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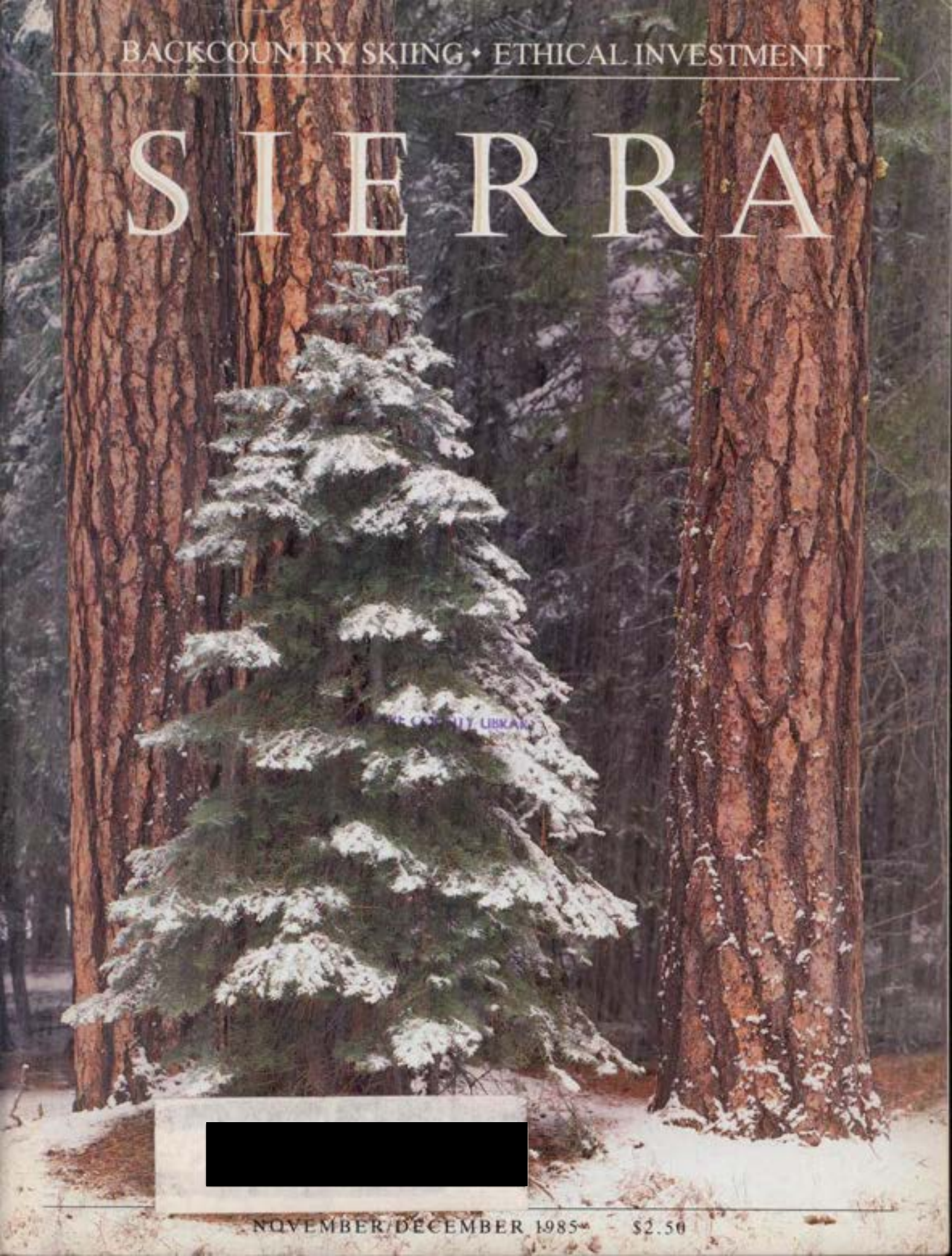

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Colors: Light Blue, Beige or White

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"'CAN'T WE BUILD A (☆!◎#ϟ) PARKA THAT DOESN'T IGNORE THE OBVIOUS,' STORMED MOTHER." —Tim Boyle

I'll be candid. Even though she's President of Columbia, my mother's not what you'd call an avid outdoorsman. Still, she recently observed something so painfully obvious that it should push parka technology ahead twenty years. It did for us.

Her revelation: Weather Changes.

While this may not sound overly profound to you, it is curious to us that apparently no jacket manufacturer has yet to notice this phenomenon. Including ourselves.

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Now, while other manufacturers may have failed to notice that the weather changes, we suspect they will be quick to notice that our parka does. So in a year or so you will probably be able to pick up a reasonably good copy of our Palmer.™

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Sometimes the weather turns extremely cold.

Sometimes it turns cold and wet.

Sometimes it turns cold and crisp.

Sometimes it turns mild and wet or windy.

SIERRA

THE SIERRA CLUB BULLETIN NOVEMBER/DECEMBER 1985 VOLUME 70/NUMBER 6

FEATURES

POLITICS

DEPARTMENTS

COVER: Put away your camera when the first snow falls, and you'll end up missing many a fine picture. For more about foul-weather photography, see page 71. Photo by Jeff Gnass.

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Bob Marshall in Alaska, page 58.

Skiing the Backcountry, page 78.

Children's Books, page 98.

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Touching Up the Portrait

Carl Pope is to be thanked for another thoughtful and carefully reasoned article ("An Immodest Proposal," September/October 1985). Several points in his article deserve discussion.

First, *Sierra*'s readers should recognize that not all of the chemical industry conforms to Mr. Pope's gloomy portrait. Repeated statements by Louis Fernandez, chairman of the board of Monsanto (see, for example, the September 2, 1985 issue of *Chemical & Engineering News*), are not just P.R. They represent the views of a forward-looking person who is honestly trying to help bring the chemical industry into line with the growing public awareness of the dangers associated with some chemical products and the misuse of many others.

Second, the situation vis-à-vis right-to-know laws is a disaster, and is worsening with time. Some laws require too much information. Mr. Pope correctly observes that many chemical companies depend for their livelihood on proprietary formulas, and have good reason to oppose attempts to force them to divulge this information. Most laws require information that does not exist. It is a sad but nevertheless true fact that *very few* of the chemicals commonly used in industrial, commercial, and domestic environments have been submitted to adequate toxicity studies.

Finally, the type of data required by most right-to-know laws is often misunderstood by the public who reads them. While some materials in wide use are certainly more dangerous than most people realize, many products *when used properly* are not dangerous, even though they contain small amounts of dangerous ingredients. A uniform, nationwide, well-written right-to-know law would be a boon to all. The present hodge-podge is only another bureaucratic boondoggle.

Third, the flaw in Mr. Pope's otherwise excellent suggestion of "hazard fees" is the fact that *no one knows what is hazardous and what isn't*. The list of candidates is so long, the cost of processing each candidate so great, that any significant improvement in this situation is virtually impossible. I don't defend this regrettable (probably tragic) situation, but it is a fact and we must deal with it.

Finally, to end on a happier note, a few progressive chemical companies have discovered that offering the public less-toxic products does pay. My current employer started a small revolution in the cleaning-chemicals business several years ago by introducing safer, nonpolluting citrus-oil solvents in place of chlorinated hydrocarbons. This has become a major aspect of our business, and our competitors are scrambling to offer similar products.

John Morris
Addison, Ill.

Climbing Errors

Eric Perlman's article on rock climbing, "A Question of Style" (September/October 1985), had plenty of pizazz, but it posed no intriguing question. Instead, Perlman served up hype and hyperbole, as if trying to increase sales of the sport's stylish equipment. He even got so carried away that he called the material of modern nuts and carabiners "chrome-molybdenum," or an alloy thereof. This may sound super, but it is not the material used in these items, which are made of aluminum.

Robert D. Grow
Sacramento, Calif.

A Gem as Precious

Illinois' Hennepin Canal, mentioned in "Jewels of the Rust Belt" (September/October 1985), has long been overlooked by conservationists. The 100-mile-long waterway has the potential to be connected to the new Illinois and Michigan Canal National Heritage Corridor to form a recreational area stretching across northern Illinois.

Unlike the urban I&M Canal, the Hennepin offers a placid body of water that flows quietly through tree-lined banks. The 33 locks and other historic structures are an outdoor museum of canal history. Com-

pleted in 1907, the Hennepin was the last to be constructed during the nation's canal-building era. Many of its construction techniques made the Panama Canal possible.

The Great Lakes Chapter is pushing for Congress to act on H.R. 1308, which would establish the Hennepin Canal National Heritage Corridor. With the support of Sierra Club members, the bill would complete the vision of a recreational corridor from Lake Michigan to the Mississippi River.

Joe Taylor
Aledo, Ill.

Reckless Statements

Your July/August "Questions & Answers" column featured a reader inquiry regarding the feeding of hormonal and antibiotic growth promotants to animals intended for human consumption. As a veterinarian responsible for the health and well-being of more than 20,000 dairy cows in California's Central Valley, and having been specially trained as an epidemiologist, I cannot accept your answer. I have no argument with those promoting healthy animals and a wholesome food supply; indeed, I too work toward that goal every day. I also agree that there are abuses within the current system, abuses that should be eliminated. But I cannot support the use of improper inferences and unsupported guesses as substitutes for scientific inquiry, especially when dealing with public health matters.

A 1984 article in the *New England Journal of Medicine* associated antimicrobic-resistant infections of humans with the feeding of antimicrobics to animals. This article —which I assume is the one mentioned in your response—has been labeled the smoking gun against such feeding practices in the popular press. The study, conducted by the Centers for Disease Control, identified 18 individuals who had been infected with a *Salmonella newport* resistant to several common antimicrobics. This *Salmonella* strain was epidemiologically traced to a herd of beef cattle that had been fed subtherapeutic levels of the antimicrobic chlortetracycline since 1982. The authors concluded ". . . antimicrobial-resistant bacteria of animal origin can cause serious human disease . . . *and that the emergence and selection of such organisms are complications of subtherapeutic antimicrobial use in animals.*" (My emphasis.)

Several gaps in this study disallow this reckless statement. First, the resistant organism could not be isolated from either the suspect farm or the meat from that farm. Second, although 40,000 pounds of meat and meat products were shipped by the

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farm, only 18 people became ill. Thus, the association is not strong biologically. Third, while *S. newport* is not a common animal pathogen, it is a fairly common human pathogen, suggesting contamination from humans, not animals. Finally, the people involved were taking antimicrobics prior to and at the time of their infection, a stated risk factor, although such use was not considered a factor in the study. Hence, the implication that feeding antimicrobics has diminished the efficacy of human therapy or increased the risk to meat consumers is not supported by the CDC study.

To the contrary, researchers around the world believe that indiscriminate use of antimicrobics in humans has caused the vast majority of resistant organisms to spring up. In fact, *we* could be infecting our animals, not the other way around.

Barrett D. Slenning
Kingsburg, Calif.

Out of Bounds

In the 1970s the Sierra Club opposed the expansion of the Havasupai Indian Reservation to include some lands that had previously been part of Grand Canyon National Park. It lost. I was thus quite amazed to see that first prize in the Club's photography contest in the "U.S. Parklands" category was a picture of Havasu Falls (September/October 1985). According to my map, Havasu Falls is not in Grand Canyon National Park. The Havasupai Tribe doesn't appear to think so either, since it operates campgrounds both above and below the falls.

David Marcus
Berkeley, Calif.

The Jury's Still Out

"Toxics on Tap" (July/August 1985) is timely and provocative. However, at least in the area in which we have direct knowledge, it is somewhat misleading.

As principal investigators of the studies that examined adverse pregnancy outcomes in San Jose, Calif., in relation to contaminated water, we must take issue with the summary of those studies that was presented. As the article stated, elevated rates of spontaneous abortions and birth defects were observed in a census tract potentially exposed to water contaminated by 1,1,1-Trichloromethane (TCA). However, with respect to this study, the report concluded: ". . . the indirect evidence about the extent and timing of exposure to contaminated water . . . was insufficient to determine whether the leak of chemicals (TCA) into Well #13 caused the excess." With respect to the results on cardiac defects, which were also cited, the study report states: "This investigation has not identified any environmental factor responsible for the increased rates of cardiac defects. In particular, the timing and geographic pattern of cases makes the contamination of Well #13 an unlikely explanation."

Because these studies were inconclusive with respect to causation, the state of California has allocated $825,000 to conduct further investigations over the next two to three years, which we hope will give us more definitive answers to these disturbing questions.

Raymond R. Neutra, Shanna H. Swan
Margaret Deane, John A. Harris
Department of Health Services
State of California
Berkeley, Calif.

Cabin Creek Mine

Gary Ferguson indicates in "A Last Fierce Paradise" (July/August 1985) that the Cabin Creek matter has been handed over to the International Joint Commission for arbitration. The truth is that it has not. Although arbitration is possible under the Boundary Waters Treaty, this provision has never been invoked. The matter was referred to the IJC for fact-finding. Over the next several months the IJC will study the situation and in spring 1986 issue a report. The U.S. and Canada must then decide what to do.

The article also states that a threat to the North Fork Flathead River exists from warm-water discharges as a result of mine operation. Any temperature change is likely to be insignificant. The real threat to fisheries and downstream values is sediment released by mining operations and possible leaching of heavy metals by acid discharges. The bull trout spawning beds in Howell Creek, which would be next to the mine pits, could be heavily impacted.

While warm-water discharges, air pollution, and increased human use are enumerated as major threats, water pollution is, indeed, *the* major threat to the North Fork Flathead River drainage posed by the proposed Cabin Creek operation.

James Conner, Harry Johnson
ExCom Members, Flathead Group
Montana Chapter
Kalispell, Mont.

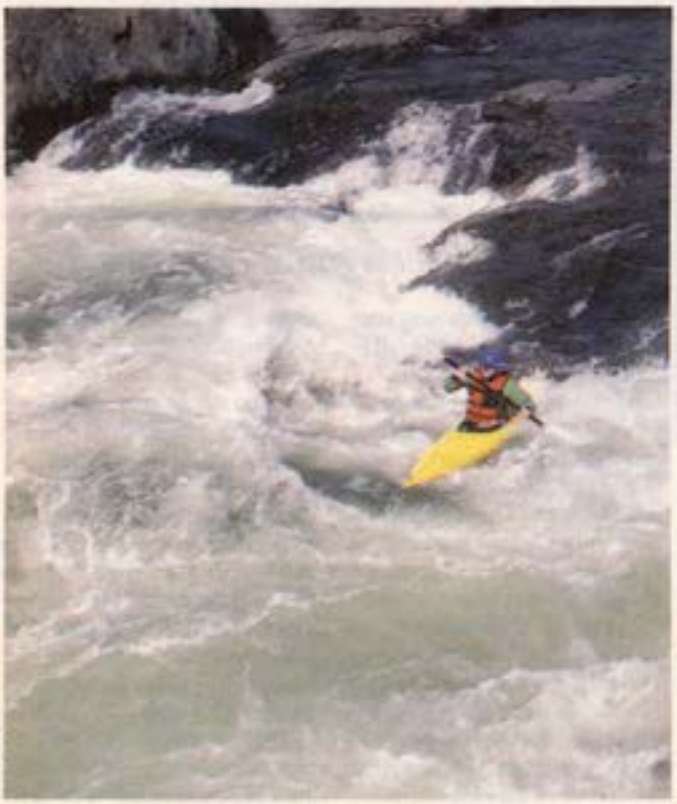
Editor's Note: *We printed the wrong box number for the Southeast Alaska Conservation Council in our September/October "News" item "Tongass Troubles." The correct address is Box 1692, Juneau, AK 99802.*

The Great Merced River Robbery

Travelers who visit Yosemite via Highway 140 know that the wonders of the national park extend well beyond its boundaries. Along this most popular access route to the park, the Merced River tumbles and churns for ten miles, providing thrills for kayakers and rafters, chills for swimmers, and a home for peregrine falcons and golden eagles. But an engineering firm from nearby Placerville has other plans for the river.

Last May, the application of Keating and Associates to build a hydroelectric project on the Merced, just 100 yards from Yosemite's boundary, was accepted "for filing" by the Federal Energy Regulatory Commission (FERC). If the project wins final approval, a ten-foot-high dam would divert the Merced and force it into a tunnel 12 feet in diameter. Water would flow underground for nearly four miles and drop 490 feet to a power plant. After spinning the generators, the water would be released back into the river.

Keating's opponents claim that the project would literally steal the river from all who enjoy it. The project would hide the river from travelers' eyes, silence the roaring whitewater, and drain all the swimming holes. Summer sun would overheat the remaining trickle of water, jeopardizing trout and other cold-water fish that inhabit the river.



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Keating is just one of many independent developers who hope to capitalize on the Public Utilities Regulatory Policy Act of 1978, which requires utilities to buy all electrical power produced by operators of small (less than 80 megawatts) generating facilities. The intent of the law was to stimulate private investment in energy production, but it has spurred a wave of hydro projects that threaten rivers throughout the nation. FERC has received more than 6,000 applications during the last six years; in California alone, 650 projects have been proposed under the "small hydro" law.

While developer Keating has gotten the initial nod from FERC, he faces significant public opposition. In July environmental groups, including the Sierra Club, joined the lead organization, the Merced Canyon Committee, in submitting official petitions to intervene in the FERC procedings. The Attorney General of California has filed official objections to the project, and many elected local, state, and federal representatives oppose the dam as well.

A Flea Powder Fight for Ferrets

Armed with more than five tons of flea powder, the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service went to war on behalf of the endangered black-footed ferret this summer.

Workers puffed insecticide containing a short-lived poison called carbaryl into some 100,000 prairie dog burrows near Meeteetse, Wyo., home of the world's only known population of black-footed ferrets.

The blitz was inspired by a Center for Disease Control report in June, which showed that the fleas in the Meeteetse area were carrying bubonic plague. While probably not a direct threat to either humans or ferrets, the disease can quickly wipe out prairie dogs, the ferret's prey.

Lurlay Parker

After the dust had settled, the site's flea population was down by 90 percent. But no one knows exactly where that leaves the ferrets. Their numbers seem to be dwindling: Researchers counted 129 ferrets at the site in the summer of 1984, but only 61 ferrets a year later. There definitely are fewer prairie dogs around for them to eat; the site's active prairie dog towns lost 10 percent of their inhabitants over the summer.

A host of unknowns remain. Biologists think that ferrets are immune to the plague, but they aren't sure yet. They wonder whether the white-tailed prairie dogs that live near Meeteetse are also resistant. In addition, they don't know how prevalent the plague is among other Wyoming rodent populations. The Wyoming Game and Fish Department is initiating studies

that may help answer these questions.

Ferret Program Coordinator Dave Belitsky of Cody, Wyo., is confident that enough prairie dogs survived this year to feed the site's ferrets. But managers are growing increasingly anxious about having all their ferrets in one place. This spring they hope to start a captive-breeding program aimed at establishing one or more ferret populations elsewhere.

Distressing Signs of the Times

Last July, "for no particular reason," Jack Leipsic of North Hollywood, Calif., collected headlines that appeared in the *Los Angeles Times* that month. His list is printed here without further comment:

"State Sees Illegal Use of Pesticide"

"National Parks Threatened by Suburban Ills"

"Selenium Contamination Found Near Kern County Wildlife Refuge"

"Acid Rain Threatens Yellowstone Park"

"Birth Defects, Father's Exposure to Chemicals Linked"

"Smithsonian Institution Leaking Toxic PCBs"

"Mobil Refinery Raided in Pollution Case"

"Superfund Schedule Fails"

"125 Evacuated After Chemical Truck Tips Over"

"Toxic Fire, Blasts Force 200 to Flee"

"10,000 Flee Plastic Fire Fumes in Iowa"

"Cave's Toxic Fumes Peril Kentucky Town"

Selective Reality, Reagan Style

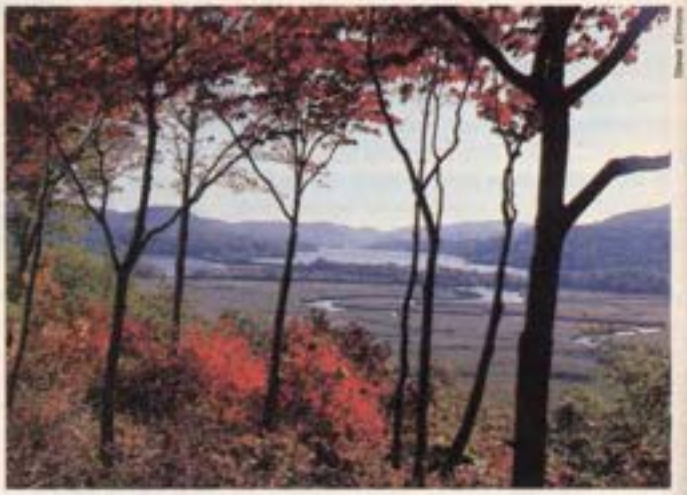
For a brief moment in September, it appeared that the Reagan administration had begun to believe that there is a connection between acid rain and industrial emissions.

"It seems to me that saying sulfates do not cause acid rain is the same as saying that smoking does not cause lung cancer," Drew Lewis, President Reagan's special representative on acid rain, told the governors of six New England states. Lewis also stated that, with President Reagan "solidly" behind him, he planned to recommend a cleanup program to reduce sulfur emissions from factory and power-plant smokestacks.

This startling acceptance of scientific evidence was short lived, however. Four days later, the deputy White House press secretary negated the significance of Lewis' statements, saying, "Nothing has changed. We are right where we were in March of 1985."

Lewis, whose remarks had seriously alarmed the utility industry as well as his bosses, is presumably giving the matter further study.

"I just love to lie in bed on a Saturday morning and listen to the sizzle of the rain hitting the roof . . . ."



Chemical Stream: Toxics in the Hudson

The Hudson River flows for 300 miles from the Adirondacks to New York Harbor. In 1982, at least 22,800 pounds of toxic chemicals were released into the Hudson and its tributaries.

In the most complete inventory to date of the river's level of toxic pollution, Inform, a New York City–based research organization, identified 555 streams of 26 selected chemicals that poured into the Hudson River during the six years between 1978 and the end of 1983. Pollutants included lead, cyanide, chloroform, and oil and grease, the latter combination by far the most widely and heavily discharged.

But "data inadequacy" was a major difficulty in ascertaining the river's toxicity, according to researcher Steven Rohmann. Chemical sampling was found to be too infrequent for accurate measurements; regulatory agencies retain few and/or inadequate records; and, perhaps most significantly, neither federal nor state agencies collect data on "nonpoint" sources of pollution such as urban, agricultural, or construction runoff. "Even among the dischargers releasing the greatest amount of toxic chemicals, Inform found errors, inconsistencies, and omissions in the data compiled by state and federal permitting systems," says Rohmann.

To Feet, To Feet Against the Arms Race

On the first of March next year, 5,000 people will walk out of Los Angeles. Nine months later, having trekked through 37 major population centers and the Mojave Desert, over two major mountain ranges, and across the Great Plains, they will walk into Washington, D.C., where they will petition the government to put an end to the threat of nuclear war.

The "Great March for Peace" is the dream of David Mixner, director of ProPeace, the organization behind the 3,235-mile journey. Mixner conceived of the idea while touring the country last year. "A couple of things became clear to me," he says. "One was that the biggest problem we face in making disarmament happen is the loss of belief, especially among young people, that they can make any difference. They have come to accept as a historical inevitability that they will die in nuclear war." The Great March, Mixner and other ProPeace supporters believe, will help to change that perception.

The monumental task of finding campsites and providing equipment, food, showers,

laundry facilities, waste disposal, and medical care for 5,000 people has been a crash course in environmental awareness for the march's organizers. To handle these logistics, ProPeace created a special department, the Environmental Support System.

"We'd like to be more than a passing carnival," says Al Peterson, director of the support system. "We are organizing contracts with food co-ops and farmers markets to grow a variety of crops that we'd harvest and consume as we cross the country. We'd like to plant trees, for instance, to leave behind a Johnny Appleseed feeling."

The primary feeling that ProPeace hopes to convey to the nation is one of hope. "We're not in it as a simple act of conscience," says Mixner. "We're going all out to win."

For more information about the walk, contact ProPeace, 8150 Beverly Blvd., Suite 301, Los Angeles, CA 90048; (213) 653-6245.

Summer Produce Tasting: A Nascent Nibblers' Network

The guests moved around the hall, stopping at each table to see, touch, and taste the samples provided. Many of the avatars of the "new American cuisine" were in attendance, and while these food professionals may be thought a jaded bunch by some, you could see the rapture on their faces as they admired a beautiful bunch of lemon thyme, or rolled tree-fresh figs around on their tongues, or took refreshing swigs of just-pressed apple juice.

Their pleasure was shared by the small farmers who had brought their wares to the third annual Tasting of Summer Produce, held this year at the Robert Mondavi Winery in Northern California's Napa Valley.

The tasting has a number of goals. High among these is the bringing together of growers and restaurateurs as a way of stabilizing the market for specialty produce, which in turn will enable farmers making use of organic farming and other sustainable agricultural strategies to survive in an era of agribusiness.

Jonathan T. King

The trend-setting restaurants of the San Francisco Bay Area have done much to make the dining public aware of the incredible range of California's seasonal produce. Yet reliable delivery service between growers and chefs, key to preserving the freshness of these often-fragile foods, is not available in much of the region, underscoring how tentative the relationship between these two complementary groups still is.

The farmers at the tasting seemed optimistic that their extraordinary produce will find its way to market shelves once it's become familiar to the restaurant-going public. "After all," said one, "how long can it take people to learn to appreciate the difference between a garden tomato and one of those squared-off billiard balls that gets trucked across the country while it's still green and hard?"

The tasting's organizers agree that direct marketing of fresh produce would do much to promote sustainable agriculture in America. That the quickest route toward this vital goal is through people's stomachs is an idea to chew on. □

Report From Bhopal

Almost a year has passed since the world's largest industrial accident struck here. As the media spotlight fades, long-term medical and economic gloom enshrouds thousands of survivors.

