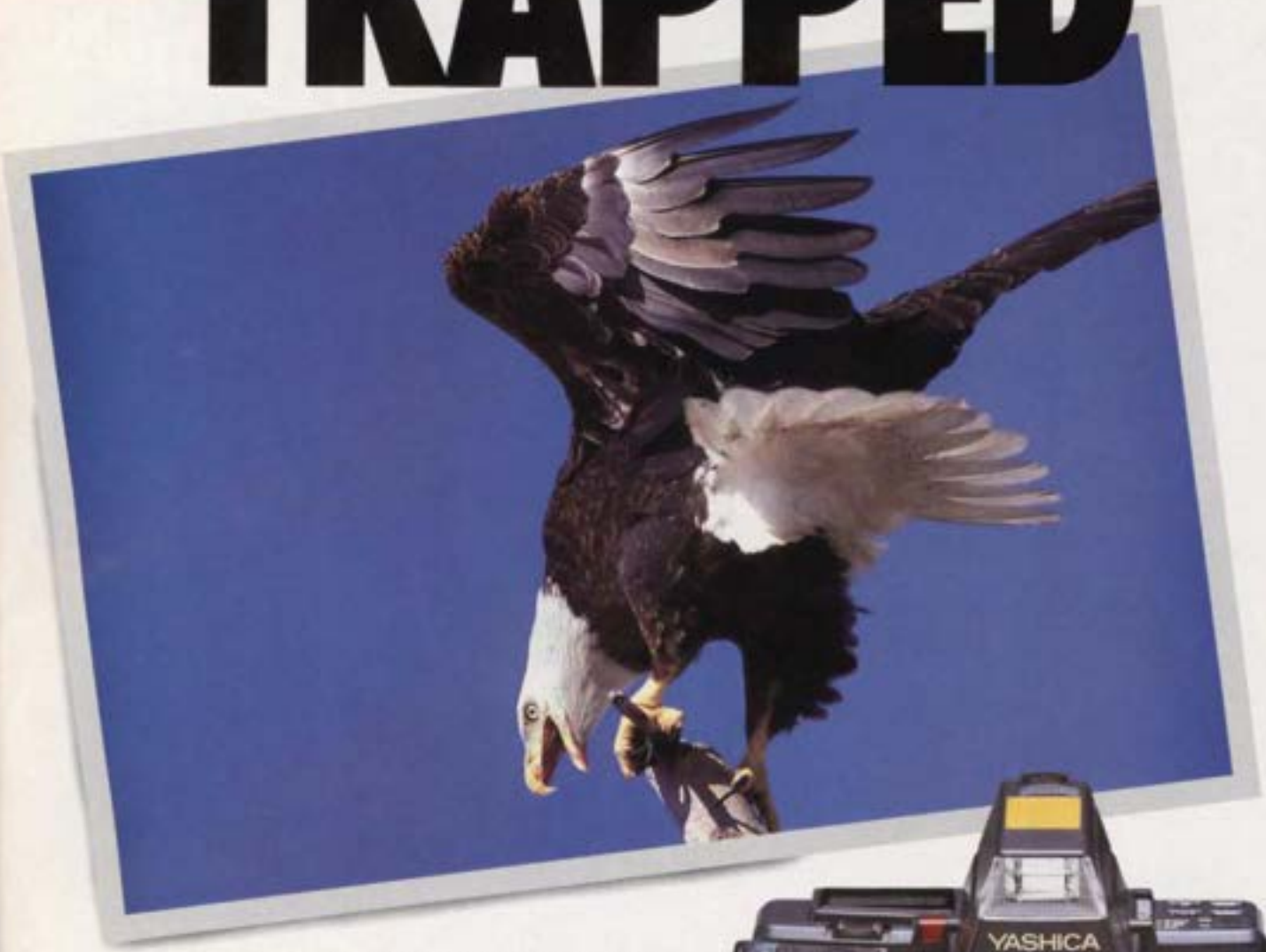

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