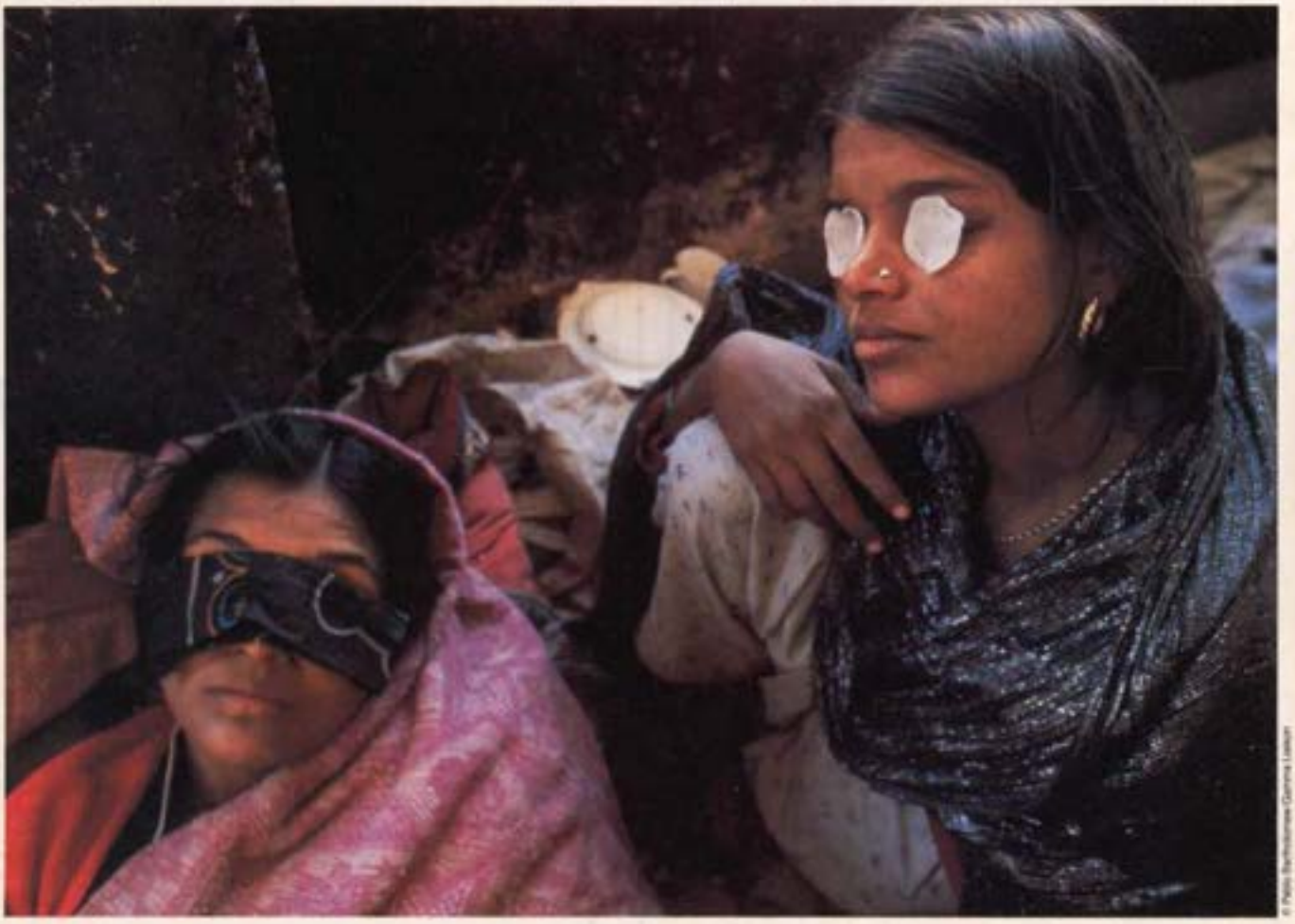
DARRYL D'MONTE

IF YOU WERE to visit Bhopal today, you would hardly be aware that it was the scene, a year ago, of the world's worst industrial accident. Even in the shanty colonies, which lie cheek by jowl with the now closed Union Carbide plant, it seems—on the surface, at any rate—that things are very much back to normal. In the rest of India the disaster that claimed so many lives is only occasionally mentioned when other factories leak toxic gas; the government appears preoccupied with the legal battle over compensation. According to some reports, Union Carbide is now prepared to offer victims $230 million in an out-of-court settlement; the Indian government is said to be pressing for about twice as much.

The victims of the gas leak will hardly be consoled by these reports. To begin with, no one knows how many were killed and how many others affected by the deadly methyl isocyanate (MIC) gas released in early December 1984. The Madhya Pradesh state government has only been able to verify about 1,400 deaths. But many of the dead were transients who belonged to the floating population of this chronically backward region. Others, mainly children, were whisked away by parents before their bodies could be cremated in government hospitals. Besides, if one considers the total number of people who lived in the affected areas around the Carbide plant—some 200,000 residents—the proposed Union Carbide settlement works out to a meager $1,000 per person.

Two problems persist in Bhopal: medical ailments and economic distress. While the city's entire medical community did a tre-

An estimated 2,500 persons died at Bhopal in December 1984. Two survivors are shown above in a photo taken shortly after the poison gas leak. Almost a year later, the wounds are less visible in this community of 600,000, but many residents are still too sick to work or lead normal lives.



mendous job treating patients immediately after the tragedy, both government and private doctors now seem to have become callous. They believe that the worst is over, that those who survived have recovered.

A doctor at the state-run Hamidia Hospital said in January that persistent chest ailments were no cause for concern. "These are mostly previous diseases, which get accentuated in winter," he said. But surveys conducted by doctors from Bombay's King Edward Municipal Hospital, reputed to be the best in the country, tell a different story. About 30 victims fled Bhopal and came to this hospital. Four months after the disaster, these patients were complaining of breathlessness and a persistent dry cough. Dr. S. R. Kamat, head of the hospital's cardiovascular and thoracic center, reported that nearly one third of his Bhopal patients suffered a loss of 40 percent of their normal lung capacity; more than half had impaired intake of oxygen.

Other organs were affected as well. In March the daily *Times of India* reported: "At least 50,000 are seriously ill with diseases and disorders of the lung, eye, liver, kidney, brain and the respiratory, neuromuscular, and immune systems. Many of them are liable to die in the coming months. The vast majority of those exposed to MIC, whether mildly or severely, remain too disabled, weak, and traumatized to work or live anything like a normal life. . . . Over 100,000 of them have been reduced to a state of utter destitution and unending, undignified misery."

CONSIDER THE FATE of Sajida Khan, the widow of Ashraf Khan, who died at the Carbide plant in 1981 as a result of exposure to phosgene gas. She arrived at the Bhopal railway station that fateful December night three years later, and lost her five-year-old son Arshad as well. Her son Shoyer survived but, in her words, he "has still not recovered. He is suffering from breathlessness and keeps coughing all day." Ask anyone from the slum colonies of Jaypraksh Nagar, just across the road from the factory, and they will tell you they can't carry heavy loads any more. The victims also suffer from psychosomatic ailments, which doctors don't treat as a medical problem.

Women and children have been particularly hard hit. Some women who were in an advanced stage of pregnancy in December have suffered miscarriages; others have had stillbirths. Dr. Charanjit Ghoois of Bhopal says, "Since December the number of stillbirths has doubled in the cases of women who were exposed to MIC. Spontaneous abortions increased three times among women who were then in their second and third trimesters. Some of these children died of asphyxia." In July the state health minister said that 21 babies had been born deformed since the disaster.

Even today there is heated controversy over the advisability of treating patients with sodium thiosulphate, an antidote to cyanide poisoning. Although Union Carbide first prescribed this for Bhopal's victims, it later changed its recommendation. State doctors likewise saw no reason to administer the drug. But after persistent lobbying by activist groups such as the Poisonous Gas Disaster Struggle Front and the Citizens' Relief Committee, the Indian Council for Medical Research in Delhi prescribed its use.

Even so, Bhopal's medical community has been reluctant to go ahead. The reason, according to activists who favor using the antidote, is that everyone who is injected with the chemical will excrete sodium thiocyanate in their urine, thus offering conclusive proof that MIC breaks down into cyanide in the body, a possibility that could strengthen the victims' cases in court. Bombay's *Business India* journal, however, now speculates that other chemicals may have been released by Carbide that night, or that MIC could have broken down in the air into monomethylamine, for which any lingering symptoms of poisoning would have to be treated differently.

The other grave problem is simply economic. All the victims were poor shanty dwellers. They are now too weak to return to their jobs as loaders, vegetable vendors, and the like. Some 600 Carbide workers have also been thrown out of employment with the closure of the factory. The federal government has provided about $26 million for relief—including distribution of free rations, utensils, and even cash handouts to the affected. But, inevitably, charges of corruption and arbitrary distribution of relief abound. In August, Prime Minister Rajiv Gandhi sent a special team to Bhopal to determine why people had the lingering impression that nothing had been done for the victims despite such large expenditures.

The state government is paying 10,000 rupees (about $900) to the family of each deceased person, and smaller amounts to those physically affected. Since many of the affected families are illiterate and didn't know how to obtain death certificates for the deceased, they haven't been able to claim the money. Sajida Khan's son isn't on the government list, for instance. Kusum Bai, who lives in Jayprakash Nagar and lost her husband and two teenage sons, says, "I have still to get a single paisa [cent] from the government." The country's largest daily, the *Indian Express*, points out: "The inadequacy of the government relief operation is

clear from the fact that although 200,000 persons, almost a third of Bhopal's population, were affected by the leak and over 50,000 were hospitalized, the official agencies have prepared a list of only 9,453 who qualify for relief."

While the government can certainly be accused of being indifferent to the plight of Bhopal's victims, environmental organizations can also be criticized for neither highlighting the problems nor coming to the aid of the affected. Rural groups, like the Chipko (Hug the Tree) movement in the Himalaya and the Save the Soil Campaign in a dam-affected area of Madhya Pradesh, might be excused for not reacting to the Bhopal tragedy. But there is no reason why city organizations such as the Society for Clean Environment (SOCLEEN) in Chembur, one of Bombay's most polluted precincts, the Save Bombay Committee, and Bombay Environmental Action Group could not have gone beyond the routine press statement and public meeting. SOCLEEN, which consists largely of scientists from the Bhabha Atomic Research Center, could have drawn local parallels: In August a chemical company leaked chlorine in Chembur, killing one person and injuring 150.

It has been left to the Kerala Sastra Sahitya Parishat (Science Literature Organization), a grassroots science-for-the-people group, to respond to Bhopal. The group has called for a boycott of Union Carbide's Eveready batteries and has distributed

Bhopal's Union Carbide factory is closed down now, a monument to industrial catastrophe.

thousands of posters that depict the Eveready mascot, a cat, as a fire-breathing monster playing havoc with people's lives. With some 7,000 members, KSSP has more support than any other environmental body in the country.

Another organization, the Medico Friends Circle, took the initiative of starting the Movement for Clean Environment after the Bhopal incident, encompassing such groups as the People's Science Movement, the Committee for Protection of Democratic Rights, Doctors for Peace and Life, and the Forum for Science, Technology, and Society. After holding some 70 meetings in Chembur and elsewhere in Bombay, the movement has died a peaceful death. The Circle continues pioneering medical surveys in Bhopal; it conducted its second in September.

But groups that had no connection with the environment have taken up the biggest challenges. By far the most active has been the Poisonous Gas Disaster Struggle Front, headed by Anil Sadgopal, a molecular biologist. He came to the city from a rural education project and plunged headlong into the campaign to wrest more relief from the government. Among the Front's earliest demands were that each affected family be paid 1,500 rupees ($125) automatically —which the government did four months later. Sadgopal has even gone to jail for brief periods for leading road blockades to press his demands and for helping to organize a medical relief center on Carbide property shortly before the factory was closed.

The Citizens' Relief and Rehabilitation Committee, led by filmmakers Tapan Bose

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New Zealand

and Sahasini Mulay, has made a 90-minute documentary on the Bhopal incident. Although they came simply to document what had happened, they were drawn into agitation on behalf of the victims.

Among the other organizations that have come to Bhopal are Sewa (Service), which runs a self-employment scheme for slum women in the city of Ahmedabad in Gujarat, and which has helped set up a similar project in Bhopal. The Consumer Education and Research Center, headed by India's Ralph Nader, Manubhai Shah, has tried to provide legal aid to the distressed. Civil liberties groups from Delhi, the People's Union for Civil Liberties and the People's Union for Democratic Rights, have also visited Bhopal.

Mention should also be made of the journalists from major dailies and magazines who not only were the first to tell the truth of what happened in Bhopal (and how Union Carbide and the government were trying to cover things up), but who also turned into activists. Praful Bidwai of *The Times* and Kalpana Sharma of the *Express* set up the Bhopal Relief Trust. *Business India* is paying a correspondent a full year's salary to supervise the establishment of a clinic in Bhopal and a media center for visiting journalists. The Centre for Science and Environment in Delhi, run by journalists and researchers, has published a newsletter and brought together different groups to work on issues concerning Bhopal.

These committed journalists, fearful that Bhopal may die a media death, are lobbying lawyers and prominent public figures to establish the Citizens' Commission on Bhopal to supervise such efforts as the distribution of relief and compensation when they occur. If one were to single out a profession that has come to the aid of Bhopal's victims, it would be the press rather than doctors, environmentalists, union leaders, or other activists.

The failure of urban environmental organizations to take action can be ascribed to their membership, which consists of scientists from government-run institutions who face the risk of offending their seniors, or to salaried professionals who are more concerned with issues like putting a stop to high-rise development than with Bhopal's problems. Indeed, many of the latter are employed in big business enterprises and have believed that the public sector is the worst polluter, not the private.

Bhopal and other chemical company leaks should have opened their eyes.

DARRYL D'MONTE *writes on environmental issues for a number of India's English-language newspapers. A resident of Bombay, he recently visited Bhopal.*

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A L A S K A

POLITICS

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Risky Business

Trained in firearms, stake-outs, and self-defense, EPA special agents pursue dangerous criminals and toxic pollutants on what might be the hottest beat in town.

COLLECTING EVIDENCE, serving warrants, and getting shot at sounds more like daily fare for the FBI or the Drug Enforcement Administration than the Environmental Protection Agency. And yet these are common activities for the agents charged with enforcing the nation's toxic waste laws.

It's no secret that toxic wastes have a way of ending up where they don't belong. Companies build pipelines to divert waste into municipal sewage systems; liquid wastes are mixed with heating oil, sprayed on ordinary garbage and sent to landfills courtesy of bribed sanitation workers, or simply hauled off by well-compensated members of organized crime. Illegal disposal of hazardous waste is not only an environmental catastrophe, it is also an economic offense: Companies that skirt the law save tremendous sums of money, at the same time securing unfair advantages over their competitors.

For the EPA's special agents, the stakes are high—high enough to require that they have at least six years' experience investigating major felonies, organized crime, or white-collar crime. Agents come from police departments, the Treasury Department, and the FBI. They often forego careers that would eventually lead to secure management positions. But they come to the EPA's Office of Criminal Enforcement because they are lured by the challenge of a new agency and a commitment to beating one of the country's most pervasive and frightening crimes. They are, as one EPA agent says, "on a new frontier of criminal enforcement."

"Disposing of hazardous waste is more profitable than selling narcotics," says Gary Steakley, the special agent in charge of the EPA's Washington, D.C., Office of Criminal Enforcement. Illegal dumpers "can make a handsome profit, especially because they don't need any up-front money to dispose of hazardous waste."

Companies large and small can be involved in the unlawful handling of toxic waste. Hayes International, a major defense contractor, was approached by a company called Performance Advantage. The two negotiated an arrangement. If Hayes would sell Performance Advantage its leftover jet fuel at a discount, then Performance Advantage (which had no experience

No job is too toxic for the men in the moonsuits. Here, EPA special agents inspect drums of chemicals at a leaking waste dump. Their next task will be to find the dumper who left them there.

A Lasting Tribute to America's Vanishing Breeds...

Presenting a fine, limited-edition porcelain figurine, created by famed American sculptor Roger Brown, and inspired by one of the most intriguing of all wild animals: the blue-eyed, Eastern cougar.

Throughout history, the forces of nature have threatened the survival of some of the world's most interesting and unusual breeds. To focus attention on these endangered species, famed sculptor Roger Brown and River Shore, have produced their first-ever limited-edition collection of animal figurines inspired by ***Babies of Endangered Species.***

After months of research, Brown chose "Sidney" the Eastern cougar to premiere this collection because of his handsome looks and playful manner. This tawny-buff and brown cougar's blue eyes dance as he rolls on his back and toys with a twig. His expressive tail wags between his legs.

It has been three years since Roger Brown has offered a baby animal figurine, and thus the "birth" of "Sidney" is causing a stir among collectors who know that many Brown works – especially his first-issue "Akiku" seal figurine from 1978 – have appreciated significantly in value in the market place.

"Sidney" is the first of eight Roger Brown original sculptures in the ***Babies of Endangered Species*** Figurine Collection – including a baby grizzly bear, a sea otter and five other charming, hand-painted porcelain pieces. As a series subscriber, you will be issued subsequent pieces at intervals of every two months at the guaranteed issue price of $45.00 for each figurine, payable in three convenient installments.

There is no risk to you in ordering now under The Hamilton Collection 100% Buy-Back Guarantee. You may return "Sidney" or any succeeding figurine at any time within 30 days of receipt for a full refund. Each issue will be accompanied by a Certificate of Authenticity, attesting to its status as part of the limited edition of 15,000.

Because the edition is so small compared to the number of Brown and River Shore collectors, and because of the charm and appeal of "Sidney" and the widespread reputation of sculptor Roger Brown, a *prompt sellout is anticipated.* Be sure to return your reservation by the final postmark date to guarantee its consideration. To be safe, order today! The Hamilton Collection, 9550 Regency Square Blvd., P.O. Box 44051, Jacksonville, FL 32231.

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in waste disposal) would get rid of Hayes' waste for free—ordinarily a very expensive process.

Performance Advantage then paid farmers nominal fees to store barrels of Hayes' used cleaning solvents on their land. The farmers didn't know what the barrels contained, but the company hinted that useful substances were inside. One farmer thought the yellow toxic waste was paint, and used it on his house. After an investigation by EPA special agents, Hayes was tried in federal court and convicted on eight counts of illegally transporting hazardous waste. Performance Advantage pleaded guilty to illegal disposal of toxic waste and violations of the Clean Water Act. Hayes' case is on appeal.

In 1983 the A.C. Lawrence Leather Company was convicted for violating the Clean Water Act, defrauding the U.S. government, falsifying reports to the government, and illegally disposing of hazardous waste. Having received $1.5 million from the EPA to help construct a demonstration affluent-waste-treatment system at the firm's Winchester, N.H., plant, company executives decided it would be cheaper to build a pipe to divert waste directly into the Ashuelot River. A.C. Lawrence's reports to the EPA never mentioned any bypass. The company was supposed to collect valuable data on its experimental treatment plant, but it falsified these reports, giving the government useless information.

Eventually a waste-treatment operator informed the EPA, which assigned a special agent and a technical support aide to a three-month investigation that involved locating and talking to witnesses, reviewing the company's records, and clandestine surveillance of the Winchester plant. During this surveillance the agent watched the company's main equalization tank spill waste directly into the river, and found 600 55-gallon drums of hazardous waste buried on the company's property. At the ensuing trial the jury listened to the minutes of a meeting that implicated company officers and some board members. The president, a vice-president, and three directors of the corporation were convicted, fined, and sentenced (because of no previous felonies) to perform thousands of hours of community service. The A.C. Lawrence company itself was convicted on 69 felony counts.

It wasn't until 1984 that the Department of Justice deputized EPA agents as marshals, giving them the power to enforce laws regulating toxic substances. Deputization was crucial, because only law-enforcement agents can obtain a warrant; previously, EPA agents had to ask another agency to execute a warrant for them. But just as important, the people who dump haz-

ardous waste "are not your John Q. Citizens," Steakley emphasizes. They can be desperate, and as deadly as the wastes they dump. "Homicide investigators know the kinds of crooks they deal with," Steakley says. "But the EPA comes across many different kinds of people." Having worked for 11 years as a Washington, D.C., police officer and supervisor of homicide, Steakley knows what he's talking about.

But one of the agency's most difficult opponents is sheer numbers. An EPA survey estimates that one out of every seven companies that generate toxic wastes may have disposed of them illegally during the past few years. While there are currently 102 criminal cases being investigated, the EPA employs only 32 special agents. Because environmental crimes are technically and legally complicated, an agent can effectively handle no more than two cases at once.

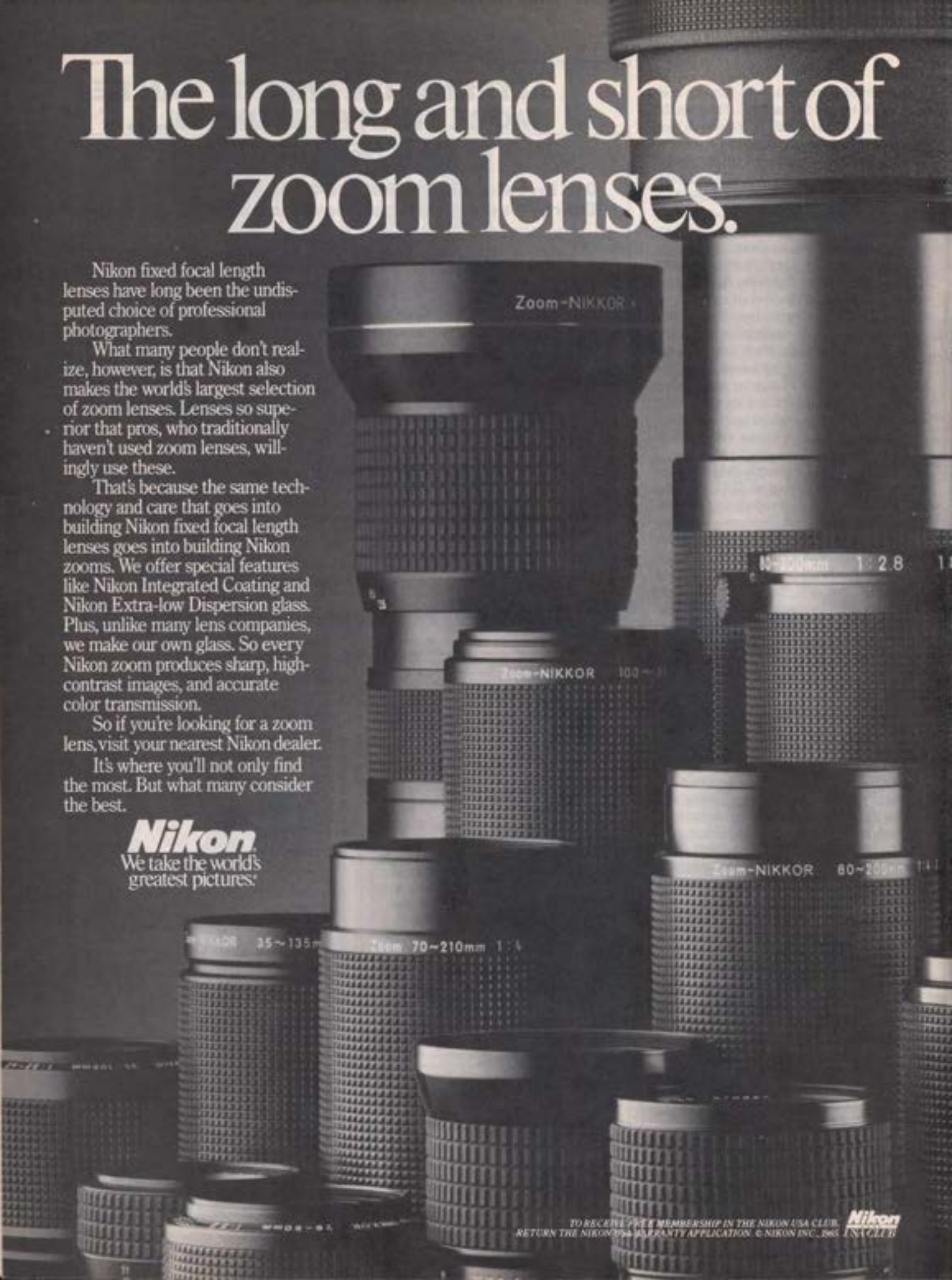
Steakley is the agency's only enforcement officer in Washington, D.C. His calm manner belies his overwhelming responsibilities: training and overseeing agents in the field, serving as liaison to federal agencies, developing programs for states to investigate environmental crimes, and going after toxic outlaws. Tom Kohl, an agent currently investigating a Miami resort suspected of dumping waste into the ocean, also has cases in two other states. Attorneys in Florida, Georgia, and Alabama each require his presence, so he spends a lot of time shuttling.

Furthermore, respirator-clad EPA agents must often seize and sample materials that have been illegally dumped in areas so isolated that the magistrate who issued the warrant lives 200 miles away—while the criminals are still at the site. Timing and coordination with state law-enforcement officials in these cases must be perfect.

The FBI and the states both offer the EPA some assistance, but usually not enough. Even when the FBI is involved in a case, it needs the EPA's time and technical support. Although state laws are also violated by polluters, most states are ill-equipped and too poorly funded to investigate these complex cases. As a result, the EPA simply can't follow every suspected violator and every possible lead. Many cases simply get stuck "in the big hold box in the sky," as one agent puts it.

But numbers dog the agency's Office of Criminal Enforcement in other ways too. Inadequate funding strikes directly at the program. Many of the agents' cars are ten years old and have logged 80,000 miles. One-person surveillances, forbidden by other law-enforcement agencies as being too dangerous, are often conducted by EPA agents. Once an arrest is made, too few

The long and short of zoom lenses.



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personnel can assist in gathering evidence. This is tough, frustrating, and dangerous work for those 32 agents who must patrol the 3.5 million square miles that comprise the United States. But, Steakley insists, the 32 are "high-quality agents."

The Office of Criminal Enforcement is also prey to politics. Through the Office of Management and Budget (OMB) and the Justice Department, the Reagan administration successfully opposed the 1983 legislation designed to give EPA agents permanent deputization powers. Only after it became apparent that Congress would give the EPA this authority anyway did the Justice Department offer the agents deputy marshal status. But the budget office is not out of the picture: Reagan's White House adheres to an executive order giving it wide-ranging power to shape regulations by applying cost-benefit analysis rather than by assessing the merits of an agency's proposal. The OMB thus holds a tight rein over the EPA, and still opposes increased funding for the agency's Office of Criminal Enforcement. As a result, the proposed fiscal 1986 budget for the office is the same as last year's. And although it consumes less than 1 percent of the EPA's enforcement budget, the Office of Criminal Enforcement accounts for 15 percent of the agency's enforcement actions.

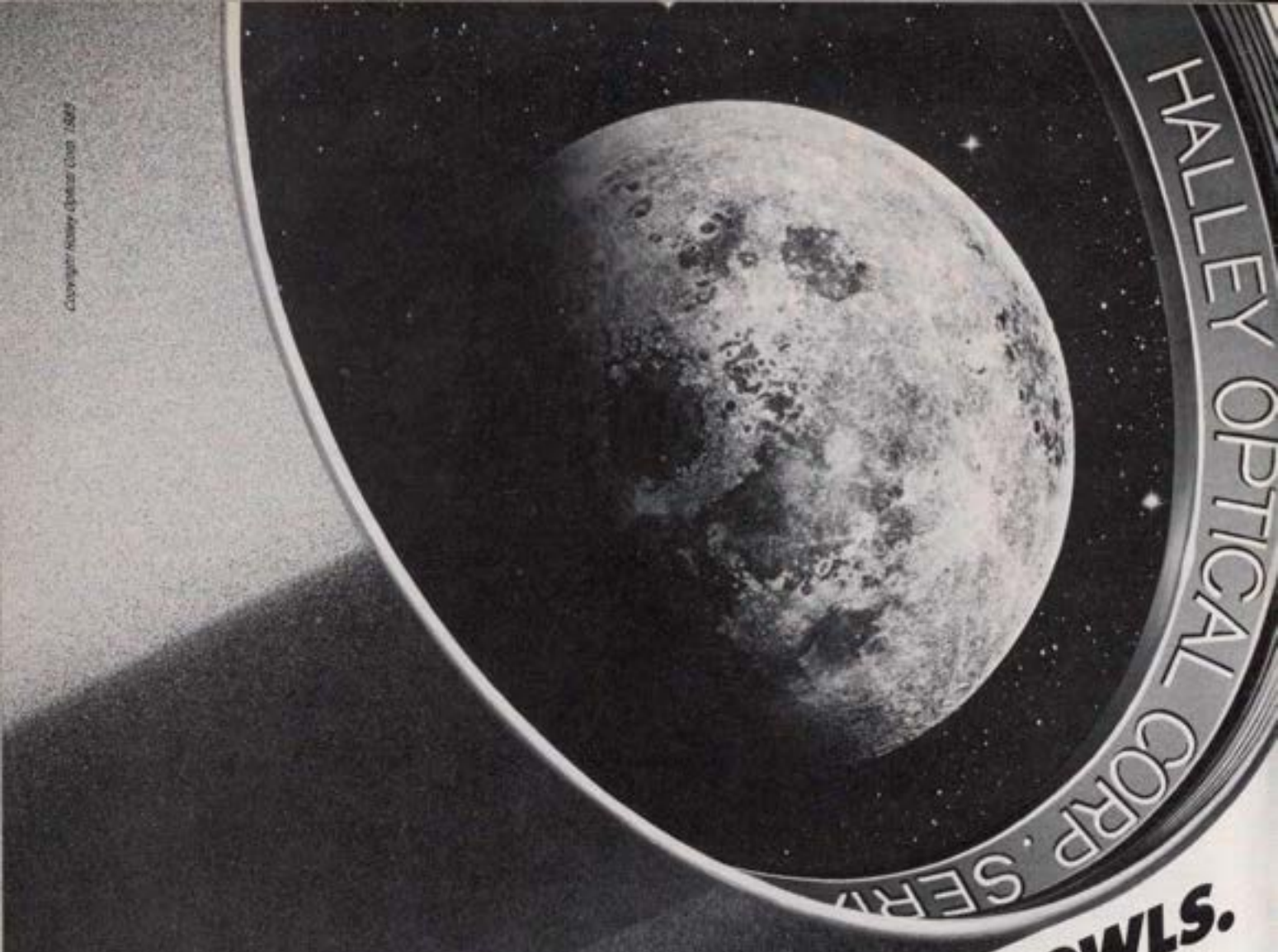
Ironically, the Office of Criminal Enforcement's budget is almost invisible against the costs of cleaning up toxic wastes. It is roughly equal to the amount of money the EPA provided A.C. Lawrence to build its ill-fated waste-treatment facility. Indeed, the agency's entire budget pales in comparison to the $100 billion that the Office of Technology Assessment predicts will eventually be needed to clean up all the high-priority toxic waste dumps around the country.

Despite the Reagan administration's calming rhetoric regarding the nation's toxic waste problems, the President considers enforcement a low priority. During the last year of the Carter presidency, 283 cases were referred to the Justice Department by the EPA's enforcement division; in 1981, 81 cases were referred. The reason, according to most observers, is that government regulation runs counter to President Reagan's philosophy of allowing industry to function unfettered. The result, says Bill Drayton, a former EPA assistant administrator and head of the Washington, D.C., public interest group Environmental Safety, is 80 percent noncompliance with toxic waste laws and an overworked EPA in which "enforcement has suffered very badly."

Steakley and his fellow agents at the Office of Criminal Enforcement deserve better. Congress should start by increasing the EPA's budget for investigation and enforcement. The proper path for toxic wastes—from a plant to a licensed waste-disposal site—will be followed if people know they'll be caught taking the dirty course. Enforcement of hazardous waste laws isn't the only way to prevent illegal dumping, but it is one of the best bargains the public can buy. The stakes are high indeed.

BILL ADLER, *a former congressional lobbyist, is now a political consultant and writer. He is the author of* The Home Buyer's Guide *(Simon and Schuster) and* The Wit and Wisdom of Wall Street *(Dow-Jones Books).*

An EPA agent is called to investigate a PCB spill on New York Harbor.



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BRAD WARREN

After the Salmon Summit

The big fish are almost gone—the victims of dams and overfishing. But a treaty now promises the species safer passage between Northwest rivers and the Pacific Ocean.

MY GRANDMOTHER shakes her head in dismay. We are looking at two small salmon steaks, each little bigger than a folded wallet. The fish is dry and deep red—cut from a sockeye, a salmon abundant on the market these days, usually harvested at five to eight pounds.

"These steaks really are small," she says. "Why, with those big chinook salmon we used to get, when you cut a steak it would fill your whole plate. What's happened to those fish? Are they all gone?"

I nod. "Most of them, anyway."

She looks out the window at the hills over Portland. "I knew the dams were killing some, but I didn't realize it was that bad. Those big chinook were everywhere. Back in the '30s we fished in a creek up the Columbia, and we let them go if they were under 30 pounds."

At 25, I have never seen a 30-pound chinook, although for the last five years I have made much of my living writing about salmon, their habitat, and the escalating struggles over who should be allowed to catch how many. The big fish are nearly a thing of the past. True, some are still caught every year. But anglers now win prizes for them, and duly record the catch with photographs of themselves wallowing in hip boots, hefting the monsters: "32 pounds, Skagit River, 1984." I wonder if in a few decades my children will pose for such photos with eight-pounders—or worse, with glass-encased fish in a museum.

There are reasons to hope for more. One of them is the new U.S.–Canada Pacific Salmon Interception Treaty, a major international conservation agreement that was finally signed last spring. After decades of fruitless dickering and political maneuvering, the two nations, four states, and 24 Northwest Indian tribes involved in the treaty talks realized they could no longer afford to squabble. "The salmon is running out of time," says Bill Frank, chair of the Northwest Indian Fisheries Commission.

© Terry Donnelly/Earth Images

A sockeye run on Canada's Adams River.

A coalition of fishing and conservation groups (including the Sierra Club) helped the treaty through Congress, but what really sped its passage was pressure from President Reagan. Normally not a champion of fish and wildlife, the President urged lawmakers to ratify the treaty in time for his March summit with Canadian Prime Minister Brian Mulroney. He then used it as a diplomatic showpiece to quiet complaints about acid rain.

Fortunately, the President's motives stole nothing from the substance of the treaty; in fact, they helped push it through in time for the 1985 salmon season. The new treaty immediately im-

proves the salmon's plight in two ways, and sets in motion a third process that could, if carried out properly, largely correct overfishing and habitat destruction—the main causes of the salmon's decline.

The pact curbs fishing where it hits hardest—mostly in British Columbia and Alaska. Reducing the size of the catch has encouraged other efforts: restoring ruined spawning and rearing habitat and rebuilding depressed salmon runs. The pact also asks the two nations to maximize their production of salmon from spawning streams and hatcheries, and it establishes the Pacific Salmon Commission to control fishing and oversee future management and research. The success of the commission, key to the treaty's long-term goals, will depend on who runs it and how much money and support it can muster.

OVERFISHING WILL BE hard to stop. Nearly all fishermen believe in conservation and often willingly refrain from fishing weak stocks. But the sheer number of fishermen and a fragmented management system have a nasty way of eroding such noble intentions. Both the United States and Canada have licensed far more fishermen—sport anglers and commercial fishermen alike—than the salmon resource can sustain. Lawmakers, more attentive to the polls than to silently disappearing fish, hesitate to tell citizens they can't go fishing.

As far back as 1962, a special commission told the Washington state legislature that the state's commercial salmon fisheries were already too crowded for most fishermen to make a living. Yet the lawmakers allowed the number of fishing boats to double. It was not until 1975, after a federal court order affirming Indian fishing rights resulted in half as big a harvest for non-Indians, that legislators enacted a moratorium on new commercial fishing licenses: That way they could blame the judge.

British Columbia's government has done no better. Canada's former fisheries minister said last year that the province's 4,500-boat salmon fleet had "the worst overcapacity in the world"; in one day it could catch three times its annual quota.

The salmon's border-crossing migrations complicate matters. For instance, upper Columbia River chinook typically swim to southeast Alaska before turning back toward their home stream. In recent years three out of four chinook harvested have been caught in waters north of Washington state. Governments scramble to catch more salmon, and managers—ostensibly protectors of the resource—join fishermen in increasing the catch in their regions. It's hard to let a few fish escape when somebody in the next country will catch them anyway.

Even more destructive is the way overfishing has chilled government willingness to spend money on rebuilding salmon runs and restoring habitat. Speaking at a gathering of fishermen and conservationists in Seattle last year, Washington Fisheries Director Bill Wilkerson called the proposed treaty "the most important fisheries and environmental issue facing the West Coast." In the absence of a treaty, he said, "We don't enhance fish runs, because the Canadians will catch the fish instead of us. And the Canadians have been inhibited from enhancing runs because *we* would stand to gain." Efforts to restore the salmon appear to be picking up again now that the two nations have agreed to catch fewer of each other's fish.

To protect the most critically depressed salmon species—chinook and coho—the treaty cuts harvests in British Columbia and Alaska by about 25 percent through 1986. It charges the new Pacific Salmon Commission with regulating fishing seasons thereafter so that salmon populations can gradually be restored. It also calls on both nations to boost research efforts and share data. Finally, the treaty requires the two nations to sustain and if possible increase their pres-

ent funding for fisheries management, research, hatcheries, and habitat enhancement, providing important leverage at a time when budget-cutters are starting to hack away at fisheries programs.

The long-awaited pact has already made a difference on some rivers. The most dramatic example is the Columbia, where the treaty has helped free up some $21 million in funding for salmon projects, part of an ambitious effort to restore the huge runs of salmon and other anadromous fish that were destroyed by the 51-dam hydroelectric network in the Columbia and its tributaries.

The Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program will eventually commit an estimated $500 million to $1 billion to this restoration, mostly for hatcheries, research, reclamation of damaged habitat, and fish ladders and bypass systems to help migratory fish get past dams and irrigation diversions. Born from a Sierra Club–inspired provision in the 1980 Northwest Power Planning and Conservation Act, the program is financed by 1 percent of the Bonneville Power Administration's $3 billion to $3.5 billion annual revenues, mostly from dams in the Columbia basin.

The power council pushed hard for passage of the salmon treaty. Without the pact's curbs on ocean harvests, it would be folly to undertake what council member Kai Lee called the largest biological-restoration project on the planet: Young fish would be ushered downstream past the dams only to be caught when they grew big enough to return from sea and spawn; and the runs would never get any bigger.

The treaty ultimately holds out far more than the prospect of curbing salmon catches. Many fisheries advocates see it as advancing "gravel-to-gravel management"—in essence, a systematic effort to improve the survival rate of salmon from the time they emerge as eggs in a gravel river bottom to the time they return from the ocean to spawn.

That's a tall order. A fundamental problem is that so little is known about salmon. What happens to them at sea, where they go, and just who catches the fish from a given stream are still largely unknown. Even the seemingly simple job of building fish ladders to help salmon over dams has been botched in the past, and Columbia tributaries are strewn with concrete-and-steel reminders of good intentions gone awry: fish ladders with steps too high for fish to leap, fish screens built to keep young salmon out of irrigation canals that fetch them up and feed them to the gulls instead. These are being replaced under the power council's program.

Such mistakes are all too easy to make, especially when salmon managers are constantly under pressure to protect both troubled salmon and troubled fishermen—two constituents whose interests are not always the same. Like the power council, the new bilateral Pacific Salmon Commission will inherit a mixed legacy of resource-management efforts—some successful, some not—and a passel of hot-collared disputes between agencies, tribes, and fishing groups whose cooperation is essential for any long-run improvement. Organizing and sustaining such cooperation won't be easy, especially given the intense and divisive pressure that the commission will face from competing fishing fleets.

But outside the Columbia drainage, the greatest problem the salmon commission is likely to run up against will be money. Already, crucial federal funding for research and salmon-enhancement measures to implement the treaty—even to continue existing hatchery operations—is under fire from the Reagan administration. Winning that funding year after year will require a long-run political commitment by all who care about salmon.

BRAD WARREN *is a Seattle-based freelance writer with credits in* Oceans, National Fisherman, Sports Afield, *and the* Seattle Times.

POLITICS PATRICK BARRY

Cities Rush to Recycle

With their landfills overflowing, city officials around the country are sounding and acting like Earth Day idealists. Is big-time recycling finally coming of age?

A COLLEGE PROFESSOR pulls into the Evanston, Ill., recycling center and hoists a stack of newspapers and boxes of glass from his car trunk. After dumping the recyclables into the appropriate bins, he fills a few bags with wood chips and compost for his garden and heads home. He has done his thing for the environment.

Throughout the 1970s this scenario was played out in college towns and environmentally conscious communities around the country, but it wasn't taken seriously elsewhere. Participation in the programs was low, profits were a joke, and the idea of mass recycling was just that—a dreamy idea.

Today the situation is far different. Major American cities are pumping millions of dollars into waste-reduction programs—not to improve the quality of the nation's forests, air, and land, but to avert a garbage crisis that looms over many heavily populated areas. As landfills along both coasts fill up, sanitation departments face the prospect of hauling their excess waste to dumps in the hinterlands. Burning the waste, a fast and dirty solution favored by many public officials, now meets fierce resistance from citizens who fear the dioxin, cadmium, and other toxins in the smoke of burning garbage.

"We've turned the corner in terms of public awareness," says Jerry Powell, editor of the trade journal *Resource Recycling*. "Volume is at an all-time high. But the national recycling rate is still very low and only creeping upward. Now we have to make the programs work."

While America remains the garbage king of the world, as Powell puts it, the rush by big cities to reduce the amount of trash they generate promises to make recycling as common here within a decade as it is in

Patrick Barry

Alley entrepreneurs sell their wares at one of Chicago's five major buy-back centers. An estimated 1,500 people in the Windy City have made a small-scale business out of collecting recyclable trash.

Holland and Japan. The cities of New York, Chicago, Philadelphia, and Minneapolis are experimenting with techniques used by smaller communities to get a significant portion of the waste stream back into the economy. The focus is on separating recyclables at the source—in kitchens and on office desktops—instead of processing unsorted garbage at massive and complex "garbage-to-gold" plants, which have consistently fallen short of expectations in the past 20 years.

The success of more than 500 curbside pickup programs nationwide provides ample evidence that Americans will recycle voluntarily. "Once people get started, they're usually hooked for good," says organizer Joe Ptak of Chicago's Resource Center. His group has convinced thousands to bag newspaper, glass, and cans for alley pickup by Volkswagen buses.

Yet many city governments, including Chicago's, have held back from committing trucks and workers to mass recycling programs, and have supported large waste incinerators instead. They argue that mass recycling might work in environmentally conscious Boulder, Colo., for instance, but not in more traditional cities.

Philadelphia abruptly changed its mind on this score early this year when a last load of garbage topped out its landfill 18 miles away. The next closest dump is in Harrisburg, a 210-mile round trip. "We are facing garbage in the streets," says recycling director Maurice Sampson. "Our entire system is strained." Sampson has a city mandate to recycle 600 tons of garbage a day by 1990. The recycling proposal, with its 20 neighborhood service centers, replaces the city's older plan to build a waste-to-energy unit in South Philadelphia that would have burned 2,200 tons of garbage a day. The unit was shelved because of aggressive lobbying by residents who already breathe fumes from nearby petrochemical plants. "The people in this town *want* to recycle," Sampson says.

Minneapolis moved last year from a pilot curbside service that achieved 32 percent participation to an ambitious citywide program. The city pays private haulers and community groups a "diversion fee" of $10.50 to $17 for each ton of garbage that does not go into a landfill. The program is funded by a landfill surcharge, which further discourages wasteful dumping.

Hamburg, N.Y., has diverted 30 percent of its waste by requiring that households keep recyclables separate from other trash. New York City, down to one available landfill but still producing 27,000 tons of garbage a day, will launch the largest curbside service in the country next spring, along with office paper recycling, an apartment-

house collection service, and half a dozen other pilot projects. "We're exhilarated, and scared, too," says New York City recycling director Joan Edwards. "We've set an ambitious goal: 15 percent diversion by 1990."

This goal is considerably lower than that of model programs in other cities, such as Berkeley, Calif., where composting, buyback centers, a salvage yard, and curbside pickup manage to chop the city's volume of waste by 40 percent. On the other hand, the sheer size of big-city programs has produced unforeseen hurdles. San Francisco dropped its curbside service after repeated theft of newspaper by scavengers in pickup trucks; the city is now focusing on collection from locked garbage rooms in large apartment buildings. Revenue problems are also imminent as citywide programs flood already soft markets with material. Chicago recyclers cringed this year when newsprint prices dropped from $1.50 per hundred pounds to $1; aluminum plummeted from 40 cents a pound to 15 cents.

"The crux of the problem is that our economy depends on waste," says Gretchen Brewer, whose whirlwind organizing for the Chicago Resource Center earned her a seat on the city's task force on waste management. "There are all sorts of subsidies that allow virgin materials to compete unfairly with recyclables." Brewer attributes the aluminum price shock to underdeveloped countries selling bauxite at prices below that of recycled aluminum. Others say cheap subsidized power for aluminum smelters is an invisible force that keeps scrap prices down.

A recent Worldwatch Institute report found that government policies put a consistent drag on the market for recycled paper. "The U.S. Forest Service significantly affects the price of pulp by leasing large areas of national forests each year, regardless of market demand," noted Worldwatch researcher William Chandler. The state of Oregon, on the other hand, balances government subsidies of the timber industry with a 35 percent tax credit on equipment used in recycling operations.

Development of industries that consume recyclables could improve recycling's financial outlook, says Neil Seldman of the Washington, D.C., Institute for Local Self-Reliance. "Wine bottles in California are worth far more when sold back to the wineries than when broken up as glass," he says. "On the East Coast, some beer bottlers are paying three cents for each bottle returned to their plants. A company in Fresno [Calif.] can offer three-year contracts for recycled paper because it makes cellulose insulation with it. That really stabilizes the local market."

Seldman, a consultant to the Philadelphia city council, says that a 20 percent recycling level is just the beginning. Philadelphia will cut an additional 3 percent by feeding clean garbage to hogs and another 5 percent through composting. Much of what's left will be sent to a variety of refuse-derived fuel (RDF) plants, which produce fuel pellets or fiber that can be converted to ethanol, a liquid fuel. These plants also recover metal, glass, compost, and plastics.

While Seldman considers the RDF approach part of the recycling package, others scorn the so-called "open-burn option" as an ecological time bomb. The residential garbage stream contains spray paint, pesticides, zinc batteries, smoke detectors containing radioactive americium, and plastics, the burned residues of which may produce airborne dioxin or PCBs. Yet with landfills overflowing and recycling limited to less than half the garbage stream, modern burn plants are on the drawing boards of many of the same cities that are promoting recycling.

In most RDF plants, people work alongside the hoppers, pulling out the dangerous items. Legislation is in the works in some states to require installation of the best available emission-control technology on new recycling plants. But Seldman admits that toxins will slip through, and that the pressure to unload hazardous wastes cheaply and illegally could lead to bribery at the hoppers. "It's a legitimate concern," he says. "There will be abuses."

Seldman's caveat may take on a sharper edge as recycling matures into a big business, and concern for profits begins to outweigh environmental principles. The labor-intensive industry could support thousands of jobs in Chicago alone, which piques the interest of economic development officials as well as conglomerate waste haulers such as Browning-Ferris Industries and Waste Management, Inc.

Faced with the prospect of passing the torch to corporate America, veteran recyclers are not blind to the irony of their situation. "We're coming at it from a negative viewpoint," laments editor Powell. "We aren't recycling primarily because it's the right thing to do, but because there's a crisis in waste management."

And yet, even with the American garbage cart placed clumsily before the horse, few argue that we can afford to ignore recycling in the future. Within a decade or two, a part of the United States' throw-away culture will be buried for good.

PATRICK BARRY *reports on urban and environmental issues for such publications as* Environment, Environmental Action, *and the* Chicago Sun-Times.

POLITICS

STAFF REPORT

At Least Ban the Test

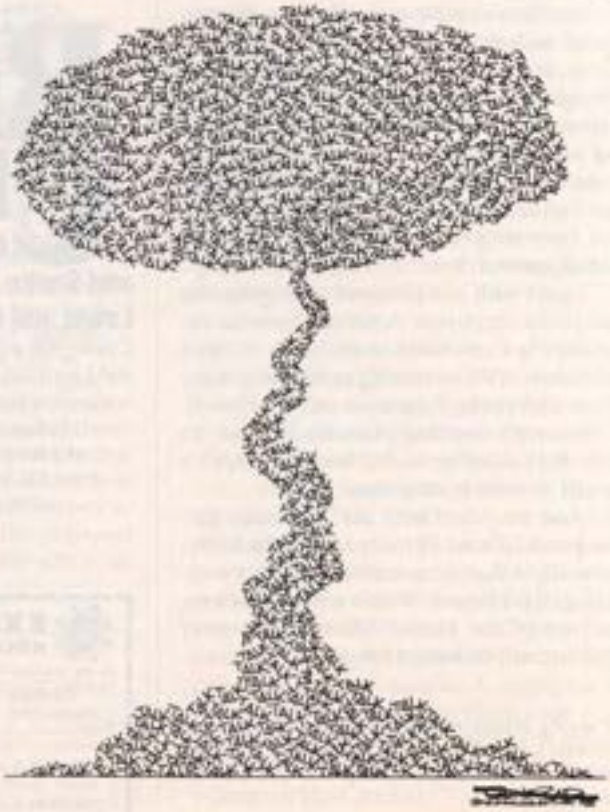
Although most nuclear weapons are exploded underground to protect us from deadly radiation, the political fallout from increased testing may be every bit as lethal.

TWENTY-SEVEN years ago, President Eisenhower committed the United States "to proceed promptly to negotiate an agreement with other nations . . . for the suspension of nuclear weapons tests and the actual establishment of an international control system." The goal of implementing a comprehensive test ban (CTB) was reaffirmed by successive presidents and Congresses over the next two decades. It was formally restated in the Limited Test Ban Treaty of 1963 under President Kennedy, in the Nonproliferation Treaty of 1967 under President Johnson, in the Threshold Test Ban Treaty of 1974 under President Nixon, and in the Peaceful Nuclear Explosions Treaty of 1976 under President Ford. CTB negotiations were actively pursued under President Carter, and virtually all elements of a text were agreed upon. But as 1985 draws to a close, a comprehensive ban on the testing of nuclear weapons has still escaped our grasp.

In a sharp reversal of the momentum that's been gathering for three decades, the Reagan administration has abandoned CTB negotiations. On February 9, 1982, Eugene Rostow, then director of the U.S. Arms Control and Disarmament Agency (ACDA), told the United Nations Committee on Disarmament that, "while a comprehensive ban on nuclear testing remains an element of the full range of long-term U.S. arms control objectives, we do not believe that, under present circumstances, a comprehensive test ban could help reduce the threat of nuclear weapons or maintain the stability of the nuclear balance." The acting director of the ACDA, James George, elaborated on the administration's position when he advised Congress in March 1983 that the United States required continued nuclear testing for "the development, modernization, and certification of warheads, the maintenance of stockpile reliability, and the evaluation of nuclear weapons effects." Refinement of nuclear weapons technology has thus taken priority over arms control.

This abrupt abandonment of a goal sought on a bipartisan basis by six previous presidents startled the world and left the United States isolated and almost without support, even among its closest allies. It came as less of a surprise to Americans. Reagan's appointees to the Defense Department and even to the ACDA had in the past been indifferent if not openly opposed to practical arms-control measures, particularly those interfering with U.S. weapons development.

The U.S. position also left the Reagan



administration embarrassingly vulnerable to Soviet leader Mikhail Gorbachev's announcement last July that the Soviet Union was unilaterally suspending all nuclear testing for several months and calling on America to do the same. Gorbachev said there should be no doubt that a Soviet-American moratorium on atomic tests would help curb the nuclear arms race. Reagan had no reply but to call the Soviet gesture a propaganda ploy; now that the United States is committed to continued testing, it can hardly look with favor on a moratorium that would facilitate a treaty it opposes.

The value of a CTB would have been greatest had it been concluded when the Limited Test Ban Treaty was signed in 1963. By prohibiting atmospheric tests, that treaty removed the specter of atomic fallout from the public consciousness, but it did not slow the rate of overall testing, which has in fact almost doubled.

"A comprehensive test ban would halt that aspect of the arms race that is most threatening, the qualitative improvements in nuclear weapons," says Glenn T. Seaborg, associate director of the Lawrence Berkeley Laboratory and former chair of the U.S. Atomic Energy Commission. Indeed, continued nuclear testing has enabled both the U.S. and the Soviet Union to develop destabilizing multiple warheads and highly accurate first-strike weapons. Whether or not the Reagan administration exaggerates the vulnerability of this country's land-based missiles, testing and deployment of first-strike systems by the Soviets has exacerbated America's feelings of insecurity.

Meanwhile, new Soviet and American weapons systems are still appearing or being proposed: land-, sea-, and air-based cruise missiles; SS-20s; neutron bombs; Pershing IIs; and nuclear-explosion-driven X-ray lasers for President Reagan's Star Wars. All of these are considered highly threatening by one side or the other and by the populations where they may be deployed. A comprehensive test ban could help put a halt to this continued multiplication and improvement of nuclear weapons, and thus holds out promise of greater security and stability.

In addition to lessening arms-race tensions between the U.S. and the Soviet Union, a CTB would reinforce efforts to prevent the addition of new members to the atomic club that now numbers five nations. The Nonproliferation Treaty of 1967 calls on the nuclear powers to limit and reduce their nuclear arsenals and strategic arms. With the Geneva strategic-arms negotiations offering little promise, a CTB would do most to weaken assertions by the nonnuclear states that the "nonproliferation

bargain" is not working and that they in turn are entitled to renege on their obligation to honor the treaty.

The perilousness of this situation was all too apparent as the third review conference for the Nonproliferation Treaty opened on August 27, 1985. United Nations Secretary-General Perez de Cuellar convened the conference with a call for the nuclear powers to honor their side of the nonproliferation bargain: "I particularly wish to stress again on this occasion that unless the nuclear arms race between the major powers is halted, the terrible possibility of wholesale destruction will increase yet further, and the fear of a final catastrophe will shadow our daily existence. In this respect, the implementation of the treaty has been largely one-sided, to the understandable concern and profound dissatisfaction of its nonnuclear weapons parties."

A common and forceful argument against a CTB relates to the reliability of our deterrent and defensive nuclear weapons: How can the U.S. have confidence in the performance of its weapons systems, so central to its defense posture, if tests are not available to reveal deterioration or to make certain that they will work properly?

"The assurance of continued operability of stockpiled nuclear weapons has in the past been achieved almost exclusively by nonnuclear testing—by meticulous inspection and disassembly of the components," says Norris Bradbury, former director of the Los Alamos National Laboratory. "One should be quite clear about this," Seaborg adds: "It is *improvements* in nuclear weapons that require testing, and the aim of a comprehensive test ban is specifically to prevent or impede such improvements. . . . Any inconvenience we suffer under a comprehensive test ban would be visited also on our adversaries."

For a large number of officials, limitations on nuclear weapons development would be desirable—if the limitations applied equally and with confidence to both sides. Verifiability has thus always been and remains a crucial issue in the CTB debate.

"Negotiations for a comprehensive test ban in the early 1960s broke down over U.S. insistence that obligatory on-site inspection was needed in order to be sure that the Soviets would not cheat," says Seaborg. "I think now, in retrospect, that even at that time we were wrong. With each passing year since then, the ability to monitor compliance with a comprehensive test ban has become more assured."

Indeed, tremendous advances have been made in seismology, particularly in its application to the detection of underground nuclear explosions and to the discrimination between such explosions and earth-

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quakes. According to Lynn Sykes of Columbia University and Jack Evernden of the U.S. Geological Survey's Center for Earthquake Research, who have conducted extensive studies on treaty verification, modern seismic science could successfully police a test-ban treaty. The two geophysicists stated in the October 1982 issue of *Scientific American* that nuclear detonations as small as one kiloton can be detected.

Opponents of a comprehensive test ban nevertheless argue that the Soviets could evade their obligations under such a treaty by deadening or masking the signal from small explosions, by conducting them in soft material or large underground holes, or by obscuring them in the aftershocks of earthquakes. The impact of such arguments derives less from their plausibility than from their appeal to widely held beliefs that the Soviet Union cannot be counted on to live up to formal commitments and has a record of systematic violation of previous arms-control agreements.

The exchange of accusations between the U.S. and the Soviet Union regarding compliance with existing treaties has been especially volatile in the last few years. As one of his reasons for abandoning CTB talks, President Reagan cited Soviet violations of the Threshold Test Ban Treaty, which limits underground nuclear explosions to 150 kilotons. Yet after having examined the "secret documents" upon which Reagan founded his claim, several weapons scientists at the Lawrence Livermore Laboratory concluded that there was no evidence that the Soviets had cheated on the treaty. Geophysicists Sykes and Evernden concurred with this judgment: "We have not found a single instance in which the size of a Soviet test has exceeded the threshold."

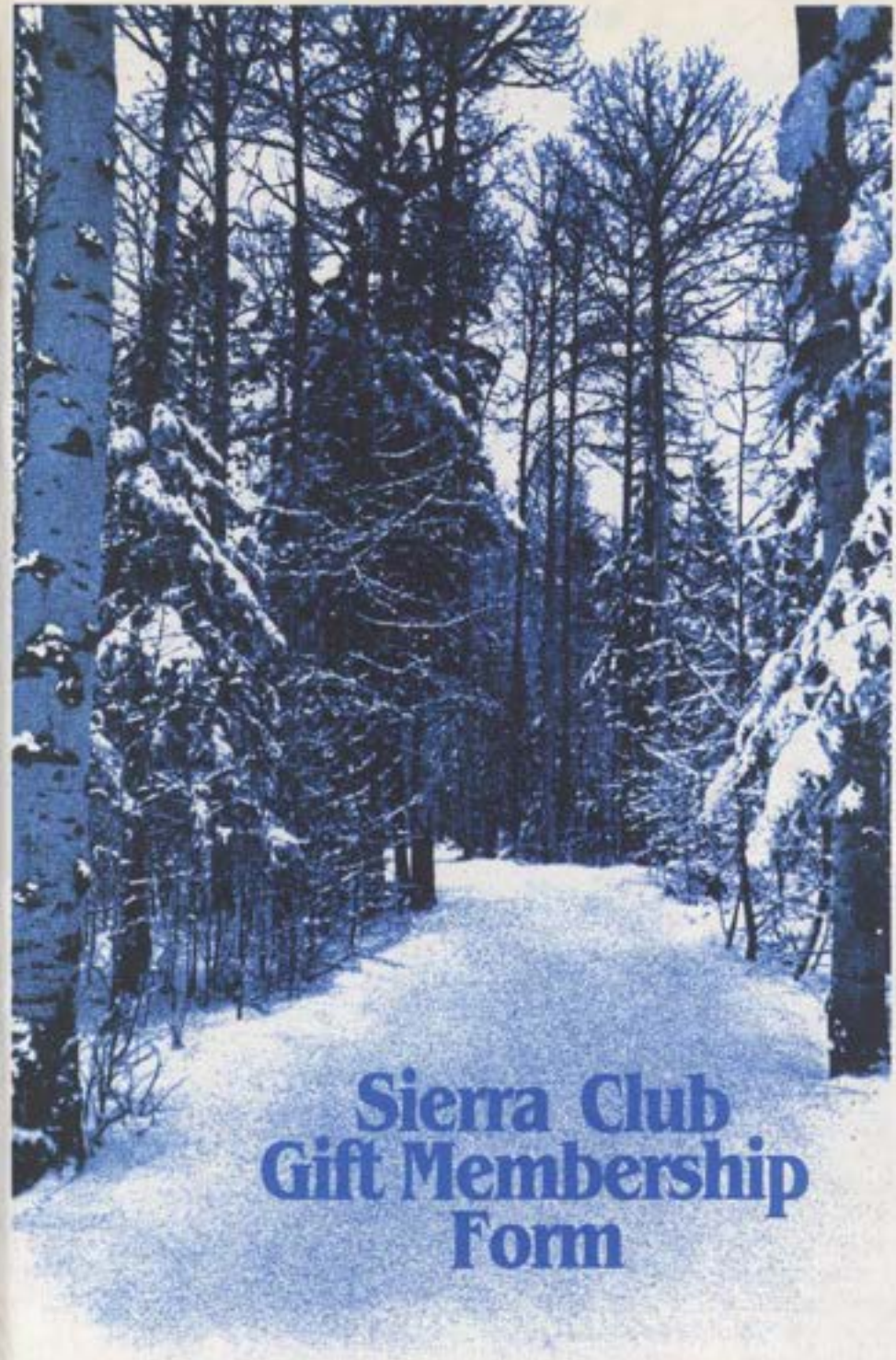
This is not to say that there are not legitimate compliance concerns on both sides. But their resolution becomes less likely as questionable charges are leveled. Furthermore, notes Seaborg, "It seems unlikely today that the Soviets would take large political risks under a comprehensive test ban for the chance of making the insignificant military gains they could achieve through clandestine tests."

Negotiation of a comprehensive test ban would spark vigorous opposition and protracted debate. Unfortunately, the atmosphere is clouded by distrust of arms-control agreements and of the Soviet Union. For the CTB to move again to the top of America's agenda will require a sharp change in spirit and policy in Washington, as well as strong citizen support.

Such a reversal is not without precedent. The test ban negotiations begun in 1958 appeared no more promising in 1962 than the CTB does now. In the aftermath of the Cuban missile crisis, with its sobering display of the high risks of confrontation in the nuclear age, test-ban negotiations were quickly revived; the Limited Test Ban Treaty, negotiated in a few weeks, was brought into force in 1963.

There has been no-arms control agreement or even progress toward one since 1980. The resumption and quick conclusion of negotiations on a comprehensive test ban would help us to break out of this impasse. In addition to the dramatic impact of attaining a nearly 30-year-old goal, such an agreement would hold out renewed hope of revitalized creative negotiations on other major elements of the arms race. On no other subject has the ground been so well prepared for quick and effective action. □

SUMMITRY



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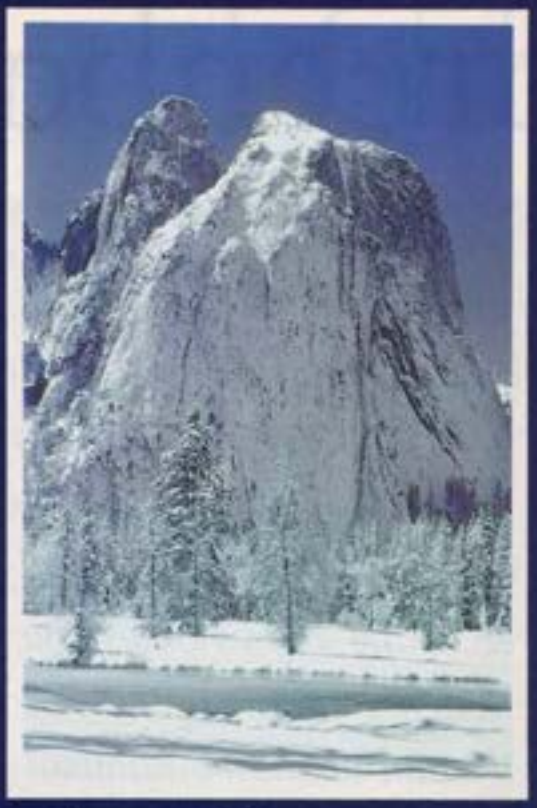

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For your convenience, Sierra Club Gift Membership forms have been inserted into this issue of SIERRA.

Sierra Club Holiday Gift Memberships

Greenbelts and the

JUDITH KUNOFSKY AND LARRY ORMAN

Imagine a glass filled with water. The water is a city, the glass a greenbelt of open space surrounding it. Contained, the water level can rise and fall; as the number of the city's homes, businesses, and residents changes, they can be arranged in an unlimited number of ways. Unrestrained, the water spills outward, and the croplands, forests, and wetlands that support the city are lost.

AMERICANS HAVE LONG looked at endless suburban expansion as inevitable: the San Joses and Houstons have become the prototypes of the way we build our cities. A particular ridge, lake, forest, marsh, or stream might be spared, but in general, development seems fated to continue ever outward until stopped by ocean, mountain range, or the next metropolitan region.

There is another way to visualize the future of our burgeoning urban regions, however; one that uses a fundamentally different concept of how to organize a metropolis. This is the glass filled with water, the "greenbelt," a system of agricultural and recreational land that sets limits to the

The city of San Francisco—seen here from San Bruno Mountain—fits comfortably within the natural borders of ocean, bay, sky, and open space. Over the next two decades, the Bay Area must accommodate an estimated 1 million newcomers.

Well-Planned City

Larry Ornan

growth of a city while ensuring the most efficient use of urban space.

The current American urban open-space controversy focuses on the open lands *surrounding* metropolitan regions. It is more complicated and much greater in scale than traditional controversies over parks and plazas, for it raises fundamental issues concerning the structure of our society: the horizontal limits to continuous outward city growth, the widespread antipathy toward making cities truly urban, the American dream of a single-family home, dependence on the automobile, the limits of private-property rights, and the relationship between city and countryside.

Sprawl or Space?

Most of our major metropolitan regions have grown without careful planning. The enormous pressure of post–World War II development, fueled by subsidized mortgages, vast new freeways, cheap cars and gasoline, and the Baby Boom, transformed large, relatively compact urban centers into disorganized, congested megalopolises.

In areas such as Los Angeles, New York, and Chicago, access to large expanses of rural landscape was lost. The open lands of these cities have been reduced to disconnected "islands," primarily public parks surrounded by seas of low-density development. However valuable these parks may be, they are still only poor shadows of the natural legacy that an urban greenbelt could—and should—have protected.

Many other large urban regions are experiencing similar pressure to obliterate their landscapes in favor of sprawling cities. Most of these areas could still achieve a balance between development and open space. An urban greenbelt, more than just a wash of color on a planner's map, can be a living landscape with vital economic, recreational, and ecological functions. By adopting a greenbelt strategy cities can conserve lands necessary to ensure safe drinking water, provide unpolluted air, offer diverse choices in fresh local produce, and encourage a sense that wilderness of a sort can be found next door. The goal of greenbelt planning is the *permanent* protection of productive open lands around and between the cities of a metropolitan region.

There are only degrees of permanence associated with land-use decisions in our society. The closest one comes to true permanence in American policymaking is establishment of a wilderness area, publicly owned and managed with the explicit goal of long-term preservation. In metropolitan regions, large-scale urban parklands and public watersheds often receive similarly strong protection.

But when it comes to protecting an entire metropolitan greenbelt, the challenge increases significantly. Most land in a potential greenbelt is privately owned and subject to the control of numerous city and county governments. The mechanisms needed to guarantee the future of a greenbelt range from land-use regulation to public acquisition of key parcels.

In most cases the primary factor in establishing and maintaining a large greenbelt is the ability of city and county governments to zone land and control the rate of urban growth. The level of government needed to establish a greenbelt varies from region to region. In some cases a city may be able to accomplish the task alone, as in the case of Boulder, Colo.; in others a special agency may need to be formed to coordinate several local governments.

To achieve permanence, however, a special commitment to greenbelt protection is necessary. Some regions may achieve this through constant monitoring and by electing supportive local officials. Others may look to state legislation or voter referenda that cannot be easily changed.

In any case, such actions inevitably raise questions about the balance between private-property rights and the public's right to determine land uses in the interests of an entire region. To resolve such concerns, greenbelt programs need to ensure that two conditions be met. First, there must be a valid, clearly stated public need for a greenbelt. The importance of agricultural land, the need for growth management, the economic benefits of compact building can all justify strong public actions to protect broad expanses of open space.

In addition, privately owned lands earmarked for an urban greenbelt must be allowed a reasonable economic function. Court cases have held that this should not be taken as a guarantee that these functions will always be profitable, partly because of the difficulty of defining that term. But the owner usually must be allowed to benefit from the land by activities such as selling

timber and farm products, establishing a homesite, or by selling the land. In some situations involving ecologically sensitive areas such as marshes, however, even these uses are precluded in the public interest. While the specifics vary from state to state, it is generally accepted that the public may establish a greenbelt through its power to regulate land use (as opposed to its power to acquire land).

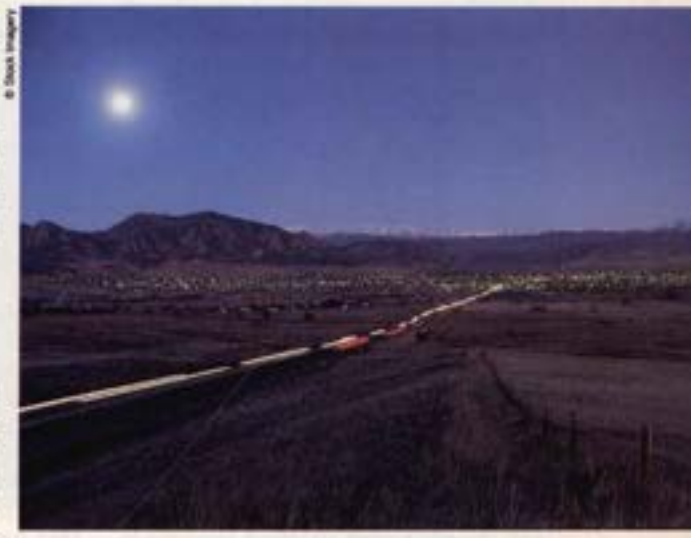
Growing Greener

WHILE THE GREENBELT movement is young in the United States, Great Britain has been nurturing the concept for almost a century. That nation now has greenbelts in 25 regions, chief among them the 12-mile-wide "donut" around London. Government policy established British greenbelts in the mid-1950s, and they have proven to be a popular planning concept.

The major purposes of the British greenbelts are to stop cities from sprawling into one another and to protect the special qualities of the countryside, especially agricultural land resources. These priorities have been challenged recently by Margaret Thatcher's government, which sought to open up greenbelt areas for development. This proposal was beaten back in a storm of public protest so strong that one cabinet minister likened it to "stepping on a rake that comes up and hits you in the face."

A number of American cities are following the British example. Boulder, for one, has chosen to construct a permanent green border to define its limits. Since the mid-1960s a rectangle of 14,000 acres has been purchased for this purpose through special taxes and bond issues, and an additional 3,000 acres have been earmarked for purchase. Half of this land is in agricultural use; the remainder is public parkland. In cooperation with its county, Boulder has also combined its open-space effort with a commitment to manage growth carefully within the city's limits, and new residential development is limited to 2 percent per year. "Open space is the most popular program in the city," says Boulder city planning director Ed Gawf. A recent survey revealed 80 percent support for the Boulder greenbelt.

The state of Oregon has laid the groundwork for a greenbelt by requiring cities to



While its past has been one of uncontrolled growth, the future path for San Jose (left) is now being debated by city officials. A greenbelt proposal to protect what remains of the open space around the city has the endorsement of the mayor but faces an uncertain fate. Because of its greenbelt, visitors to Boulder, Colo. (above, top), won't find the city until they reach the foot of the Rocky Mountains. But if developers in Santa Clara County, Calif., have their way, travelers will always be arriving and never leaving.

map 20-year growth boundaries. Lands outside these boundaries are zoned exclusively for farm and related uses, while complementary policies encourage efficient use of urban land.

One of the nation's most complete countywide greenbelts is thriving in Marin County, Calif., just north of the San Francisco Bay. As a result of a citizen revolt against excessive development proposals in the early 1970s, the county adopted a new plan that concentrated urban growth in the cities in its eastern areas while establishing regulatory protection for the rolling dairylands in the west. The inner "green line" dividing the two sections has been established by a combination of purchase and land-use regulation.

Other areas have made useful starts as well. Seattle has an ambitious program to purchase easements on agricultural land; Cincinnati has its Hillside Trust program, Boston its Trustees of Reservations group and Urban Wilds effort. Although few of these are linked to a complementary growth-management strategy, each has the potential to become a broad-scale greenbelt effort encompassing the entire system of open space around the metropolis.

Inside the Belt

THE GOAL is a ring of open space surrounding a large urban region. But how can we meet our needs for housing and other development if greenbelts define the outer boundaries of cities?

First of all, it is unlikely that any greenbelt would be established all at once and be of such a scale as to prevent any building beyond current city limits. The challenge, then, is to make the gradual shift to using urban land resources in the most efficient way possible.

The most obvious place to start is at the suburban fringe, where new homes are usually built on lots of 6,000 to 10,000 square feet. By increasing the number of homes per acre from four or five to ten or twelve, for instance, large amounts of farmland and other open space can be saved and more affordable housing provided. Most dwellings would still have their own lots, while a greater range of choice would be available to those who can't afford or don't want a detached house.

But building more compactly on new land is only half the picture. Considerable opportunities for more efficient land use are also available within existing cities. The downtown areas of Kansas City, San Jose, Dallas, and many other medium-size cities are dotted with acres of parking lots and vacant land next to newer office and commercial buildings. In some of these communities homes are being brought back to the underused older centers—not detached houses, but denser urban town-and-garden apartments.

Even more opportunities for housing can be found along the commercial strips that abound in so many American cities. In Mountain View, Calif., a stretch of six-lane roadway that was once flanked by used-car lots, fast-food outlets, and furniture stores is now the site for several hundred homes. They were built to be screened from traffic but retain access to transit and new commercial shops. In older industrial areas new homes can replace abandoned factories. For instance, the old construction site of World War II Liberty ships in Richmond, Calif., is now occupied by the first of several thousand condominiums.

Another alternative to detached homes is the addition of a rental unit to an existing home, a long-established American tradition. These "granny apartments" offer excellent housing while conserving energy and other natural resources because utilities are often shared with the original house.

These approaches can help "in-fill" a city with only a modest overall increase in density. A research project evaluating these strategies for the nine-county San Francisco Bay Area has shown that their use could more than meet the next 20 to 30 years' housing needs while still allowing for a large, permanent metropolitan greenbelt in the region.

Unfortunately, the challenge of promoting development in the right places may be as great as the challenge of setting aside a greenbelt. Many people—including environmentalists on occasion—oppose more housing in urban and suburban areas. Unless residents can see a clear and immediate benefit (better transit service, for example), they often conclude that increased housing, which means increased population in the immediate vicinity, will hurt the environment. Growth may very likely bring more cars, more noise, less open space, and less sunlight. City services may be temporarily strained. For these reasons residents often

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Larry Ulrich

Howard Watkins

The rolling hills of the counties that surround London (left) will remain green under a British law that prohibits virtually all development. Even in areas left open to housing, there are ways to minimize its impacts. Compact dwellings such as these in Sonoma County, Calif. (above, top), fit into the landscape far more gracefully than their counterparts in northeastern Arizona.

argue against development on environmental grounds. But if a region's population is increasing, growth can be accommodated more soundly by compact cities than by continued sprawl into the greenbelt.

Public aversion to more housing may also reflect a strong antipathy toward truly urban cities. Many Americans (and most young Americans) have little or no experience with urbanization at concentrations that make the pedestrian rather than the automobile the dominant species. They may judge cities only by the standards of the worst ones: congestion, pollution (from automobiles, usually), and anonymity.

But the American dream of a rural home near an urban job market is no longer realistic. Suburbs are becoming socially and economically unsustainable. Traffic is destroying the peaceful atmosphere and once-easy commute to work, and no amount of highway expansion can provide a permanent solution. Only when people live close to their jobs or take public transit can commuting problems be permanently solved. Taxes are rising because new city services—sewers, water, streets, parks, police, and fire protection—cost more to set up in new low-density areas than they would cost to augment in existing cities.

Nor does the suburban dream meet the needs of the vast majority of Americans. More than half the nation's households consist of one or two people, and the three- and four-bedroom single-family home is not practical or affordable. The low density of suburbs—and accompanying lack of public transit—hinders mobility for the elderly, the disabled, the young, and the poor. And access to a wide variety of jobs, which is in part what makes urban regions valuable, is impossible unless jobs and housing are dense enough to make public transit affordable. True urban living is desirable not only to protect the greenbelt, but for the sustainability of the city and the well-being of its residents.

In many parts of the country, people are rethinking the future of the metropolitan regions in which they live. Many issues, old and new, are being addressed. The vision of a metropolis combining urban, people-oriented cities and protected greenbelts is one that offers solutions to many problems that may now be seen as unrelated.

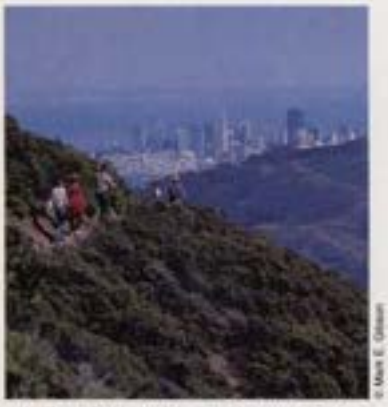
The environmental quality of life in more than a dozen large metropolitan areas will likely be determined within the next ten years. During that time, regions such as Denver, Seattle, Phoenix, Indianapolis, Miami, and Atlanta will decide whether to save or pave the natural greenbelts that still surround them.

If protection fails, these communities, choked by sprawl and traffic, may be cut off forever from the benefits of nearby crop and grazing lands, natural areas, watersheds, and other resources. Their environmental problems may be virtually unsolvable, unless deterioration somehow opens the way to convert sprawling suburbs back into fields and pastures.

If protection succeeds, these regions may be able to develop compact patterns of settlement in tune with the need for energy conservation, clean air, and affordable housing. Their future will then be one of balance between city life and open land. □

JUDITH KUNOFSKY *directs the Greenbelt Action Program of People for Open Space, a conservation group dedicated to protecting the open lands of the San Francisco Bay Area.* LARRY ORMAN *is the organization's executive director.*

Citizen Action
A Greenbelt's Best Friend



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Mt. Tamalpais in Marin County, Calif., rises above San Francisco. To the north lie some of the most productive dairy and agricultural lands in the state.

THE ONE INDISPENSABLE component of a successful greenbelt campaign is participation by the region's residents.

There are several important rules for grassroots greenbelt action. First, make a compelling case. This means identifying the lands that are to make up the greenbelt—and then spelling out the benefits for residents of the area. This should not be difficult, because a greenbelt has something for everyone: food consumers and agricultural interests, hikers and horseback riders, taxpayers and businesses.

The key here is to make the greenbelt real. Map it, showing those who have a stake in keeping it open just what they will get. Equally important is *naming* the greenbelt, so it can become visible in political circles and in the public psyche. For some places, a term other than "greenbelt" may serve better, but the purpose will be the same.

Next, the tools used to carry out the greenbelt proposal must fit the purposes of the lands to be protected. For example, it may be necessary to purchase parkland, but it may be more beneficial for farmland to remain in private ownership. Although compensating landowners to prevent development is legally unnecessary, sometimes it may be expedient to do so.

Finally, develop a broad citizens' coalition committed to a long-term effort. Ally with every interest that will benefit from the greenbelt, including those in central cities, suburbs, and outlying towns. A greenbelt campaign needs to operate at all civic levels—legislative, regulatory, legal, and electoral.

Greenbelt campaigns are unique in that their goal is the protection of large systems of open land, not just a few key pieces. This enhances the formation of broad coalitions, media coverage, and public appeal.

For more information on greenbelts, contact People for Open Space, 512 Second St., San Francisco, CA 94107.—*J.K. and L.O.*

Fortunately for Mr King of Bulawayo, our jackets can protect you from wilder things than the weather.

Early on the morning of 27th August, 1982, Mr King was giving the elephants of the Chipangali Wildlife Orphanage their breakfast, when an animal of quite a different stripe decided to breakfast on him.

As he was unloading trunkfuls of leaves and branches from the back of his Land Rover, an enraged zebra mare attacked him from behind.

She bit his collar, reared up and struck him with her fore-feet, and sent him crashing to the ground.

Her appetite whetted, she proceeded to jump on him, lashing out wickedly with her hind legs.

Only two things saved Mr King from the possibly dire consequences of the zebra's fury.

One was the timely arrival of the elephant attendant, who drove the mare off with a well-aimed shower of stones.

Two was the fact that in the chill of the African dawn, Mr King had put on his Barbour 'Solway Zipper' jacket.

As it turned out, it was to prove a wise precaution.

Although it was not for lack of trying on the zebra's part, the jacket remained undamaged throughout the attack.

Had it not, or had Mr King not been wearing it, witnesses considered that instead of the numerous cuts and bruises he sustained, he would have undoubtedly been very seriously injured.

Needless to say, we have always made our jackets to withstand the worst the weather and the countryside may do.

But as Mr King rightly pointed out, we have never claimed them to be zebra-proof.

Thankfully, however, it would seem that this is one particular light that we have been hiding under a bushel.

For full details of the complete Barbour range, send $2.00 to: **TAFTCO** Incorporated, 212 Welsh Pool Road, Lionville, PA 19353

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CLEAN & GREEN

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ROBIN J. IRWIN

SUPPOSE YOUR UNCLE EDGAR has a heart attack while trout fishing in Montana. In his will he remembers the knobby-kneed kid whose hooks he once baited, and he leaves you $20,000 worth of blue-chip stock . . . in Dow Chemical.

If you're a good child of the 1960s, you're not into having your money invested in chemical companies, or for that matter in nuclear power plants, weapons manufacturers, or apartheid.

But rather than cash in Uncle Edgar's stock and blow the whole wad on a trip down the Amazon, you decide to reinvest it in something a bit less tainted. You want your dollars invested according to your principles, not contrary to them.

Is it possible? Can you really keep both your money and your conscience clean without losing financial ground—or worse yet, your shirt?

The knee-jerk Wall Street reaction, of course, is that principles and profits don't mix. These hardliners assert that limiting the field of potential investments in any way only cuts into potential earnings.

Yet, faced with demand from Uncle Edgar's heirs and their philosophical kin, a few hardy souls within the investment industry are bucking the mainstream. This new breed of financial professional is proving that it's not necessary to ignore your conscience to make a profit. Their financial subculture is known as "ethical," "socially responsible," or just "social" investing. The field has even spawned its own somewhat saccharine cliché: "Doing well while doing good."

So how well *is* the field doing? Admittedly, its success has been mixed . . . but it appears to be getting better.

In the past, Wall Street doomsayers were by and large correct. The late 1970s and early '80s were dismal times for most mutual funds, and especially so for those with social scruples. Earnings were low, and consequently investors put their money elsewhere. Some social mutuals failed to survive this drought and silently slipped from the financial pages. Two years ago, Foursquare Fund—the most venerable of the social mutuals—died a quiet death due to lack of investor interest, and was merged into a larger, nonrestrictive fund. Last year a much-ballyhooed attempt by Shearson–American Express to start a new social fund was aborted when the company couldn't generate enough initial investments.

Nonetheless, the outlook is promising. Recently, social funds have at least been running in the middle of the pack, and sometimes better. In 1983 the peace-minded mutual Pax World Fund racked up an impressive 24.17 percent return to outperform the Standard and Poor's 500 index. The same year, Calvert Social Investment Fund's Money Market Portfolio did better than any other money-market fund, socially responsible or not.

So it comes down to this: If you're a shrewd investor, you can probably make more money ignoring that little voice. But if you're lazy and don't want to bother actively managing your money, you can surely make less than your ethical friends—just by putting your booty in the bank, for instance.

Social mutual funds aren't the only way to invest your money ethically. You can also work through a broker or go it alone. But mutual funds are the easiest way, and thus a traditional starting place for the novice investor.

When you buy shares in a mutual fund, your money—along with that of many other small investors—is watched over by professional market analysts and a financial manager. Together, all these collective nest eggs go into perhaps 30 or more financial baskets. If one stock takes a dive, the rest will buffer the loss. Such professional management and financial diversification are difficult for small investors to obtain any other way.

Where the half dozen socially responsible mutual funds differ from the other 490 or so in the pack is that they tack social considerations onto standard financial criteria. For instance, they may decline to invest in an otherwise profitable company if it has a poor environmental record, discriminates against minorities, ignores job safety, or does substantial business in South Africa. The problem, says one ethical-investment professional, is that "there's no consensus on what constitutes socially responsible investing. Out of six funds there are six different definitions, although some overlap."

In other words, you first have to decide which social goals are most important to you. Do you care whether or not your money ends up in South Africa? If so, is that more or less important than staying out of firms with lousy environmental records? Where does equal-opportunity employment fit in? How about nuclear energy? Product safety and quality? OSHA violations?

If answers to these questions don't pose any problems, here are a few that are trickier. Would you like to do your bit to promote alternative energy? If so, is investing in a company that makes solar calculators and watches close enough for now? Do you consider expanding small-scale hydropower an evil or a social good? How about geothermal energy? Or wind farms?

The result of all this soul-searching will be your own personal "social screen." You can use it to put together a stock portfolio or, more likely, to judge how well various socially responsible mutual funds measure up to your standards.

Now stop reading and back up. Did you notice how the discussion three paragraphs back dealt only with negatives, things you might refuse to put your money in? And how the next one dealt with positives, things you might intentionally choose to invest in? Each represents a different approach to social investing, says stockbroker Amy Domini, author of the book *Ethical Investing* (Addison-Wesley, 1985).

Domini says she personally prefers the positive approach, especially when evaluating a company's environmental performance. "Avoiding companies with bad environmental records is a very difficult thing to do because there's no established reporting system in place. You can't just call a single office in Washington, D.C., and get all the information you need," she says. "But working from the positive side, it's quite possible to find companies that have a demonstrated commitment to the environment and have gone beyond legal requirements. For instance, many corporations earn their living selling systems to analyze, clean up, or protect the environment." Most do-good mutuals follow one tack or the other, and some do both. When evaluating any potential social-investment fund, ask yourself which philosophy it follows and whether that's the one you would prefer.

There are other differences in how companies apply social criteria. Dreyfus Third Century, for instance, first ranks companies according to social criteria, then selects the most profitable of the socially acceptable ones as potential investments. Nonetheless, the firm has been accused of being one of the least restrictive of all social-investment mutuals. For example, Dreyfus owns stock in Caterpillar Tractor and drug manufacturer Warner-Lambert, both of which have some involvement in South Africa. In her book Domini quotes Timothy Smith, executive director of the Interfaith Center on Corporate Responsibility, who describes Dreyfus' social criteria as "big enough to drive a nuclear weapon through."

Calvert Managed Growth Portfolio, on the other hand, chooses stocks according to financial performance first, then checks to see if they pass muster on social issues. Since, like Dreyfus, the fund compares companies only against others within the same industry, this can lead to investments in the best of a bad lot, investments that don't appear at first glance to be socially responsible. For instance, Calvert invests in Atlantic Richfield because compared to other oil companies it has made special efforts in the areas of environmental protection and occupational safety and health, and because it operates a solar-energy subsidiary.

Both funds interview corporate officials and rely heavily on government enforcement data in evaluating companies for social performance. Since the Reagan administration tightened up access to such information (each request now requires a separate Freedom of Information action), the funds get their data directly from the companies.

It may come as small surprise that this approach can leave some loopholes. Take the case of Fort Howard Paper Company in Green Bay, Wis. For some time Fort Howard was a darling of social investors because of the corporation's leading role in paper recycling. (Domini recommended the stock to her clients; the ethical-investment newsletter *Insight* still monitors the stock, although it is not currently listed as one of its recommended investments.) Accordingly, Calvert bought the stock a few months after the fund organized in 1982. Fort Howard was not only an extremely profitable company, it observed all pollution laws—at least, according to available government statistics.

But the letter of the law is one thing, the spirit quite another. Fort Howard plays hardball when it comes to environmental politics, says Frank Jablonski, attorney for the aggressive public-interest group Wisconsin's Environmental Decade. In 1983, when Wisconsin officials devised a plan to bring Green Bay's air quality into compliance with the Clean Air Act, Fort Howard counterattacked and came up with its own, more lenient proposal. The company claimed the state's stricter version would force it to lay off workers (a tactic Jablonski calls job blackmail), and thus rallied Green Bay's paper-town citizenry to pass the looser, industry-sponsored cleanup plan.

According to Jablonski, Fort Howard is also Wisconsin's largest papermill source of polychlorinated biphenyls (PCBs), dispersing some 40 to 45 pounds into the Fox River each year and thus ultimately into Lake Michigan's nearby Green Bay. Recent research shows that double-breasted cormorants, Forster's terns, common terns (all locally threatened or endangered species), and other Green Bay waterbirds are hatching with crossed bills and other deformities at up to 133 times the expected rate, most likely as a result of PCB contamination.

Fort Howard maintains that paper recycling inevitably leads to liberating PCBs, and that its wastewater discharge permit allows the company to dump the persistent chemical legally. Jablonski cites memos from other paper-industry sources that claim PCBs would drop to unmeasurable amounts if Fort Howard merely installed readily available equipment to reduce suspended solids in its wastewater.

Social broker Domini says she sold off Fort Howard's stock in June 1983, when the corporation acquired Maryland Cup, a company that makes throwaway paper and plastic containers for McDonald's, Wendy's, and 7-11 convenience stores. (Interestingly, the decision she made for ethical reasons also turned out to be sound financially, because the price of Fort Howard stock rose with announcement of the merger.)

Calvert initially decided to hold on to Fort Howard despite its Maryland Cup subsidiary, says Grace Parker, assistant vice president of the fund. When attorney Jablonski wrote her soon after, detailing Fort Howard's less than salutary environmental history, Calvert investigated. After repeated requests for the company's side of the story went unacknowledged, Calvert sold its Fort Howard stock.

The lesson to be learned here is that *no fund is always squeaky clean*. Wisconsin's second-largest PCB-discharging paper company, Scott Paper, is seeking to increase its annual output to as much as five pounds per year. The company recently won a first-round court battle that may ultimately allow it to achieve that goal. Dreyfus Third Century owns stock in Scott Paper.

Another thing to remember about any mutual fund is that it will attempt to do exactly what it says it will do—and no more. If the fund's managers say they will invest a certain percentage of their assets in stocks and another portion in bonds, that's exactly what they will do. If they tell you they'll give first priority to protecting your investment from inflation and only secondarily try to make it grow, believe them. Likewise, if they say they won't invest in environmental polluters but don't promise to shun apartheid, expect some South African investments in their portfolio.

If you're looking for a mutual fund that meets your social concerns, investigate its claims and holdings very carefully. "If

Funds of Knowledge: Facts and Figures

BOOKS

Ethical Investing: How to Make Profitable Investments Without Sacrificing Your Principles, by Amy Domini with Peter D. Kinder. Addison-Wesley, 1984. $17.95.

The only complete volume on the subject, and already the bible of social investment. Includes chapters on mutual funds, brokers, managing your own portfolio, shareholders' revolts, and more. With statistics for dozens of areas of interest to the ethical investor, from the 25 top black-owned businesses to the 50 largest U.S. air polluters.

Concerned Investors Guide: Non-Financial Corporate Data. Resource Publishing Groups, Inc. (1401 Wilson Blvd., Suite 101, Arlington, VA 22209). 1983. $147 ($117 for nonprofits).

Details the nonfinancial performance of more than 1,400 companies in such areas as environment, fair labor, OSHA, product safety, antitrust, and civilian nuclear industry laws. Special sections provide information on weapons contractors (including nuclear) and companies operating in South Africa. Meant primarily as a resource tool for professionals. Talk your broker or local library into buying a copy, or order individual reports on as many as 20 companies at much-reduced rates.

The Directory of Socially Responsible Investments. The Funding Exchange (135 E. 15th St., New York, NY 10013). $5.

A good primer on the social-investing movement. Includes information not only on corporations, mutual funds, and brokers and investment advisers, but also on socially responsible banks, credit unions, and community-development organizations.

NEWSLETTERS

Good Money: The Newsletter of Social Investing and Inventing. The Center for Economic Revitalization, Inc. (Box 363, Calais Stage Rd., Worcester, VT 05682). Bimonthly; $108 (corporate), $12 (low-income and student).

An informative, somewhat folksy and whimsical publication for individuals, covering all phases of social and alternative investments. Bimonthly supplement *Netbacking* gives readers a forum for sharing news and information. Special in-depth reports on social issues available separately.

IRRC News for Investors. Investor Responsibility Research Center (1319 F St., N.W., Suite 900, Washington, DC 20004). (202) 833-3727. Monthly; $175 per year.

Meant primarily for institutional investors involved in shareholder revolts, not individual investors. A valuable source of information nonetheless. Additional reports available separately detail specific social issues.

Inform Reports. Inform (381 Park Ave. South, New York, NY 10016). (212) 689-4040. Bimonthly; $25 per year (membership).

More a corporate watchdog than an investor-oriented organization, Inform researches industry response to environmental problems. Its newsletter and books provide hard-hitting information on corporate transgressions as well as positive contributions to cleanup.

Insight: The Advisory Letter for Concerned Investors. Franklin Research and Development Corp. (222 Lewis Wharf, Boston, MA 02110). (617) 723-1670. Quarterly; $78 per year.

Covers both social-investment issues and no-nonsense corporate profiles. Subscribers also receive monthly market updates and analyses of individual companies, plus in-depth quarterly reports on specific industries.

Renewable Resource and Conservation Report (311 Miramar Rd., Rochester, NY 14624). Bimonthly; $45 per year (individuals), $58 (corporations).

According to editor and publisher F. Douglas Muschett, "One important means of promoting environmental objectives is to use existing economic incentives and the profit motive to beneficially promote important environmental industries: energy conservation, cogeneration, alternate energy, recycling and waste management, and environmental protection." Each topic is covered on a rotating basis. Also featured in each issue are an analysis of important technological, economic, legislative, and policy developments; an interview with a corporate executive; company profiles; and selected recommendations for various investment objectives.

The Clean Yield. Fried and Fleer Investment Services, Ltd. (Box 1880, Greensboro Bend, VT 05842). Monthly; $65 (individuals and nonprofits), $100 (businesses and corporations).

This new publication (its motto "principles and profits working together") is exclusively a stock-market newsletter, directed primarily at individual investors but intended to be of use to financial professionals with clients interested in ethical investment. The publishers claim that ethical investors are "natural contrarians" who reject the conventional wisdom of Wall Street, and whose "resilience and daring is rewarded with clean profits." Company profiles and a tracked model portfolio are among the regular features.

ORGANIZATIONS

The Social Investment Forum (222 Lewis Wharf, Boston, MA 02110). (617) 723-1670. Membership $25 (individual), $1,500 (institutional).

The Social Investment Forum is a trade group for people in the social investing business. Its list of brokers, investment managers, and financial advisers is invaluable to those with larger sums to invest. Also lists loan funds, development banks, credit unions, and other specialized programs for alternative investors. With the Funding Exchange, the Forum co-sponsors socially reponsible investing seminars around the country. Publishes *Vendor Guide*, a summary of its members and services that is available to nonmembers for $5.

potential investors think they've purchased a set of ideals and only later find unexpected investments in the portfolio—weapons, for instance—then that's their own fault," says Domini. "They're not looking before buying."

The best place to start looking into a fund is its own *prospectus* and *statement of additional information*, both available for the asking. One or the other (and sometimes both) will tell you what the fund's social and financial goals are, where it has investments now, and how it goes about choosing them.

Some funds, such as Parnassus and Calvert Managed Growth, publish profiles of specific companies they've chosen for their portfolio. Get these profiles, if they're available, along with anything else the fund will send you about its investment process and holdings. A close look at these materials may disclose companies you wouldn't be caught dead investing in. If you keep an eye on environmental news, you may know more than financial professionals do about the polluters and scofflaws featured in a given fund's portfolio. Or if you're attracted to a fund but note its holding of a few stocks that raise a red flag for you, ask for an explanation before you put your money down.

THE SOCIAL MUTUALS we've been talking about so far are all *equity* funds. They invest primarily in stocks and securities that represent partial ownership in the corporations that issue them—just as your home equity is the portion of its value that you own.

Working Assets and Calvert's Money Market Portfolio are a second type—the socially responsible money-market funds. These funds invest primarily in *debt*—essentially loans secured by government agencies, corporations, and other financial institutions. To see how this works, let's take a look at one form of this debt: government-agency securities.

When a bank or savings and loan gives you a 30-year mortgage to buy a home, it doesn't actually tie up its own money for all that time. Instead, the institution recoups its outlay by selling your mortgage to a government agency or government-chartered corporation such as Freddie Mac (the Federal Home Loan Mortgage Corporation, or FHLMC) or Fannie Mae (the Federal National Mortgage Association, or FNMA). If you obtain an FHA or VA loan, it gets sold to Ginnie Mae (the Government National Mortgage Association, or GNMA). These agencies then pool your mortgage with scores of others for sale to insurance companies, pension funds, mutual funds, and other large institutional investors. Likewise, Sallie Mae (the Student Loan Marketing Association) resells its student loans; the Small Business Administration markets its small commercial loans; and the Federal Farm Credit System deals its agricultural loans.

The beauty of these securities is that they keep the money machine flowing, pumping dollars from institutions with huge sums to invest to borrowers who need only relatively small loans. The securities are virtually risk free because they're backed by the agency that creates them. They also pay a predetermined interest rate for a certain length of time.

Both Working Assets and Calvert's money-market funds invest in some or all of these securities. But the question is, do these really constitute socially responsible investments? Working Assets, for instance, claims to invest your money in home ownership and construction jobs (read, Freddie Mac and Fannie Mae securities), family farms (Farm Credit loans), renewable energy and small businesses (SBA loans), and higher education (Sallie Mae securities). True, they aren't investing in South Africa, but my small-town bank also makes loans to home buyers, business people, students, and farmers . . . and it doesn't lay claim to being a socially responsible bank. There seems to be a certain amount of marketing hype at work here.

"If you have a locally oriented community lender—say, a savings and loan that makes housing loans, student loans, and so forth—then leave your money in there," says Jerry Dodson, president of Parnassus Fund and founder of Working Assets. "But as an alternative to depositing your money in a conglomerate commercial bank, it's better to put it into Working Assets."

As Dodson suggests, it is possible to invest your money ethically just by depositing it in a bank—depending on the bank. In fact, that's exactly what Working Assets and Calvert's money-market funds do with a portion of theirs: They invest it in certificates of deposit at institutions such as the South Shore Bank of Chicago. The South Shore Bank then lends those deposits as mortgages or construction loans to purchase and rehabilitate property in its inner-city neighborhood. If this meets your criteria, you could bypass the funds and deposit your money in such a bank youself, or into one of several community-development credit unions that do much the same thing.

The social money-market funds may be guilty of overstating their case somewhat, but that doesn't mean they don't play a valuable role. They're safe, offer competitive interest rates, allow you to write checks on your balance, and at least let you rest assured that Uncle Edgar's generosity isn't trickling up to Union Carbide. If that's enough for you, entrust your funds to them with a clear conscience.

All this raises another question: What do you want your money to do for *you*? What are your personal financial goals? Any reputable stockbroker will suggest that you not even consider investing until you've taken care of basic needs—housing, transportation, insurance—and have at least three to six months' salary stashed away for emergencies. After you've dealt with these essentials you can start considering how best to invest any surplus.

For instance, if either you or your spouse is planning to quit your job and write the Great American Novel, you may want to put your money where it will earn current income in the form of interest. This speaks for a money-market fund. On the other hand, if you have all the money you need to live on, you can stash away any extra cash where it will grow to pay for retirement, your kids' college expenses, or that mountain cabin. In that case you'll want to consider long-term investment in an equity fund.

Another consideration is your own personal tolerance for taking risks. In the world of finance, making money is always something of a gamble; the more risk you're willing to take, the more money you stand to make . . . or lose. That's why bank accounts and money-market funds—about as safe a pair of investments as you can make—seldom do more than keep pace with inflation, plus perhaps a percent or two. Stock funds, on the other hand, try to make your money appreciate—otherwise there'd be no sense in taking the risk inherent in playing the market. Some mutual funds are riskier than others, although even the riskiest socially responsible funds are relatively conservative.

Balanced funds such as Pax World represent the most conservative approach. They invest a specific, stated percentage of their assets in safe, secure bonds and a certain share in riskier stocks—with an eye to preserving your capital while still providing for some income and modest growth.

Long-term growth funds represent the other end of the spectrum, at least among the socially responsible mutuals. Funds

Clean, Green Money Machines

Pax World Fund, Inc.
224 State St.
Portsmouth, NH 03801
(603) 431-8022

Oldest of the socially responsible mutual funds, Pax World was founded in 1970 by staff members of the United Methodist Church Board of Social Concerns who felt it was improper to profit from the Vietnam War. Although half its initial investors were foundations or church-related groups, the fund has an interdenominational board of directors and is not directly affiliated with the Methodist Church.
Type: Balanced fund.
Social Screen: Pax World has no investments in the Defense Department's 100 largest contractors or in companies with 5 percent or more gross sales from defense contracts. It also excludes businesses engaged in liquor, tobacco, and gambling industries.
Minimum Investment: $250.
Subsequent Investments: At least $50.

Dreyfus Third Century Fund
666 Old Country Rd.
Garden City, NY 11530
(800) 645-6561

Dreyfus Third Century Fund, launched in 1972, is the second-oldest and by far the largest of the socially responsible mutual funds, with total assets exceeding $129 million.
Type: Growth fund
Social Screen: Third Century evaluates its investments on the basis of the contribution each may make to four "areas of special concern": protection and improvement of the environment and proper use of natural resources; occupational health and safety; consumer protection and product purity (safety); equal employment opportunity. In addition, the fund may invest up to one third of its total assets in companies that "contribute to the enhancement of the quality of life in America" by developing products, services, or technology related to these four areas of special concern or to the fields of health, housing, education, or transportation.
Minimum Investment: $2,500 ($750 for an IRA).
Subsequent Investment: At least $100 (no minimum for an IRA).

Parnassus Fund
1427 Shrader St.
San Francisco, CA 94117
(415) 664-6812

Parnassus is a "contrarian" mutual fund launched in January of this year by Jerry Dodson, one of the founders of Working Assets Money Fund (see below). The fund gets its name from Mt. Parnassus in Greece, home to the Delphic oracle. According to the fund's prospectus, "quite often the oracle went against the prevailing wisdom of the time, and frequently the proud were humbled and the lowly justified."

The oracle is an appropriate symbol because Parnassus buys only stocks in financially sound companies that, for one reason or another, are out of favor with the rest of the stock market—and thus underpriced.
Type: Long-term-growth fund.
Social Screen: Whether or not Parnassus qualifies as a social-investment fund is a question of interpretation—even fund president Jerry Dodson hedges. The fund applies a number of social criteria to its investment decisions, but does so for financial rather than ethical reasons. The fund invests in companies that produce high-quality goods and services, practice consumer-oriented marketing, treat employees well, are innovative and responsive to change, and are sensitive to the communities in which they operate. Companies that score well on all five of these "Renaissance" factors (as the fund calls them) are considered to show "enlightened and progressive management" likely to pay off for investors in the long run.
Minimum Investment: $5,000 ($2,000 for IRAs).
Subsequent Investment: At least $1,000. Three percent sales charge.

New Alternatives Fund, Inc.
295 Northern Blvd., Suite 300
Great Neck, NY 11021
(516) 466-0808

New Alternatives is the smallest of the social-investment funds, with only $620,000 in assets. It is technically called a "natural resources" fund within the financial industry, and has been rated as the top performer out of 16 such funds listed by Lipper Financial Services for the quarter ending June 30, 1985. By nature the fund is somewhat risky, but it counters this inclination by leaning toward conservative investments within its area.

New Alternatives is the only mutual fund that invests entirely according to positive criteria; that is, unlike funds that attempt to satisfy social criteria in whole or in part by directing their investments away from companies with, say, poor environmental records or extensive South African holdings, NAF invests exclusively in companies that actively pursue what it holds to be positive social and economic goals.
Type: Long-term capital-growth fund
Social Screen: New Alternatives invests in solar and alternative-energy companies. It defines these very broadly, however, to include companies involved not only in solar photovoltaic cells, geothermal energy, solar hot-water panels, cogeneration, and energy conservation (insulation and efficient electrical devices, among others), but also hydroelectric power and even natural gas. By virtue of this specialized focus, the fund excludes military, atomic energy, oil, and South African investments from its portfolio.
Minimum Investment: $2,650, including 6 percent sales charge. (Lesser investments for IRAs will be considered.)

Calvert Social Investment Fund
1700 Pennsylvania Ave., N.W.
Washington, DC 20006
(800) 368-2748

Calvert's Managed Growth and Money Market portfolios were both established in October 1982.

Calvert Managed Growth Portfolio
Type: Growth and income.
Social Screen: The fund looks for companies that deliver safe products and services in ways that sustain the natural environment, invite worker participation in management, provide equal employment opportunity, negotiate fairly with workers, and foster awareness of a commitment to human goals such as creativity, productivity, self-respect, and responsibility. This portfolio contains no investments in nuclear power plants or equipment, weapons manufacturers, or business activities in South Africa.
Minimum Investment: $1,000.
Subsequent Investments: At least $250.

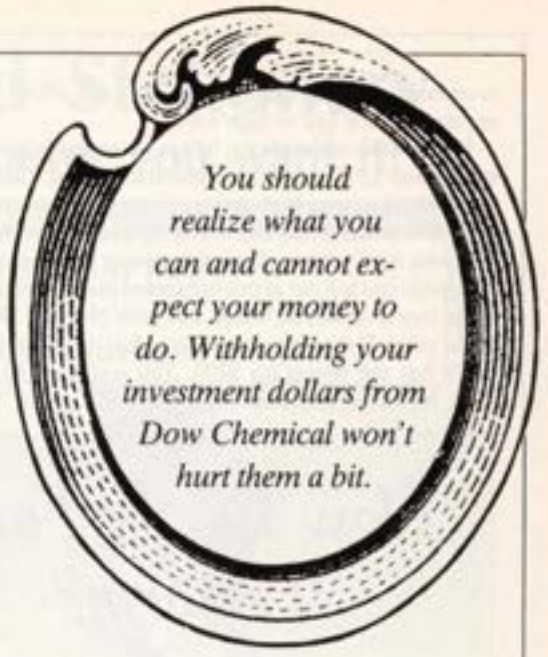
Calvert Money Market Portfolio
Type: Money-market fund.
Social Screen: Same as Calvert's Managed Growth Portfolio (above).
Minimum Investment: $1,000.
Subsequent Investments: At least $250.

Working Assets Money Fund
Working Assets Management Company
230 California St.
San Francisco, CA 94111
(800) 543-8800

Working Assets is perhaps the most aggressively advertised of the socially responsible funds.
Type: Money-market fund.
Social Screen: Invests in government-agency securities, commercial paper, and bank certificates of deposit that "have a positive social or economic impact." Although the fund leaves itself open to investing in Treasury bills, at the present time it intends to limit itself to no more than 10 pecent of its assets in such investments because of concerns over the federal deficit and defense spending. A recent fund prospectus lists no T-bill investments.
Minimum Investment: $1,000.
Subsequent Investments: $100 or more.

such as Parnassus, New Alternatives, and Dreyfus Third Century emphasize buying stocks that will increase in value. Although some of those stocks may also pay dividends, that income is considered secondary. The risk these funds entail varies with their investment philosophy, from somewhat risky to fairly conservative.

Growth and income funds such as Calvert Managed Growth try to achieve the best of both worlds. Calvert tries to beat inflation by providing current income from dividends on stocks and interest on bonds, plus 1 to 3 percent in growth of the initial investment.



That's the theory, anyway. In practice there are sometimes surprises, such as conservative Pax World's impressive 24.17 percent gain in 1983.

So if pitching pennies makes you nervous, you'd best stick with a nice, safe money-market fund such as Working Assets or Calvert. You won't make a lot of money, but you won't lose any, either. On the other hand, you may be willing to take a little risk for the fun and profit of seeing your money grow. If so, pick the fund that best satisfies the gambler in you: Pax World for most conservative, Dreyfus Third Century or Calvert Managed Growth for slightly more risk, New Alternatives or Parnassus if you're a poker player.

But do keep in mind that, in the cosmic scheme of things, all of these funds are conservative investments compared to the shenanigans that take place daily on Wall Street. New Alternatives, for instance, invests very conservatively in alternative-energy developments, but as alternative energy goes, so goes New Alternatives. Even the Parnassus Fund, which invests only in stocks nobody else wants, can't really be considered risky, at least according to fund president Jerry Dodson. "There's more risk in the Parnassus Fund than in a money-market fund, certainly, but in my opinion once a stock is out of favor, once its price is down low enough that we're interested in it, most of the risk has been taken out of it."

You needn't bet your whole pot on a single fund, either, if you apply what's called the *multitrack method*. You could, for instance, satisfy your need for three to six months' liquid capital by putting up to half of Uncle Edgar's bequest into Working Assets or Calvert's Money Market Portfolio. You could then put most of the rest into Pax World, Dreyfus Third Century, or Calvert's Managed Growth and expect to achieve at least modest gains with moderate risk. Then, if you're feeling devil-may-care, you could speculate a little in Parnassus or New Alternatives. At this end of the risk spectrum, however, it's probably wise to follow the experts' advice and put no more than 10 percent of your investment assets into such specialty funds.

But you say you don't have an Uncle Edgar, let alone his money? If you have a few bucks left over at the end of the month, you can still invest in mutual funds relatively painlessly by using what financial advisors call *dollar-cost averaging*. Basically, it works like this: First, you carefully research the fund (or funds) you want to invest in. Then, after you come up with the minimum

investment, you decide how much you can afford to plow into it regularly, come hell or high water.

For the sake of simplicity, let's say you decide you can afford to stash away $100 every three months. If your fund's shares cost $10 each, then your first-quarter investment buys you ten shares. Now let's assume that the following quarter the market hiccups and your fund's shares drop disastrously in value, to $5 each. Do you panic and sell out at this depressed price? Definitely not! You again buy $100 worth, which this time gets you 20 shares at the lower price. If the price rebounds to $10 by the third quarter, you again buy ten shares for $100. You now own 40 shares worth $400, for which you paid only $300.

How Do the Funds Perform?

THIS CHART shows the performance of each of the socially responsible mutual funds compared to all mutual funds (*i.e.*, without restriction) of its type. Ideally, you should check to see how a fund does over the long haul—five or ten years, in good times and bad. But only two social funds—Dreyfus and Pax World—have been around that long. Looking at 1984 performance is the next best thing, because 1984 was both a good and a bad year—the first half was dismal for mutual funds while the second half was a virtual boom time.

Fund	*1984*	*1985 (through August 29)*
Dreyfus Third Century	+ 1.39	+19.92
Parnassus	–NA–	+ 2.33
All Growth Funds	– 3.19	+15.48
Pax World	+ 7.39	+13.06
All Balanced Funds	+ 8.55	+15.56
New Alternatives	– 0.30	+12.57
All Natural Resource Funds	– 6.45	+15.31
Calvert Managed Growth Portfolio	+ 6.79	+15.98
All Growth and Income Funds	+ 3.99	+15.21
Calvert Money Market Portfolio	+10.16	+ 5.20
Working Assets	+ 9.88	+ 4.99
All Money Market Funds	+10.14	+ 5.14

The advantage of this system is that it prevents you from being tempted to sell out at a loss when your fund's price per share drops. But my, are you sitting pretty when the price rises!

These are purely financial considerations, however. What if none of the social funds meet your ethical standards? Do you have to sacrifice your principles just to invest your dollars?

Not at all. If you really want to be certain that not a cent of your money goes to support corporate or government policy you disagree with, you can go it alone and decide where to put your money yourself—either with or without the help of a professional stockbroker. These days brokers with a conscience are easier to find, and there may be one near you. They even have their own trade group, the Social Investment Forum.

The rest of the financial community is beginning to get the hint, too, and mainline brokerage houses such as Smith Barney and Paine Webber may have a socially concerned broker in the office who officially or unofficially can help you put together an ethical-investment portfolio according to your specifications.

Stockbrokers work on percentage. You pay them a fee, usually 2 to 5 percent of the price of any purchase you make through them. You'll need several thousand dollars to invest before they'll bother to construct a tailored social-investment portfolio for you. Amy Domini says she usually considers $18,000 her minimum, so Uncle Edgar's legacy will probably fill the bill with most brokers.

It's even possible to go it entirely alone, doing your own research with the help of several newsletters that give ethical-investment information. There's a plus to this approach, too. Due to recent changes in Securities and Exchange Commission regulations, many banks, savings and loans, and even credit unions are offering discount brokerage services at savings of up to 70 percent or more over traditional brokers' fees. Discount brokers buy or sell your stock for you but offer no financial analysis or advice.

If the idea of going it alone appeals to you, keep in mind that you'll have to train yourself in the art and science of recognizing valuable investments. In effect, you'll be training yourself to be your own stockbroker. If that sort of dedicated effort doesn't appeal to you, stick with the pros.

No matter which route you choose, you should realize what you can and cannot expect your money to do. For instance, withholding your investment dollars from Dow Chemical won't hurt them a bit; Dow's stock was issued and paid for years ago. The stock has been traded between private investors ever since, not between investors and the company. Even the millions of dollars that mutual funds invest won't affect stock prices enough to make bad-actor companies shape up.

But that doesn't mean there aren't sound moral and financial reasons for putting your money into socially responsible investments. For one thing, ethical-investment professionals agree that socially responsible companies also tend to be profitable ones. Corporations that deal creatively with pollution, employment, and safety problems are likely to be innovative in other business pursuits as well. For another thing, investing with your principles feels good. And for most people, that may be reason enough.

For others, social investing is a beginning, an essential first step in turning the world around, says Amy Domini. "Once that step is taken, once people begin to realize that the power to bring about change is right there in their own hands, then great things can be achieved." □

ROBIN J. IRWIN, *a freelance writer and editor specializing in environmental topics, lives in Madison, Wis.*

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JIM DALE VICKERY

THE MAN Robert Sterling Yard once described as "the most efficient weapon of preservation in existence" is owed a debt by every lover of wilderness. Although few people today may be aware of his role in the evolution—indeed, the very concept—of American wilderness preservation, upon scrutiny it seems that Bob Marshall's tracks are everywhere.

In *John Muir and His Legacy*, Stephen R. Fox wrote that Bob Marshall, born with the 20th century on January 2, 1901, was "the first mountaineer in the conservation movement since Muir to approach his combination of firsthand experience, scientific interests, and writing skill." Like Muir in his day, Bob Marshall became a legendary hiker: On one sleepless day in 1936 he hiked 70 miles through Arizona's Fort Apache reservation. His brother and chief biographer George Marshall says Bob made more than 200 dayhikes of 30 miles each, and that 40-mile jaunts were not at all unusual. Sigurd F. Olson said of him: "Bob had an indomitable urge to do the impossible, physically and mentally, because of a deep love of wild places."

Courtesy of University of California Press

Boreal Mountain (left) is the easternmost of the Gates of the Arctic, the two peaks that flank the North Fork of the Kuyukuk River. In the photo at right, Bob Marshall (center) poses with Jesse Allen and Nutirwik, two of his companions on the 1938 expedition that set out to explore "the uncharted sources of the Anaktuvuk River."

Marshall's peripatetic love of wild places began in New York's Adirondacks, where his parents owned a summer cottage on Lower Saranac Lake, in a residential cluster called Knollwood. It was there that young Marshall spent the first 21 summers of his life.

He climbed his first mountain, Ampersand, on August 15, 1916, and during the next six years he, brother George, and friend Herb Clark became the first climbers to scale 42 of the 46 peaks in the Adirondacks above 4,000 feet. (They later climbed the last four.) In 1922 Bob Marshall published *High Peaks of the Adirondacks*, a book about their climbs.

Marshall's appetite for adventure had actually been stirred at age 11, while he was bedridden with pneumonia. Someone read him Captain Ralph Bonehill's *Pioneer Boys of the Great Northwest*; inspired, the young man reread the text up to three times annually for the next ten years. His resulting ideology was, he wrote later, "definitely formed on a Lewis and Clark pattern, and for a time I really felt that while life might still be pleasant, it could never be the great adventure it might have been if I had only been born in time to join the Lewis and Clark Expedition."

By his junior year in high school, young Marshall was on record as proclaiming that he would "hate to spend the greater part of [his] lifetime in a stuffy office in a crowded city." While in his teens he decided to become a forester. Although he "didn't have the remotest idea what forestry was,"

he had "vague notions of thrilling adventures with bad men, of lassoing infuriated grizzlies, and of riding down unknown canyons in Alaska."

After graduating from New York's Ethical Culture High School, Marshall enrolled in Columbia College for one year; he then spent four years at New York's State College of Forestry in Syracuse. In 1925 he received a Master of Forestry degree from Harvard after a summer spent working for the U.S. Forest Service in Washington state.

Between 1925 and 1928 Marshall worked at the Northern Rocky Mountain Forest Experiment Station in Missoula, Mont., first as a junior forester, then as an assistant silviculturist. Weekends were spent hiking in the Flathead and Lewis and Clark national forests. (Much of that territory is today known as the Bob Marshall Wilderness.) It was in 1928 that he published an article (in the *Forest Service Bulletin*) that tried to drum up support for preserving pristine sections of national forests. It was the first of many eloquent pleas he would make for the cause he worked so diligently to promote and defend.

With his confessed fascination for "blank spaces on maps," it must certainly have been a euphoric moment for Marshall when the wheels of Noel Quien's Hamilton touched down at the remote outpost of Wiseman, Alaska, on July 12, 1929. Though he was at that point already 200 miles from the closest pavement, auto, or railroad, it was the wilderness beyond, the *terra incognita* of the mountain ranges to the north, that lured Marshall as light does a moth.

Of particular interest to him was the Central Brooks Range (the Endicott Mountains), part of the vast range that stretches 600 miles east to west across the Arctic, an area Marshall called "the most unknown section of Alaska." He teamed up with prospector, miner, and woodsman Al Retzlaf; together the duo (with their two packhorses) traveled on foot up the North Fork of the Koyukuk River, passed between Boreal Mountain and Frigid Crags (the "Gates of the Arctic"), and climbed Slatepile Mountain. They next explored Ernie Creek, where Marshall pursued the explicit purpose of his first Alaskan visit: to study tree growth at northern timberline.

The trip back from Ernie Creek was not without incident. En route back to Wiseman, Marshall came face to face with a grizzly, and he and Retzlaf were almost cut off from their goal by flooding, rain-swollen rivers. All in all, Marshall's baptismal plunge into the Brooks Range, a region that had never really been explored by anyone, Eskimo or otherwise, was a heady taste of wild magic.

The following year *Scientific Monthly* published what has been called Marshall's most important wilderness article: "The Problem of the Wilderness." Benton MacKaye, the "father of the Appalachian Trail," dubbed it the Magna Carta of the wilderness preservation movement. As a concise statement of the psychological and aesthetic values of wilderness, and a call for its preservation, it was unprecedented.

The essay had four salient themes: the variety of beauty in the wilderness experience and the need to decide the fate of America's last wilderness by "deliberate rationality"; the benefits of wilderness (physical conditioning, mental objectivity, repose from society, and the possibility of a pure, aesthetic experience); the rapid disappearance of wilderness; and the need to preserve it.

"To carry out this program [of preservation]," Marshall concluded, "it is exigent that all friends of the wilderness ideal should unite. If they do not present the urgency of their viewpoint, the other side will certainly capture popular support. Then it will only be a few years until the last escape from society will be barricaded. If that day arrives there will be countless souls born to live in strangulation, countless human beings who will be crushed under the artificial edifice raised by man.

"There is just one hope of repulsing the tyrannical ambition of civilization to conquer every niche on the whole earth," he continued. "That hope is the organization of spirited people who will fight for the freedom of the wilderness."

These were powerful words for a 28-year-old, words that were rejected five times before they found a publisher. No matter; their author was busy pursuing other goals. The ink was barely dry on the *Scientific Monthly* article when Marshall received his doctorate in plant physiology from Johns Hopkins University, and he was now making preparations for a 13-month return visit to Wiseman.

Although he was still professionally interested in Alaska's northern timberline, Marshall had left Wiseman the first time "with a vivid impression that the few white and Eskimo people who were scattered throughout this remote region were on the whole the happiest folk I had ever encountered." He decided to study Wiseman's eclectic frontier community and to continue exploring the headwaters of the North Fork of the Koyukuk River. But above all else his "most important though not advertised objective" was "gaining the absolutely unassessable thrill of just looking at superb natural beauty."

Marshall's second trip to the Upper Koyukuk region, again with Retzlaf, took him back up the North Fork to Ernie Creek country, and included explorations of Kenunga Creek and Ernie Pass. Altogether they backpacked and led horses over 216 miles, made 170 miles of side trips with light packs, climbed six unscaled peaks (three on the Arctic Divide), visited three major unexplored valleys and six minor valleys, gulches, and chasms, and mapped 42 miles of previously untraversed valleys. Upon reaching Wiseman, Retzlaf returned to Fairbanks while Marshall settled in a 16' × 18' rented cabin next door to the roadhouse.

What followed was an explorer's fantasy. In October, Marshall went on a four-day shakedown trip by dog sled. March found him and Ernie Johnson exploring the headwaters of Clear River, followed by a dogsled sally to Wild Lake country and a return to Wiseman via Bettles. It was on the return leg of this trek that Marshall experienced "the supreme exaltation of which a person is capable" and, while exploring Karillyukpuk Creek, found himself "happy in the immediate presence of nature in its most staggering grandeur, in living intimately with something so splendidly immense that all life seemed trivial in its presence."

Finally, in July and August 1931, Marshall and Johnson explored the Alatna and John rivers by motorboat, poling, and foot travel. On Cairn Mountain, Marshall—soon to leave the Arctic—was again struck by the beauty of the Brooks Range: "Its black summits and sparkling green slopes tumbled around in a wild confusion as far as we could see in every direction—endless mountains rising and falling as if the waves of some gigantic ocean had suddenly become frozen in full motion."

When Marshall returned to Washington, D.C., and New York from Alaska in 1931, he began work on a series of literary projects. An active writer all his life, he compiled a bibliography that included more than a hundred items on wilderness theory and policy, wilderness travel, technical forestry, sociology, Alaskan policy, Adirondack trips and history, and forest policy. It was in 1933, however, the same year he was appointed director of forestry at the Office of Indian Affairs, that Marshall's writing career truly blossomed. Two of his most important books, *Arctic Village* and *The People's Forests*, were published in that year.

Some believe *Arctic Village* is Marshall's

major literary contribution: a 399-page study of the civilization of whites and Eskimos as he found it flourishing in the upper reaches of the Koyukuk during his Wiseman experiences of 1930 and '31. The book covers geography, climate, history, roadhouse activities, food, clothing, shelter, the quest for gold, sex life, philosophy, and even conversations, of which Marshall recorded 83 hours' worth.

"The fact that plans for more than three months in advance occupied only ten minutes out of more than five thousand minutes of conversation," he wrote, "is typical of one of the most distinctive Koyukuk traits. People live and think emphatically in the present, enjoy life while it is passing without dreaming constantly about some future happiness, and do not spend their time in futile worry about what will probably never occur." Overall, Marshall found, the inhabitants of the Koyukuk "would rather eat beans with liberty, burn candles with independence, and mush dogs with adventure than have the luxury and the restrictions of the outside world."

Arctic Village became a bestseller and a Literary Guild selection in the Lower 48. One critic called it "an unusually interesting and valuable sociological document, fit to join the works of Malinowsky and Margaret Mead, but more humanly appealing than either."

The People's Forests, meanwhile, examined the use and abuse of American forests. After systematically describing the devastation of forests that was sweeping the country, Marshall analyzed the economic and aesthetic values of forests and wilderness. In 1931, he noted, there were 246,900,000 visitors to forests, parks, and monuments in this country; park use had increased by 750 percent and forest use by 920 percent over 15 years, evincing "the enormous popularity which recreational forest use has attained in America."

"There can be no doubt that the greatest attraction of the forests is their natural beauty," he wrote. "As society becomes more and more mechanized, it will be more and more difficult for many people to stand the nervous strain, the high pressure, and the drabness of their lives. To escape these abominations, constantly growing numbers will seek the primitive for the finest features in life."

The most important values of forest recreation, Marshall argued, are not reducible to monetary terms. Rather, "they are concerned with such intangible considerations as inspiration, aesthetic enjoyment, and a gain in understanding. It is no more valid to rate them in terms of dollars and cents than it would be to rate the worth of a telephone pole in terms of the inspiration it gives."

The common denominator of the commodity and recreational value of forests, then, was the "human happiness which may be derived from each use."

Marshall wrote that wilderness allows its visitors to sidestep the "historic stream." It exhibits "dynamic beauty," "gratifies every one of the senses," and "furnishes perhaps the best opportunity for pure esthetic enjoyment," which requires that "beauty be observed as a unity, and that for the brief duration of any pure esthetic experience nothing remain in a person's consciousness except the feeling of this beauty."

Marshall defined wilderness areas as "regions which contain no permanent inhabitants, possess no means of mechanical conveyance, and are sufficiently spacious for a person to spend at least a week of active travel in them without crossing his own tracks." The dominant attributes of wilderness, he said, are that "visitors to them have to depend exclusively on their own efforts for survival," and that they "preserve as nearly as possible the essential features of the primitive environment."

A map of the North Fork Koyukuk territory, reproduced from Marshall's Arctic Wilderness, *shows much of the vast wilderness area he and his companions were the first to explore.*

In calling for the public acquisition of 562 million acres of forest, mostly for commodity purposes, Marshall nevertheless concluded that "it would certainly seem conservative to bar mechanized transportation from the scant 200 million acres of forest land which alone remain to remind us of the vast wilderness tracts of our recent pioneer history." He estimated that 200,000 acres was the smallest area that could reasonably be termed a wilderness.

During his four-year stint as director of forestry for the Office of Indian Affairs, Marshall took the wilderness preservation bull by the horns, helping to establish The Wilderness Society early in 1935 with cofounders Benton MacKaye, Aldo Leopold, Bernard Frank, Ernest C. Oberholtzer, Harvey Broome, Robert Sterling Yard, and Harold Anderson. The society's specific purpose was to fight off "invasion of the wilderness" and stimulate "an appreciation of its multiform emotional, intellectual, and scientific values."

This statement of purpose is not unlike the Sierra Club's, formulated 40 years earlier: "To explore, enjoy, and preserve the Sierra Nevada and other scenic resources of the United States and its forests, waters, wildlife, and wilderness . . . and to enlist public interest and cooperation in protecting them." In fact, the Club allowed the fledgling Wilderness Society to use its mailing list to recruit members. Two years later Marshall tightened ties between the two groups by escorting Club members into the High Sierra on a Forest Service inspection tour. The cooperative relationship between the two organizations has continued for half a century.

Bob Marshall achieved much in 1937 in his dual role as writer and administrator. In April he published "The Universe of the Wilderness is Vanishing" in *Nature*, once again directing the public's attention to wilderness that was "melting away like the last snowbank on a south-facing mountainside during a hot afternoon in June." In May he was made chief of the

Courtesy of The Wilderness Society

In 1937, one of his most productive years, a smiling Bob Marshall found time to take a canoe trip in the Quetico-Superior region.

new Forest Service Division of Recreation and Lands, a position of influence he used to make important additions to the national forest wilderness inventory. (Eventually almost 5½ million acres were added to the NFS wilderness system.) Earlier, in his forestry post with the Office of Indian Affairs, Marshall had spearheaded the effort that helped create 16 wilderness reserves on Indian land.

Yet Alaska was haunting him. He returned to Wiseman in August 1938, hoping to climb Mt. Doonerak and explore "the uncharted sources of the Anaktuvuk River which, by way of the Colville River, empties into the Arctic Ocean." On August 10, Marshall and three companions voyaged up the North Fork of the Koyukuk in a 30-foot boat, setting up base camp near Ernie Creek. For the next two weeks they explored Pyramid Creek, climbed the Arctic Divide, and explored the upper reaches of the Anaktuvuk. Rain for 27 of the trip's 29 days prevented them from climbing Doonerak; it also caused a series of floods, one of which nearly killed Marshall when the party's boat overturned and was swept beneath an embankment.

Regardless of hardships, Marshall's hunger for the awesome never abated. "Everything we looked upon was unknown to human gaze," he wrote. "The nearest humans were a hundred and twenty-five miles away, and the civilization of which they constituted the very fringe—a civilization remote from nature, artificial, dominated by the exploitation of man by man—seemed unreal, unbelievable. Our present situation seemed also unreal, but that was the unreality of a remoteness which made it seem as if we had landed miraculously on another planet which throughout all passage of time had been without life. There was also the unreality of countless needle pinnacles, jutting around us through the fog, alternately appearing and disappearing as the atmosphere thinned and thickened."

Nine months later Marshall was back in the Brooks Range for the fourth and last time. Again he failed to climb Doonerak, although he made first ascents of Apoon, Amawk, North Doonerak, and Alhamblar. From their summits he finished mapping 15,000 square miles of Koyukuk country, an area twice the size of the Adirondacks. During his total of 210 days in the Brooks Range, he climbed 28 peaks and named 150 geographic areas.

"His joy was complete," George Marshall wrote in his introduction to his brother's posthumously published book, *Arctic Wilderness*, "when, standing on some peak never before climbed, he beheld the magnificence of a wild, timeless world extending to the limit of sight filled with countless mountains and deep valleys previously unmapped, unnamed, and unknown."

Bob Marshall came to realize that such joy was of immense value to the person who experienced it. He wrote to Melville B. Grosvenor of the National Geographic Society that the "thrill of adventure" and "the fact that exploration is perhaps the greatest esthetic experience a human being can know" necessitated that "the possibility of exploration be prolonged as much as possible." Alaska, he believed, was large enough to permit accommodation between U.S. development policies and the wilderness movement; it was in Alaska that the "emotional values of the frontier" could be preserved.

Alaska continued to occupy Marshall's thoughts and dreams in his last years as the full significance of northern Alaska began to sink in. His thinking was reflected in a report he made to a congressional resource committee, entitled *Alaska—Its Resources and Development*:

"Because the unique recreational value of Alaska lies in its frontier character, it would seem desirable to establish a really sizable area, free from roads and industries, where frontier conditions will be preserved. Fortunately, this is peculiarly possible in northern Alaska, for economic and social reasons. Economically, the population is so scattered that airplane transportation is the only feasible means of mechanical conveyance, and auto roads could not possibly justify their great cost. At the same time, the country is far too remote from markets for successful industry. Sociologically, the country of northern Alaska is inhabited chiefly by native populations which would be much happier, if United States experience is any criterion, without either roads or industries. Therefore, I would like to recommend that all of Alaska north of the Yukon River, with the exception of a small area immediately adjacent to Nome, should be zoned as a region where the federal government will contribute no funds for road building and permit no leases for industrial development.

"Alaska is unique among all recreational areas belonging to the United States because Alaska is yet largely a wilderness," he concluded. "In the name of a balanced use of American resources, let's keep northern Alaska largely a wilderness!"

Bob Marshall's dream was partially realized 42 years later when, on December 2, 1980, President Jimmy Carter signed the Alaska National Interest Lands Conservation Act. The act tripled the area protected by the National Wilderness Preservation System, and in doubling the size of the National Park System set aside much of Marshall's Koyukuk stomping grounds in the 7.9-million-acre Gates of the Arctic National Park and Preserve.

Marshall never saw the realization of his ultimate dream, however. He died of a heart attack on November 11, 1939, at age 38 while riding a train between Washington, D.C., and New York City.

"With his passing," Sigurd Olson eulogized, "the cause of wilderness preservation lost one of its greatest champions, a man whose love of the wilds was deep and sincere, a man who had the courage to fight for what he believed." □

Jim Dale Vickery *is a contributing editor for* Canoe *magazine. He reviewed* The Canoe: A History of the Craft from Panama to the Arctic *in the July/August 1984* Sierra.

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THE PRAIRIE

Restoring an ecosystem is a project of imposing proportions–a collaborative effort that

University of Wisconsin Arboretum; inset: Jim Brandenburg

MAKERS

begins with a miracle as small as a seed.

JOHN J. BERGER

When fire—what the Indians called "the red buffalo"—storms across a prairie, eco-invaders are snuffed out and natives have more room to grow. Naturalists at the University of Wisconsin Arboretum rediscovered the value of this ancient "technology" in the 1940s, and now prairie burns are regularly planned and set.

People have been coming to the aid of prairies for more than 50 years. A volunteer at the Fermi project (left) gathers seeds from thriving grasses to plant next season. At right, Aldo Leopold (second from left) and others help control one of the first burns at the University of Wisconsin's Curtis Prairie.

WHIPPED BY spring winds, the fire roared across Wisconsin's Curtis Prairie, sucking air into the firestorm at the center of the blaze. During the two minutes it took the fire to roast the buff-colored prairie, flames leapt 25 feet into the air and exploded through the tall, dry grasses. Gray smoke billowed high, visible for miles. As the acrid smell of burnt grass drifted away, the Curtis Prairie lay charred and sterile-looking.

No one was dismayed to see the prairie go up in smoke, however. The prairie fire at the University of Wisconsin's arboretum in Madison had been carefully planned and set. In fact, it is a regular event, reminiscent of the vast, primeval prairie fires that once swept across the American plains, ignited by lightning or Indians. A prairie fire could race from northern Illinois into Indiana, leaping creeks until the wind turned or it came to a major river. Those huge conflagrations were often visible many miles away on the Great Plains. Early settlers in the Mississippi Valley remarked on the eerie and beautiful way distant tongues of liquid fire festooned the night sky.

Prairie ecologists now believe that fire is beneficial to native prairie and necessary for its survival. Roots and seeds of prairie plants beneath the soil survive the blaze, as do many prairie animals. Fire removes the thatch of dead prairie grass that interferes with new plant growth and shields the ground from the sun's warmth. Most important, the fire kills trees, weeds, and other competitors of the prairie community.

Much of this country's wealth depends on its bounteous agriculture, which in turn depends on a generous national inheritance: soils formed and enriched by prairie plants and animals. Prairie vegetation retained water and prevented erosion, even during violent rains. Hundreds of plant species and thousands of insects, birds, mammals, reptiles, amphibians, bacteria, and fungi inhabited the prairie. The bison is perhaps the most familiar prairie animal, yet prairies were also home to elk, pronghorn antelope, white-tailed deer, plains bighorns, wolves, coyotes, foxes, squirrels, shrews, black-tailed prairie dogs, prairie chickens, meadowlarks, and prairie falcons. Brooks and prairie pools were filled with sunfish, minnows, turtles, and tadpoles.

America once had 700 million acres of prairie. Grass grew taller from west to east across the continent along a gradient of increasing moisture. In Illinois, the "Prairie State," the grass grew 10 to 12 feet high, and early settlers had to mark their paths with cairns to reduce the chances of getting lost.

Settlers told of waving grass stretching to the shimmering horizon. Beneath sunny skies the rolling land was a sea of shining color, a mosaic of flowers ever-changing as the seasons progressed. The blooms transformed the living prairie carpet from early, timid greens through a kaleidoscope of colors until the russets, tans, and golden browns of autumn suffused the land.

This enormous prairie biome is now almost extinct, thanks to the sodbuster's plow and the developer's bulldozer. Only a few scattered prairie relics are left—less than 1 percent of the original ecosystem—mainly within protected areas such as parks, refuges, and old cemeteries.

Even before the turn of the century an awareness of what had been lost had already dawned in the minds of several prominent naturalists and ecologists. A few small-scale prairie plant restorations were attempted between the 1880s and the 1940s, such as those by midwestern landscape architect Jens Jensen. But in general little attention was paid to the early advocates of prairie restoration, and even less was known about how to achieve their goals.

Concern about the destruction of America's native plant and animal communities grew during the Depression as widespread ecological damage became more apparent. The nation's great prairies were almost gone by the 1930s, the virgin forests of the Great Lakes region had been clearcut, and the calamitous soil losses of the Dust Bowl darkened skies in the Southwest.

These developments were very much on the minds of ecologists at the University of Wisconsin in 1934. At the arboretum's dedication that year, ecologist Aldo Leopold urged the university "to reconstruct a sample of original Wisconsin—a sample of what Dane County looked like when our ancestors arrived during the 1840s." Leopold and others felt that the arboretum should do more than warehouse individual plant species in a living museum; it should try to re-create natural communities. As part of this effort, in 1936 Leopold hired Theodore M. Sperry, a young prairie ecologist, to restore a 60-acre arboretum field to native prairie.

The arboretum was then the site of a Civilian Conservation Corps encampment, and Sperry directed the unskilled recruits in prairie-making. Corn stubble still stood on the land, surrounded by quack grass and ragweed. Because so little was known about prairie re-establishment, Sperry re-

Jim Brandenburg/DNR Photo

University of Wisconsin Arboretum

lied on the results of experiments performed by the students of botany professor Norman Fassett. The best prairie restoration method they had found was to transplant whole sods from existing prairie. Accordingly, Sperry and his crew drove trucks to the east side of the Wisconsin River opposite Prairie du Sac and dug up plants from a gravelly native prairie remnant.

By the spring of 1936 they had planted 25 tons of prairie sod, but a severe summer drought followed and only 3 percent of the plants survived. Sperry persisted in his restoration efforts, however, and by the time he left the arboretum in 1941 he had reestablished 42 different prairie species in segregated single-species stands—a patchwork quilt of prairie vegetation.

While later prairie devotees would deplore the fact that Sperry had ransacked virgin prairie to accomplish his mandate, some of the prairies he dug up were being destroyed anyway. Under pressure to produce timely results for his sponsors, Sperry also seems to have viewed his task more as a construction effort than a scientific experiment. This approach to prairie restoration changed radically as the years went by and the arboretum's management grew more sophisticated about restoration.

During the 1940s further experiments were carried out on the site to learn the best way to re-establish prairie, and a second stage of planting began in 1950. Sperry's days of destroying relic prairies were now long past. Much of the new planting was done by casting prairie seed into disked ground and using a cover crop to hold the soil and protect the new plants.

By the 1980s, nearly 50 years after the restored prairie was first begun, nonnative species and weeds had been greatly reduced, and parts of the prairie were comparable to and even richer in species composition than native prairies. In addition to the Curtis Prairie, a more sophisticated prairie restoration was undertaken at the arboretum by the late Henry C. Greene, an expert among experts on the seed-bearing plants of Wisconsin. Greene single-handedly produced a magnificent, natural-looking prairie—a work of art by a master botanist.

Ecologists Ray Schulenberg and Robert Betz have continued prairie restoration and conservation work in the tradition of Leopold, Greene, and University of Wisconsin botanist John T. Curtis, for whom the Curtis Prairie was named.

Schulenberg is Curator of Plant Collections for the Morton Arboretum in Lisle, Ill. In the 1950s he read Curtis' major work, *The Vegetation of Wisconsin*, and in it heard echoes of his own concern for restoring and preserving local flora using local plant stock. After corresponding with Curtis about prairie ecology, Schulenberg visited the Wisconsin arboretum prairies and eventually conducted a model prairie restoration at Lisle during the 1960s. Beginning with a badly eroded 25-acre cornfield dominated by coarse Eurasian forage plants and weeds, Schulenberg created a self-maintaining community of prairie plants native to northern Illinois, using seed he collected by hand from native prairie remnants within 50 miles of the arboretum in Lisle.

Today the Morton Arboretum prairie is lush and green in June, a polyphony of flowers through the summer, and a symphony of soft, warm tones in fall as the grasses go to seed and prepare for winter. Under the surface, soil is turning rich and dark again as it is improved by the legumes and the deep fibrous root systems of the warm-season grasses. "The prairie is building soil just the way it did before it was plowed up," Schulenberg says. The land is full of healthy prairie plants, including cream and white wild indigo, rattlesnake master, leadplant, wild hyacinth, yellow coneflower, false sunflower, big bluestem, little bluestem, coreopsis, golden Alexander, shooting star, and perhaps 105 other species Schulenberg introduced. The prairie is used for educational purposes, and serves as a refuge for endangered local plants and insects.

In 1961, about a year before Schulenberg began restoring the Morton Arboretum prairie, he met Robert Betz, a biology professor at Northeastern Illinois University in Chicago. Betz is a robust, full-bearded man of 61. Though modest, he is something of a Renaissance man, with a B.S. in biology, an M.S. in bacteriology, and a Ph.D. in biochemistry.

It was not until he was 37 years old and already a professor that Betz learned about prairies. Floyd Swink, a plant taxonomist from the Morton Arboretum, was leading a group of students on a field trip in 1960 when Betz, then teaching an ornithology class, decided to go along. "For the first time, I saw a real prairie—and fell in love with it," he says. "Prairie was the thing I was always looking for."

As soon as he recognized that these were the native plants of the region and that he was seeing what the Indians had seen, Betz was awed. "I got this feeling of something that went all the way back for thousands of years," he says. "This was what the real vegetation of Illinois was like."

University of Wisconsin Arboretum

In 1936, Theodore Sperry and a CCC crew began making prairie at the University of Wisconsin. In retrospect, Sperry's methods are considered unorthodox, but he took a field and made it bloom.

The original prairies were hosts to a rich variety of plants and animals. After years of careful harvesting, man-made prairies are celebrating the return of the natives, a few of which are pictured here.

Sandhill crane
[*Grus canadensis*]

Illustrations by Kristen Oneil

Betz has been searching the land for prairie remnants ever since. He soon realized that there was little prairie left and that every morsel was in jeopardy. Shortly after seeing his first real prairie, Betz met Ray Schulenberg and a mutually beneficial collaboration began. "Ray not only has the intellect and intelligence, he has the fire a real prairie person has to have," Betz says.

When Betz and Schulenberg discovered that none of the prairie remnants they visited were safe from development, they began trying to save prairies. For Betz this led to more than 20 years of unpaid and spare-time labor on prairie remnants, including countless hours cutting out blackberry bushes and pulling ragweed from sunup to sundown. With some weeding, brush removal, and managed burns, these often degraded relics could be returned to high-quality prairie. "You can't just go to school and read books about prairies," Betz says. "You have to spend time and get dirty and get tired and go home half dead working on them. Ray was the same way; we're successful partly due to the fact that we did this. When you work with these plants, you know each one on an intimate basis."

While at a national prairie conference in 1972, Betz heard from taxonomist Swink that the Morton Arboretum had been approached by Fermi National Accelerator Laboratory (then under construction) to provide the facility with landscaping assistance. Betz was dismayed. "You mean to say they're going to take that thing and plant a lot of biological monstrosities? Why don't they turn it back into prairie the way it should be? The soils are all there!" The idea may have been compelling to Betz, but convincing a high-energy accelerator laboratory that it should not only allow but actually sponsor three ecologists to build something as anachronistic as a prairie was another story.

Some months later, Betz, Schulenberg, and the late David Blenz of the Cook County Forest Preserve arranged a meeting with laboratory director Robert Wilson. Betz talked passionately about prairie, its beauty and appeal for him. It was everyone's heritage in the Midwest, he said, and he spoke of its possible scientific and medical value. "Some of these plants, with their glycosides and alkaloids, may hold a key to solving diseases. They've never really been tested adequately." Betz did not fail to convey his basic motivation for saving prairie: "Ray and I both had this feeling that it was immoral to destroy nature, the thing that gave us birth. To destroy all these animals and plants and the whole community without one whimper was wrong. We were not going to see it go down the drain without a fight."

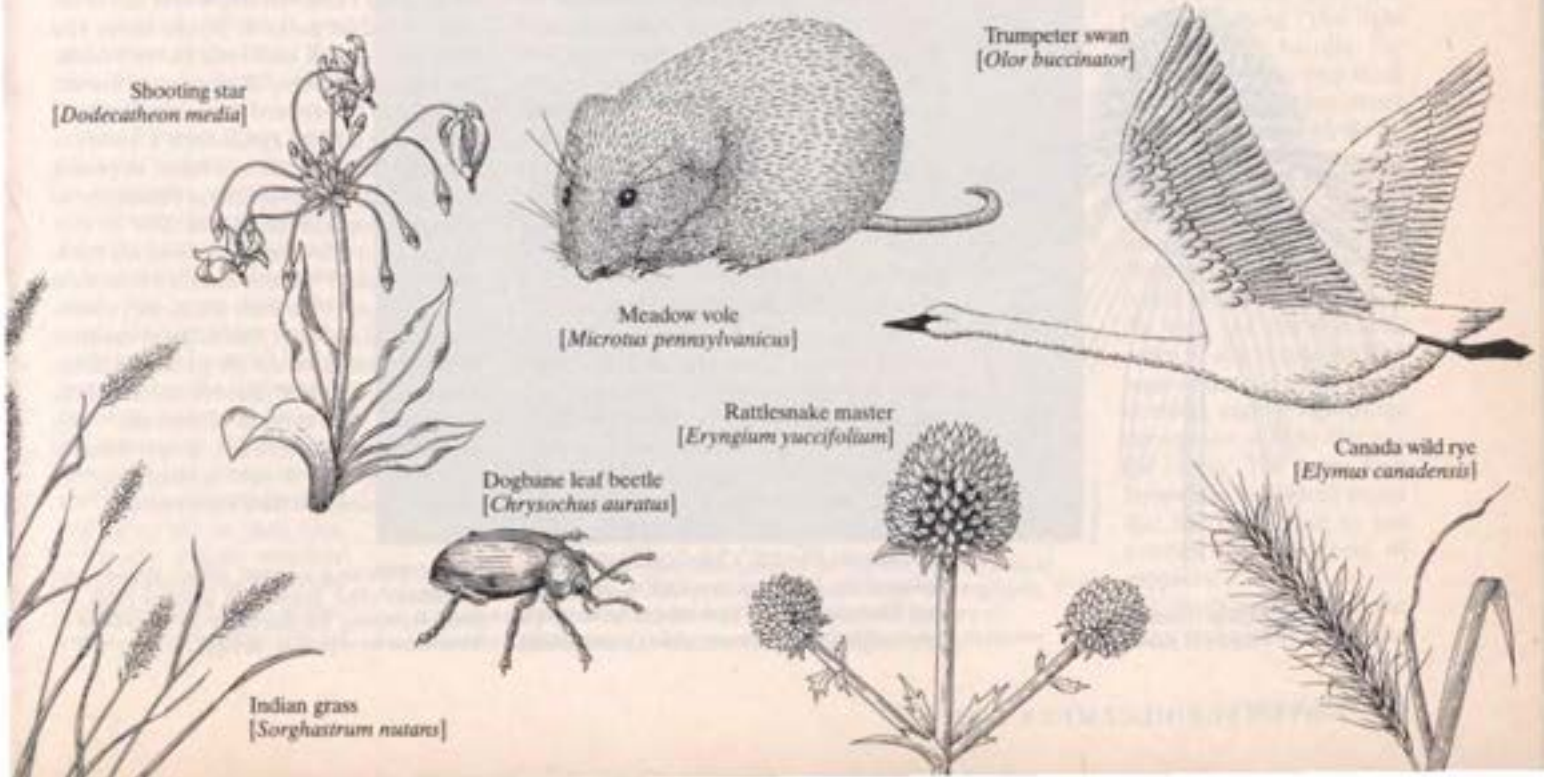
The prairie proposal was formally submitted to the lab through the Illinois chapter of The Nature Conservancy. The laboratory granted permission to create a prairie on 650 acres of land in the center of the new proton accelerator ring in front of the facility's main building.

Until that project, prairie had been restored largely by hand, a few acres at a time. But if Betz and Schulenberg worked at that rate, it would be a hundred years before the Fermi prairie could even be planted properly. A new technology for prairie restoration was obviously needed, and Betz rose to the occasion. He saw that the same equipment that had been used to destroy the prairie could now be used to rebuild it. "This was one of the first times anyone ever used agricultural equipment on a large scale to build a prairie," he says.

Even with mechanization, the restoration presented enormous problems. Because Betz and Schulenberg insisted on using only locally adapted prairie seed, they had to organize a major collection program. More than a hundred volunteers collected about 400 pounds of prairie seed by 1974. The following spring it was used to plant eight of the 650 acres at Fermilab with 40 to 50 different prairie species. After the ground had been repeatedly plowed and disked to get rid of as many weeds as possible, seed planting was done with a Nesbit drill (an older piece of farming equipment).

At first, says Betz, "the weeds grabbed that land, and we had towering ragweed, we had lamb's-quarters, we had daisies, we had thistles, we had everything." Betz then gave an informal tour of the area for state and private-sector conservationists, and he had to get down on his hands and knees to show them the tiny tufts of prairie plants that were just beginning to poke through the soil. Many of the conservationists "just wrote the whole thing off," he says. But he knew from his more than 15 years of fieldwork that to get established, prairie plants grow downward before putting out much above-ground growth. He also knew that because they had been exposed to the forces of natural selection on the prairie for thousands of years, the prairie plants were far better suited to thrive in the region than nonnative weeds.

"I knew the prairie was working from within, and I said, wait 'til those little ones grow. These weeds don't know what's in store for 'em. And sure enough, the second



year, all of a sudden these tiny little fellows started to grow, especially the grasses, and within about two to three years the grass got tall and thick; we were able to burn it, and with the fire as an ally, the prairie just rolled over those weeds and cleared 'em all out!"

"The next year [1976] we put in seven acres," Betz continues, "then nine acres, then we jumped to 30. Then we jumped to another 30 [in 1979]." During this time he was continuously experimenting with new methods of cultivation. The Nesbit drill was eventually retired for a modified highway salt-spreader. After three or four years Betz and his crew were able to begin collecting seed on their own prairie plot.

Despite all these gains, the volunteers on whom the project largely depended were beginning to become discouraged with the seemingly endless labor required. "Why isn't all the seed in?" they would say after a season of backbreaking toil. And then they'd disappear.

"It looked like the work would never end," says Betz, "and people lost interest and thought it was a failure." But as more and more volunteers defected, Betz' determination held up. "Tony Donaldson worked on this, and he and I kept it alive," he says. "I told myself, we'll have that prairie at Fermi if I have to go and push those plants up from the roots!"

Betz then decided to hold a little reunion to thank all the people who had assisted in the project. Way out in the center of the prairie, he gave an informal talk and progress report. "It was August, and the grass stood six to seven feet high with the compass plants blooming. It was a beautiful thing to see," Betz recalls. "They began to realize it was going to be a success, and that turned the thing around. They reorganized the committees that had essentially disintegrated, and there's been a resurgence that's moved forward ever since."

Yellow coneflower
[*Ratibida pinnata*]

To reduce the human labor required, project members began harvesting seed with a combine so they could collect it on 30 or 40 acres instead of just nine. In 1981 they gathered enough seed to plant 90 more acres of prairie, and by 1983 they were planting 120 acres and collecting 12,000 pounds of seed from their own prairie. More than 300 acres of prairie have already been planted, and the project's pace continues to quicken. The Fermilab prairie is now the largest restored prairie in the United States, and it is one of the few places in the country where both wildlife and habitat are being restored at the same time.

Native sandhill cranes will be reintroduced, and seven native trumpeter swans are already established in ponds on the prairie. They have adapted readily to their surroundings and may eventually produce an indigenous flock. Betz is also planning to reintroduce prairie insects at Fermi, especially those without functional wings, which might have a hard time returning to the restored prairie. He will also reintroduce Franklin's ground squirrel, a native prairie dweller.

In the course of his Fermi work, Betz has come to realize that prairie needs to be restored in phases. The first phase of "pioneer" prairie plants that invade newly disturbed ground are aggressive and competitive. They can overcome foreign weeds. A second phase of less competitive prairie plants can then be interseeded among the first. These could not have survived with the weeds, and would not thrive alone on bare soil, but they are adapted to grow with the pioneer plants. Each successive phase of the restoration introduces ever more delicate prairie plants. Betz believes prairie must be long established, with an accumulation of soil fungus, bacteria, and antibiotics, before the more finicky prairie species can move in. "I don't know all the answers," he says, "but we're working on them. I may never live to see the last wave go in at Fermi. I'll probably never see the Fermi in all its glory," he says without chagrin.

The legacy of the University of Wisconsin's pioneering prairie restoration is alive today not only in the work of Schulenberg and Betz, but also in the efforts of others, such as landscape architecture professor Darrel G. Morrison from the University of Georgia. Morrison has designed and supervised the installation of an 80-acre prairie for General Electric's Medical Systems Division in the Milwaukee suburbs. The General Electric project and others have given him insight into economically attractive and practical uses for the technology of prairie restoration.

Using prairie instead of lawn saved money for General Electric because the prairie cost only $300–$400 per acre to install, versus the $1,000 per acre the corporation had paid for a conventional bluegrass lawn nearby. Whereas the lawn requires mowing, watering, fertilization, and weed control, prairie requires nothing but occasional burning. General Electric's prairie management costs have been less than $5 per acre per year. According to Morrison, park departments around the country often spend $500 per acre per year to maintain mowed lawn, whereas those with prairie spend less than $50 to manage it.

Morrison advocates using prairie instead of lawn along highway rights-of-way, provided some mowed area is left so motorists can pull off the road. Roadside prairies would be beautiful and would help the prairie region retain its distinctive regional identity. In addition, says Morrison, "the interstate has eight acres of right-of-way for every mile of highway, on average, so when you eliminate mowing, watering, and fertilizer, you cut costs by 80 to 90 percent. It adds up very quickly." Less labor would be needed for lawn maintenance, but new jobs would be created in propagating prairie plants, gathering seeds, and marketing and distributing the plants.

Because they can tolerate drought, high temperatures, strong sun and wind, low soil-nutrient levels, and relatively high alkalinity, prairie species may also be valuable in the revegetation of surface mine sites. Morrison has planted various prairie grasses and forbs in iron-ore tailing deposits at the Jackson County Iron Company at Black River Falls, Wis. He would like to see parts of public parks in prairie states and some agricultural land returned to prairie. "In large parks 10 or 20 percent of the site could often be restored to prairie," he says.

In conventional agriculture a complex native ecosystem such as a forest or prairie is simplified, and competition eliminated so a single crop can be grown. But in ecosystem restoration simple systems are made more complex. "Restoration is a new form of agriculture committed not to the production of food and fiber, but to the re-creation of communities based on naturally occurring models," says William R. Jordan of the University of Wisconsin arboretum. "This is a truly historic concept, a new form of stewardship and a new relationship between humans and their environment." □

JOHN J. BERGER *is a writer, editor, teacher, and consultant. This article was adapted from his book* Restoring the Earth, *to be published in November by Alfred A. Knopf, Inc.*

FOCUS ON WINTER

MIKE WHYE

Rain, snow, and cold present special challenges to any outdoor photographer. Follow these tips, and foul weather won't spoil those magical winter pictures.

I COULD READ IT in their eyes. They thought I was crazy.

Having driven up Glacier National Park's Going-to-the-Sun highway in an autumn snowstorm, possibly without seeing another person for miles, they rounded the corner—and there I was. A few yards off the pavement, I had my camera mounted on a tripod and was composing a flurry-filled photograph.

They slushed to a stop, and the driver rolled down his window.

"You all right?" he asked.

"Yeah, fine," I answered. Then he asked the question I knew was coming: "Do you really expect to get good pictures out here in this muck?"

I nodded. "Sure, I get good shots all the time. You just have to know what you're doing."

And it's true: If you know what you're doing, you won't let inclement weather stop you from photographing in the wild. I never set out to be a foul-weather photographer, but given that photographing nature is the main reason I camp, I had to learn to handle the nastier elements and turn them to my advantage. By doing so I've captured many images that fair-weather shutterbugs will never see in their files.

Cloudy, stormy weather not only yields less light than the balmy kind, it's a different *quality* of light as well. In good weather bright rays of sun hit everything in sight from only one angle. In bad weather, however, the lighting is diffuse—almost uniform in tone if the clouds are thick enough—but generally brighter in one area of the sky than the rest. You still won't see the hard shadows of a sunny day, though, and the resulting lack of contrast will make your photos appear murky. You have to learn to compensate for this by setting different exposures than the ones your meter suggests you use.

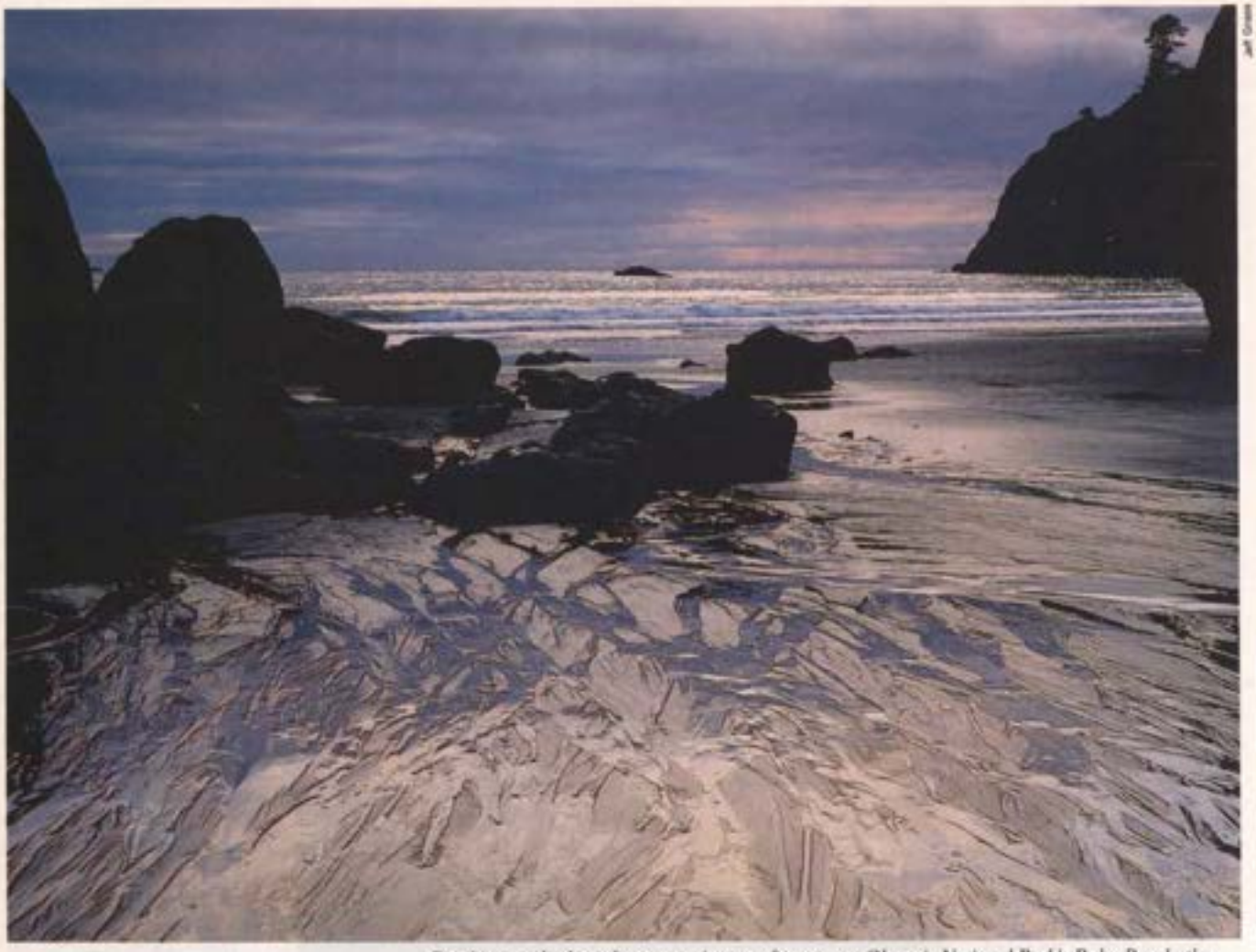
© Gary Ladd

Hikers move through a November snowstorm in the Navajo Canyon area of Arizona. Once you understand the principles of foul-weather photography, you can select the proper combination of shutter speed and aperture to accentuate the appearance of falling snow or rain—or eliminate it altogether.

This is where many people err: They believe their light meters are giving them the gospel. But meters are only guides. When I hear someone excuse their poor pictures by saying "the light meter didn't handle the scene well," I can only think that the photographer didn't know what to do with the information the light meter was providing.

The discrepancy between what we see and what our photographs show is centered somewhere between the eyes and the brain. In order to see accurately, the pupil of the eye either opens or closes slightly to regulate the amount of light that hits the retina. The brain then formulates an overall image that has been more or less evened out in terms of exposure.

Unfortunately, even the most technically advanced



For this moody shot of a stormy August afternoon at Olympic National Park's Ruby Beach, the photographer determined his exposure (f32 at ¼ of a second) by calculating the average of the light-meter readings he had gotten for the dark clouds and the highlights reflecting off the wet sand.

This treed black bear may have been seeing red when this picture was taken, but it's the photographer who ended up seeing spots—because falling snowflakes reflected the light from his flashbulb. You can nullify the "blob factor" by using a coiled synchronization cord to connect your flash unit to the camera and holding the unit at arm's length to the side.

film can't do that, and neither can light meters.

Every light meter is set up to read *neutral gray*. This is what the photo industry calls 18 percent gray—18 parts black to 82 parts white. (A black/white value of 50-50 appears almost pure black.) Consider the following example: You photograph a neutral-gray horse against the walls of a gray barn, a black barn, and a white barn, using a camera with an internal light meter, which is how many cameras today are equipped. If you go strictly by the meter, your results will be, respectively, a gray horse against a gray barn, a white horse against a gray barn, and a black horse against a gray barn. Obviously, the ol' gray mare ain't what she used to be. Why?

The meter sees a gray horse against a gray barn and says, "It's neutral gray." Fine; that's what you get. But when you photograph the horse against the black barn, the light meter attempts to compensate for the blackness of the wall by making it more neutral gray, lightening the gray horse so much that it appears to be white. Just the opposite happens with the white barn. If you want to photograph these scenes accurately, you have to meter the neutral-gray horse, back up while keeping the meter's indications adjusted on your camera, and then shoot your pictures.

In photographing foul-weather scenes, it's important to recognize the contrasts that exist within a given scene. On a sunny day there's very little difference in the amount of light coming from the sky and the ground, so the meter reads the scene without much problem and you get acceptable pictures. But throw in a stormy sky and everything goes to pieces, because of the great difference between the light values of the sky and the ground. At times the sky can be up to four times brighter than the ground. That brightness will affect your light meter, and if you shoot at the recom-

A light rain was falling in Acadia National Park when this photo of native leaves and grasses was taken. Dampness, combined with flat light from overcast skies, produces saturated colors, rich and deep.

Saltwater is highly corrosive of mechanical devices. If you're near sea spray a lot of the time—or just standing around in the ocean, like this fellow—try to avoid changing your film and lenses there.

mended setting, you'll get very dark ground and some nicely exposed clouds. That's fine if you want nothing more than good cloud photographs, but most of us have ambitions beyond that; we want landscapes. Here are a few methods you can use to expose for ground detail.

- Find a patch of ground that would approximate neutral gray if the scene were in black and white, and take a meter reading off that. As long as the ground isn't black rock or white snow, you should feel comfortable using the reading you get in this manner.
- Meter the palm of your hand; increase the setting by one f-stop with either the aperture or the shutter (hence doubling the amount of light that reaches the film), and use that setting for your pictures.
- Carry a Kodak gray card (available at most photo stores) in your car. If light conditions aren't changing too quickly, as would happen if broken storm clouds were passing by, you can read the card with your meter and use the result as your setting. It's not necessary to have the card in focus when you're metering it, as long as it fills your viewfinder. The same holds true for metering your hand.
- Carry an incident light meter, which reads the amount of light falling on a scene rather than the light reflected by objects. As long as you're not in a sheltered area, you're more than likely receiving the same amount of light as your subject. Of the four methods I've mentioned for exposing for ground detail, I regard this as the most accurate.

A word of caution, however: Incident meters require skilled interpretation for accurate results. Exposure must be adjusted from the reading the meter gives based on the reflectivity of the subject, the angle of incidence, and the relationship of the photographer to the light source and to the subject. Amateurs can interpret a reflective

If you drop your camera overboard, immerse it completely in fresh water and take it to a repair shop as soon as possible.

If it's dropped in saltwater, rinse it several times with fresh water before sealing it in a container filled with fresh water.

Should you find yourself nowhere near a repair shop, rinse the camera with fresh water first, then rubbing alcohol. Open the camera completely, remove the lens, dry the works with a hairdryer, and work the mechanisms as they dry.

In either case, hope for the best. . . .

The faster the shutter speed one chooses during a storm, the more distinct will raindrops appear in the final photo. At speeds slower than 1/60 of a second, raindrops and snowflakes blur, while a timed exposure—effective in so many natural settings—makes them seem to disappear entirely.

For a timed exposure of night lightning, set your camera on its 'B' setting, position it solidly, and open the shutter. For ASA 100 film, use an f-stop of 8 or 11; for ASA 64, try f5.6. This array over the Sonoran Desert silhouettes the McMath solar telescope on Arizona's Kitt Peak.

light meter, like the ones built into most modern single-lens reflex cameras, with more ease and more consistent results.

- Some people have cameras with no settings other than those used to adjust film speed. But even this simple correction can often be helpful. To give the film more light, change the film-speed setting (ASA) to half that suggested by the film manufacturer. For example, if you want to give film with an ASA of 100 one more setting of light, set the film-speed indicator to ASA 50. To darken a scene, adjust the recommended setting in the other direction. Just remember to readjust the film-speed setting once you've taken the shot!
- Finally, in situations where you're worried about what exposure to use, remember that film is cheap when compared to the overall cost of your trip. It's wise to take a few extra shots rather than hope that one will come out okay. Take one exposure at the setting you've calculated, then take two more—one at the next-higher setting and one at the next-lower setting. This is called bracketing your exposures, and while it isn't always necessary, it's good insurance when you come upon that special image you'd feel terrible about missing.

Filters have many applications under varying light conditions, but aside from the clear ultraviolet filters many people use as clear protective lens covers, others are often of little help in foul weather. Filters don't affect stormy skies much, and they absorb a lot of light—which you need in bad weather.

Sometimes, though, a specialized filter or two can help you out. When you're shooting color film, a polarizing filter can help reduce haze or eliminate unwanted reflections in water. When you're using black-and-white film, check the color of the clouds in your scene. If there's some blue in them and you want them to stand out against snow, use a yellow, orange, or red

An orange (medium-dark) filter was used to enhance contrast in this shot of a creek crossing on the Little Colorado River in Arizona's Apache-Sitgreaves National Forest. A polarizing filter minimizes glare in photographs that feature reflections in water as a central element.

. . . . . .

If you own a camera with a mechanically operated shutter, you can use the following exposure guide if your meter quits. For example, if you're shooting at a film speed of ASA 64, set your shutter speed at 1/60 of a second; at ASA 200, use 1/250. Then set your aperture as follows:

Bright or hazy sun • f16
Cloudy bright (no shadows) • f8
Heavy overcast • f5.6
Open shade • f5.6

filter, depending upon how much contrast you want. The deeper the color of the filter you use, the darker the sky will appear in your photos.

So much for questions of exposure. What about equipment?

You'll be happy to know that when it comes to film, you can use your favorite sunny-day brand for lousy-day photographs with no problems. If you believe in using low-speed film, you'd better believe in using a tripod too. A tripod sturdy enough for a 35mm camera can cost as little as $40, and it's a wise investment, as is a shutter-release cord. With these two items on hand, it doesn't matter how slow your film speed is. (For ways to improve your camera-handling techniques without a tripod, see "Safe at Any Speed," July/August 1985.)

A few tips for handling film in bad weather are in order here. First, be sure to check how many shots are left on your current roll while you're still in a dry place, especially if you aren't going to be around one for a while. If you have only a few shots left, consider using them up then and there and loading a fresh roll while you, the camera, and the film are still dry. This can save you mental anguish, ruined film, and a camera-repair bill. Keep all film in the plastic containers it comes in—they're waterproof.

Cameras cost quite a bit of money, and most photographers learn to shelter their valuable equipment from the elements. When I don't have my camera in its bag (along with the accompanying lenses), I have it hanging around my neck inside my waterproof jacket or coat with its lens cap on. When I'm ready, I remove the lens cap, pull the camera up, meter the scene, then compose and shoot as quickly as I can so the camera isn't exposed to the elements for too long. In mists, fog, snow, and light rain, I can get away with this. In downpours I don't attempt a photo unless shooting from a sheltered area.

If you must change lenses in inclement weather, do so with care. One maneuver I've found helpful is to bend over with my back to the wind, forming a shelter near my midsection that gives me space to switch lenses quickly. For those brief seconds when the camera has no lens on it, I hold it close to (but not pressed against) my clothing to prevent moisture from penetrating the internal workings.

Dry handkerchiefs and perhaps a towel are useful for wiping away any excess moisture. You can't dry your equipment too often when shooting in damp weather. If drops form on your viewfinder, carefully dab them away with a handkerchief or cotton swab, but don't press on the glass; on some cameras it will cave in under too much pressure. For lenses, wipe as best you can, taking care not to abrade the lens surface. If you have lenses with a lot of back-and-forth barrel movement, as many zoom lenses have, be careful not to allow a wet part to slide into a dry part.

For those who want to waterproof their cameras, there's a plastic-bag arrangement on the market that completely encloses a 35mm camera while offering the photographer two clear viewing ports—one for the viewfinder and another for the lens. The camera's controls are operated by means of special finger inserts. You can also get a plastic hood that drapes you from head to waist and has an open viewing port to which the camera is attached. Finally, at least one major manufacturer advertises a specially constructed waterproof camera suitable for whitewater enthusiasts, divers, and those whose activities regularly find them out in rain and snow.

Temperatures colder than 20 degrees Fahrenheit present more of a danger to

Mike Whye

Photography in a misty environment brings its own special exposure problems. To emphasize the depth of the fog in this shot of trees in Nebraska's Fontenelle Forest, the photographer composed his scene so that objects in the foreground can be seen clearly while others recede into the mist.

To prevent the fogging that occurs when a camera that's been out in the cold is brought into a warm place, simply enclose the camera (and other lenses) in an airtight plastic bag before taking it inside. Condensation will then take place on the outside of the bag instead of on the camera.

shutter mechanisms (both electronic and spring-loaded) than does moisture. If the shutter's accuracy is off by even a tiny amount, those amounts can add up in cold weather, when the shutter tends to respond a bit sluggishly. Let's say your shutter is off by 1/500 of a second. That's no big deal if you're shooting at 1/60 or 1/125. But if you're gunning at 1/500, your exposure will be off by one whole stop. That's why it's wise to stick to shutter speeds in the middle range or slower in cold weather.

Cold can harm your batteries, too. In the past few years cameras have become increasingly electronic. Whereas they once needed a battery only to operate a meter, many newer models require batteries to run the meter, the shutter, and even the film advance (on some models). If you're heading for cold weather with one of these electronic wonders, pack an extra set of batteries along. There's nothing more frustrating than being out in the middle of nowhere and having your camera quit for lack of juice.

If you're only an occasional photographer, you might consider buying lithium batteries as spares; they have a longer life than silver-oxide formulations, both on the shelf and in the camera, and they operate in the cold just about as well. Also, keep the spares warm (close to your body will usually do), and don't throw away batteries that appear to have died; they may just need to be warmed up, which can be accomplished by putting them in the warm spot where the spares had been.

Static presents another headache for photographers. Cold weather is usually drier than warm weather, and dryness leads to static. Rapidly winding and rewinding film can create static within a camera, something you won't be aware of until your film is developed and you see tiny lightning flashes streaking across your photos. So take it easy; advance and rewind film slowly. This is one reason to leave your autowinder at home on cold days. (Besides, I'll never understand people who think they need winders capable of advancing five frames a second to shoot a mountain that's been around for millions of years and that—unless it's a Mount St. Helens—isn't going anywhere soon!)

You've probably figured out by now that there are a few differences between cold-weather photography and the relatively straightforward picture-taking that's possible most of the year. On the one hand you must be patient, willing to spend extra time preparing your moves. Wiping down gear, hunching over to change lenses, and fiddling with plastic protective shields takes more time than you need when shooting in fine weather. On the other hand, you must sometimes move faster, metering, composing, and shooting a scene without getting too wet. Photography under these conditions may seem to be a hassle at first, but as the pictures on these pages prove, your efforts will be worth it. □

MIKE WHYE *is a writer and photographer based in Rock Rapids, Iowa.*

A NEEDY CHILD'S CHRISTMAS LIST

- ☐ A CUP OF MILK
- ☐ CLEAN WATER
- ☐ GOOD FOOD FOR MY FAMILY
- ☐ A WARM, DRY BED
- ☐ A SCHOOL
- ☐ CLOTHES FOR EVERYONE
- ☐ A DOLL AND TIME TO PLAY

- ☐ SOMETHING TO SMILE ABOUT

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☐ **Where the need is greatest.**

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☐ Instead of becoming a sponsor at this time, I am enclosing a contribution of $_____

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Save the Children. SCB 11/5

Backcountry Skiing

Your destination may be near or far away, the terrain gentle or rugged, the going easy or extreme. But the goal is always the same: to enjoy the winter wilderness.

DAVID WEINTRAUB

Backcountry skiers tend to be enthusiastic about their sport. Let me rephrase that: Backcountry skiers are out-and-out zealots.

Listen to a friend of mine as she describes skiing down a steep bowl in Idaho's Sawtooth Mountains: "You stand on this ridge and look down, and you say to yourself, 'Oh my God, I'm never going to make it down that!' And then you let your skis go, and all of a sudden you're dancing on the edge of excitement and adrenaline." Sound like fun?

For some the idea of backcountry skiing conjures up visions of a serene shuffle through acres of freshly fallen snow. For others it means a teeth-gritting, ski-chattering descent of an icy mountain couloir. Backcountry skiers make their own tracks. There is no machine-set track or groomed trail. The route can be a summer hiking trail, a snow-covered road, or merely an idea and a line on the map.

Historically, backcountry skiing represents the melding of several different interests. The backpacking boom of the late 1960s and early '70s brought many people to the outdoors in the summer. Consequently, interest grew in visiting the backcountry in winter. At the same time, Nordic ski racing was appealing to those fitness-conscious citizens who had already embraced jogging and bicycling as favored forms of exercise. Backcountry skiing, then, became an ideal way to appreciate the beauty and splendor of the outdoors in winter while getting the benefits of a cardiovascular workout.

What kind of equipment do you need to ski the backcountry? The answer depends on the kind of terrain you want to cover and on your personal requirements. If you'll be doing most of your skiing in set tracks, making only occasional forays into the backcountry, lightweight skis and one of the newer boot-binding combos may be right for you. If you want an all-around set-up for general touring, wider skis and the standard 75mm boots with three-pin bindings could be the ticket. And if you're out to challenge the steep and deep, metal-edged Alpine-style skis and double boots belong on your ski rack. In any case, what you want to accomplish determines what equipment you will need.

The most common mistake that would-be backcountry skiers make is to assume they need new equipment to ski the off-track wilderness. That's the way Karl Andersson, ski instructor and equipment buyer for Oregon Mountain Community, a Portland outdoor store, sees it. Most of the time, he says, you can use what you already own. There is one big exception to this general rule, however. While you can get by with skis and poles that are not top quality, boots are another story. Says Andersson, "Boots are the weakest link. You can make the worst skis turn with good boots, but lousy boots won't make even the best skis perform." If you're thinking about new equipment, here's the place to put your bucks. "Buy the best boots you can afford," advises Andersson, "and use any money left over to take a ski lesson."

Good boots, then, are essential. But faced with a bewildering array of boots and bindings, how is the novice skier to choose? For all-purpose touring it's still hard to beat a good leather 75mm boot with standard three-pin bindings. While today's 75mm boots and bindings may look the same as those from ten years ago, they are much improved. For example, a flexible boot used to be a floppy one, meaning

The off-track skier has access to ungroomed miles of mountain majesty . . . and snow, snow, snow.

the skier had to put up with loss of control in exchange for the unhampered forward flex so necessary for good skiing technique. The new leather boots are made to flex forward easily, while still maintaining good side-to-side rigidity, or "torsional stiffness." The result? Improved comfort *and* control for the skier.

For track skiing and light backcountry use, several integrated boot-binding systems on the market offer an alternative to 75mm boots and bindings. (See "Trends in Cross-Country Ski Gear," January/February 1984.) These systems are light and sleek, and feature almost unlimited forward flex. But, as always, there are compromises. The flexibility inherent in some of the designs to date brings back that old nemesis, lack of control. In other words, when you go to make a turn, you can torque your heel right off the ski. This isn't a problem for track skiers, because most turns are made by following the track or stepping the ski, but in the backcountry it could spell trouble. If you are interested in one of these newer systems for backcountry use, be sure to look for a torsionally stiff boot and a tight fit between boot and binding that does not allow the boot to twist off the ski.

It's tough to lay down any hard-and-fast rules about which ski is best for backcountry use. Karl Andersson advises using skis that will give you the most enjoyment over the long run. So, if you're going to make day trips with a light pack the focus of most of your skiing, you don't need heavy, metal-edged skis designed for mountaineering. Similarly, if most of your time will be spent snowcamping in remote areas, you'd better have sturdy, stable skis.

As for the debate between waxable and waxless skis, it's really no contest: Both sides win. The grip and glide of a well-waxed ski are hard to beat, but the convenience and versatility of a good waxless model are good points too. In some areas, such as the Cascades of the Pacific Northwest, snow conditions and temperatures that hover around the freezing mark make waxless skis very popular. In other areas, where the snow is colder and conditions are more consistent, waxable skis hold sway. And when nothing works, you can always slap on some adhesive climbing skins and walk up the steepest slopes.

Whatever equipment you end up with, you'll need to keep it in good repair. Carry a tool kit with spare parts along on all your backcountry tours. (See "A Ski-Tourer's Repair Kit," January/February 1984.) Many ski shop technicians recommend carrying a spare ski tip, extra bindings, screws, glue, and a special screwdriver known as a #3 Posidrive. That way you can always fix your own (or someone else's) equipment

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In addition to preparing a repair kit for your equipment, you'll need to prepare yourself for dealing with the winter environment. Certainly this means being physically fit and having the proper clothing and equipment. But there's more to it than that. How well you fare in the backcountry depends to a large degree on your reactions to the environment and to the various situations you encounter.

A common adage holds that good judgment is the product of experience, and experience is the product of bad judgment. Writer and mountaineer Ray Smutek has devoted much time to the study of judgment, good and bad, and to a phenomenon he has dubbed "negative-event feedback." Simply put, negative-event feedback means drawing the wrong conclusions from a situation in which nothing bad happened. Let's see how this applies to backcountry skiing.

Imagine the following scenario. You are leading a group of friends on a ski tour through the woods. It's the day after a heavy snowfall, clear and cold. The route breaks out of the trees and comes to a steep, open, north-facing slope—a combination of factors that could spell avalanche. You and your party decide to cross one at a time, keeping a sharp lookout for signs of trouble. Nothing untoward occurs, and you all make it safely across.

This is a classic negative event . . . because nothing happened. How do you interpret this experience? Do you judge this slope and similar ones you encounter in the future to be safe? Or do you vow never again to jeopardize the safety of yourself and your friends? Which answer is right? How can you know for sure?

While many backcountry skiers may never face the kind of black-or-white choices this example entails, we all make hundreds of judgments during the ski season—involving routefinding, weather, hazard evaluation, and so on—to ensure the success of each trip. In the situation we're talking about here, you would need to take into consideration (among other factors) the history of the snowpack, current wind direction, temperature, and alternate routes away from the hazard zone. You might find yourself needing to think about how important it is to make the crossing at all. In short, safety is not just a matter of having the right equipment and adequate knowledge; it's what you *do* with these resources that counts. Your good judgment is what will pull you through in the event of an emergency—or keep you out of trouble in the first place.

Lest you think that guaranteeing a safe backcountry trip involves years of field practice, the good news is that safety starts at home, with some common-sense things you can do before you load up the car and head for the hills.

For example, pilots and sailors wouldn't think of leaving home without a weather briefing; skiers should follow their example. Recorded weather information is available by phone or radio 24 hours a day virtually everywhere; in some areas avalanche warnings are broadcast as well. And what if the weather is threatening to ruin your trip? How about trying a less-exposed route or a different area on the drier side of the mountains? Be sure to leave your destination and return time with someone you trust—and notify that person when you get back.

Another common problem—again, one that can be solved before you leave home—is lack of functional clothing and equipment. Without repeating the Ten Commandments ("Thou shalt not wear cotton; only polypropylene, bunting, and Gore-Tex shalt thou wear. . . ."), suffice it to say that while the outdoor-clothing industry has zoomed into high-tech, some basic principles still stand: Shun cotton like the plague, layer for warmth, and carry protection from wind and wetness. How you do these things is up to your fashion sense and your bank balance. Get in the habit of checking out your clothing and equipment at home and keeping them in good repair.

Finally, you can learn a great deal about backcountry skiing by visiting your local library, bookstore, or outdoor shop. There is a wealth of material written for the skiing public, ranging from backcountry cookbooks to technical articles on snow-crystal formation. Excellent magazines, instruction manuals, and guidebooks are devoted to the sport. To supplement the written word, Nordic clubs and outdoor shops often sponsor clinics, slide shows, and seminars on various aspects of skiing, snow-camping, and outdoor safety. These programs are valuable to novice and advanced skiers alike. There is always more to learn.

Several trends are developing in backcountry skiing that are worth looking at, if only because they underscore the extreme diversity of the sport. On the one hand, expert skiers are pushing Nordic equipment to its limits, tackling difficult routes in out-of-the-way mountain ranges. On the other hand, guided trips and hut-to-hut tours have opened up the backcountry to novice skiers and those unfamiliar with the rigors of the winter wilderness.

You don't have to be an expert skier to appreciate the speed and mobility Nordic equipment affords the backcountry traveler. While a relatively small band of enthusiasts forges a brave new world of radical skiing, the rest of us benefit, in a trickle-down sort of way, from their advances in

equipment and technique. Five years ago the sight of a telemarker at a downhill ski area would have provoked shouts of glee from delighted (if skeptical) skiers on the chairlift. Today, many downhill areas offer telemark instruction and rent the equipment. The effect on backcountry skiing has been to expand the range of what can be skied safely on Nordic gear, and to give backcountry skiers new confidence in their skills.

As for guided trips and hut-to-hut tours, skiers so inclined can experience the luxury of touring the backcountry unburdened by a heavy pack, and have a delicious meal waiting for them at day's end. Or they can choose something a little more rustic—say, a do-it-yourself dinner in a canvas-wall tent. In any case, the availability of huts and guided trips makes the backcountry more accessible to a wider variety of skiers. And if the success of guided river-rafting trips is any indication, this way of enjoying the winter wilderness may become more popular in coming years. An article in the February 1985 issue of *Powder* magazine lists 17 organizations offering various levels of hut skiing and guided tours in ten states from

Routefinding on Snow

JUNE FLEMING

WILDLIFE TRACKS are easier to spot in snow than in dirt, and so are those of skiers. Unfortunately, that fact can lull a snow traveler into careless routefinding. After all, you can simply follow your own tracks out, right?

Maybe. But getting where you want to go on snow is often much more complicated, especially in the backcountry. Take the matter of tracks. Blowing snow can erase them in minutes; other skiers' tracks can mingle with yours; yesterday's can look like today's. In these situations the skier who depended on his or her tracks is in trouble.

There are other complications, each of which adds to the challenges and rewards of mastering this special kind of adventuring. Every trip brings new lessons, and when you learn them well, there's no greater satisfaction. Without trails a skier is freed from that limiting malady, tunnel vision. He or she sees a much wider, more interesting world, and pays closer attention to both the whole and the sum of its parts.

What are the factors that affect a winter wanderer?

- Covered with snow, even the most familiar features may look new. Meadows and lakes look alike; streams are often hard to find.
- Clear summer trails can be two-foot-high tunnels with no blazes or signs to point the way. Some open places look like trails but aren't.
- Visibility is usually poorer, so distant landmarks can't be counted on.
- Some factors, such as a tricky water crossing or a change in the weather, can quickly render your Plan A unworkable or unwise.
- The pace of travel is much more variable, and often unpredictable until you're under way.
- There's less travel time, because the days are shorter and camp tasks take longer.

To meet these challenges you need solid routefinding skills. First and foremost among these is fluency in reading topographic maps. It's also important to be able to use map and compass together for basic procedures: pinpointing your location, identifying landmarks, and measuring and following travel bearings. Finally, you must be alert to the shape of the country and the course you've followed through it.

Much of the success of snow trips is determined by careful route planning. Make your first jaunts into familiar territory that's relatively gentle and close to help. Plan your itinerary conservatively, avoiding such foreseeable hazards as avalanche slopes, and shoot for the least mileage you could make under tough conditions. Keep both daily and overall goals within the reach of the least skilled and experienced skier in your group.

Gather current information about the area from others who've been there recently, the agency in charge of the land, and outdoor stores. And, of course, check the weather forecast.

Homework done, another key factor comes into play—*flexibility*. Successful travelers continually assess and adapt. They monitor their physical and mental states, snow conditions, and the weather. Consulting compass and waterproofed map, they keep track of their location and mark their progress through the landscape.

In addition to the basic routefinding

New England to California, plus the Canadian Rockies. Sierra Club members living in or visiting California can take advantage of four mountain huts in the Lake Tahoe area that are available by reservation for winter use by contacting the Club's Outing Department (730 Polk St., San Francisco, CA 94109).

To some, guided trips and hut-to-hut skiing smack of rank commercialism, seeming to be the very antithesis of everything a backcountry experience should be. Still, I'm sure some of us wouldn't mind a bit more comfort and a little less rigor in our skills listed above, a backcountry skier can make use of two other particularly helpful ideas.

A *baseline* can provide a boundary to keep you from straying out of your chosen area, or a line you can follow to a given destination. It's any long, fairly straight linear feature (ridge, river, unplowed road, power-line clearance, etc.) whose direction from you is known. In ground-hugging clouds I've skied my way along the base of a massive butte rather than strike out along the flats. In this "skiing by Braille" the topography itself was my guide. On another trip a power-line cut saved me miles in deteriorating weather.

A second valuable technique you can employ is following a travel line by using *intermediate landmarks*. When you can't see your goal because of distance or limited visibility, chopping the line into short chunks is the only way to stay on it. You can do this with a compass, and it's a relatively simple procedure with endless applications for both safety and exploration.

Last New Year's Day was clear and bright as I skied toward Sisters Mirror Lake, hoping to be the first person there this year. My route led through a half-mile-wide strip of deep forest that obscured the mountains otherwise keeping me on course. Compass in hand, I skied through the woods and emerged in the open, still on my travel line, no energy or time wasted.

The recent deep snowfall lay unmarked except for a thread of coyote tracks ahead. The privilege of sharing this creature's lovely backcountry world was the kind of reward that makes route-finding on snow worth the effort it takes to learn.

JUNE FLEMING *is the author of* Staying Found: The Complete Map & Compass Handbook *(Vintage, 1982).*

outdoor adventures. After all, how do you think the Europeans got to be such good skiers? They didn't drag tons of equipment over the frozen Alps on their backs; they stayed in huts, ate hot meals, and slept in bunk beds.

Guided trips are especially attractive to novice backcountry skiers because they provide an opportunity to ski with and learn from an experienced guide. According to Rick Borkovec, director of Crested Butte Nordic Adventures, a Colorado touring center and guide service, newcomers to the sport are leery of the winter environment, with its problems and prospects of subzero weather, routefinding, avalanches, and hypothermia. "The backcountry is a big, scary thing for them," he says. "A mistake in winter can be quite costly. It's not very forgiving. Our job is to attract people to it, then teach them respect."

Crested Butte is blessed with an abundance of wilderness in almost every direction, and Borkovec, who helped popularize the telemark turn in the 1970s, spends a lot of time skiing the backcountry. One of his favorite routes crosses Conundrum Pass high in the Elk Mountains—some of whose summits soar above 14,000 feet—and descends to Aspen. The return can be made via Pearl Pass, for a round trip of 45 miles. The best part, says Borkovec, is camping by Conundrum Hot Springs, where, as he puts it, "you can rest your aching bones." Similarly inviting routes in backcountry areas around the country await your investigation and enjoyment.

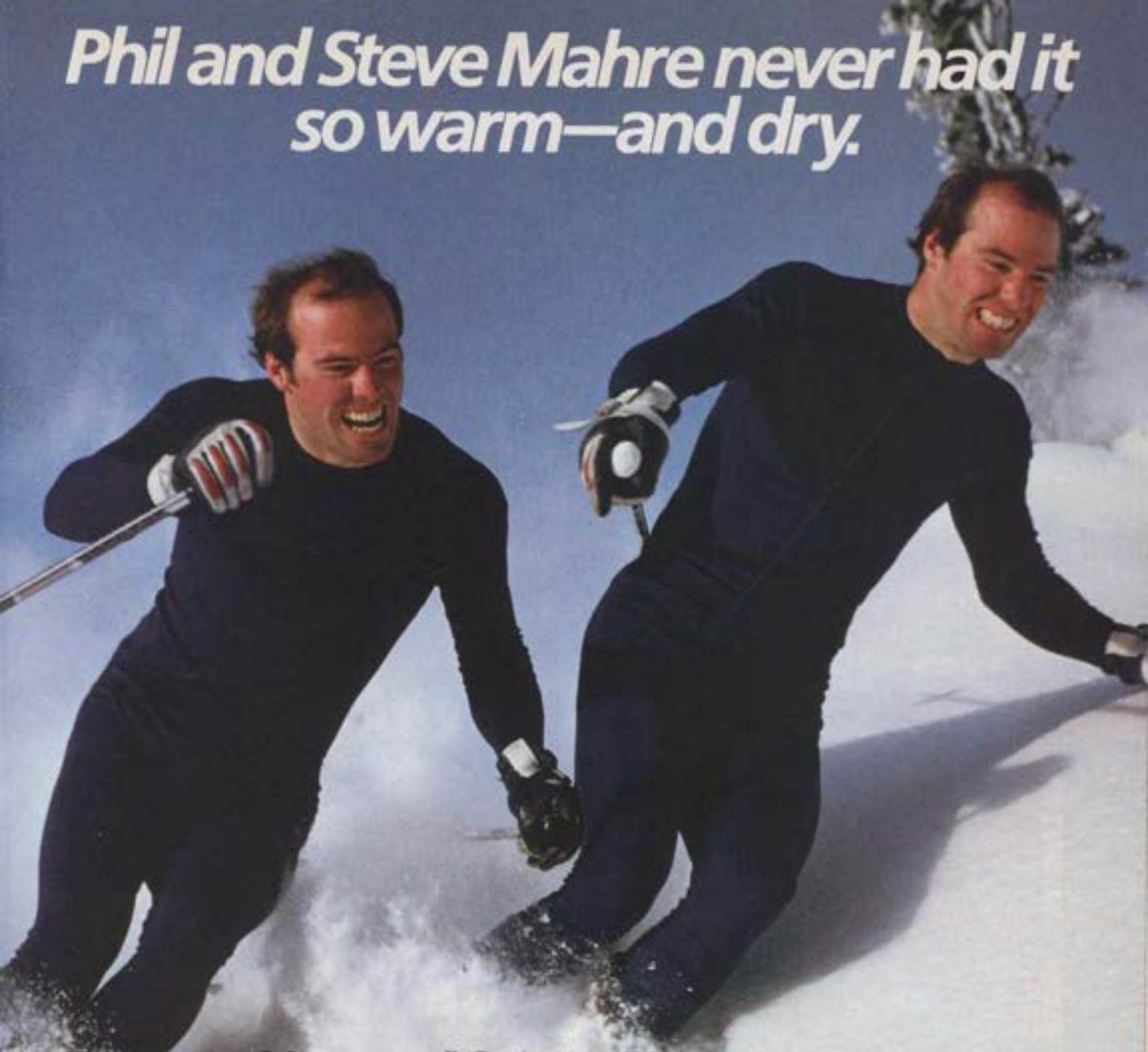
As I write this, the August sun stands high in the sky, and you could hot-wax your skis on the pavement. The only skiing to be done 'round these parts is high on the slopes of Mount Hood, where glaciers and permanent snowfields wait for those willing to hike with their skis or pay to ride the Palmer chairlift at Timberline.

Still, the seasons have a way of crowding in on each other, especially as you get older, and I'm not so sure that's a bad thing. After all, the fall and winter ski catalogues will be out soon, and the outdoor shops will change their displays to get ready for the preseason sales that loom just around the corner. It's time for you to break out the maps and guidebooks, to go over plans for the coming winter's outings with a friend. Or to walk down the basement stairs and run your fingers over the smooth bases of your skis, checking for nicks that need repair. It's almost time to wax your boots, assemble your gear, and load up your pack.

In fact, wasn't there a distinct chill in the air last night after the sun went down? □

David Weintraub is a writer/photographer from Portland, Ore.

Phil and Steve Mahre never had it so warm—and dry.



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RON HIRSCHI

OLD COAT/NEW COAT

ANIMALS DON'T GO shopping for new clothes or have their hair cut, but they do get a whole new look as the seasons change. Their coats of fur or feathers are constantly changing to adapt to their growth, the weather, or the color of their surroundings.

If you have a cat or dog, you may have noticed that it sheds fur from time to time, leaving little hairs on the bed, the couch, or your lap. The old hair on your head also falls out sometimes, and is replaced by new hair.

But unlike humans, wild animals that live in cold climates shed their entire coat and grow a brand new one each time the seasons change from warm to cold.

In winter, some mammals grow a thick coat to help keep them warm. Sometimes this coat will be white, which helps the animal blend into its snowy surroundings. As the days grow longer and summer draws near, this winter coat starts to fall out, revealing a lighter summer coat underneath. This coat is often brownish or spotted, like the pattern of summer sunlight on the forest floor. When the days start getting shorter again in the fall, the animal will shed (or "molt") its lightweight coat to reveal the new winter coat that's been growing underneath.

Of course, animals don't *choose* to molt, just as you don't choose to replace your fingernails or the hair on your head. The hair of a mammal grows to a certain length, and then stops. At this point, a new hair starts to grow beneath the old one, until it eventually pushes the old hair out. In some birds, such as penguins, the new feathers grow right on top of the old ones. The timing of these events is probably triggered by the changing length of the days during the year.

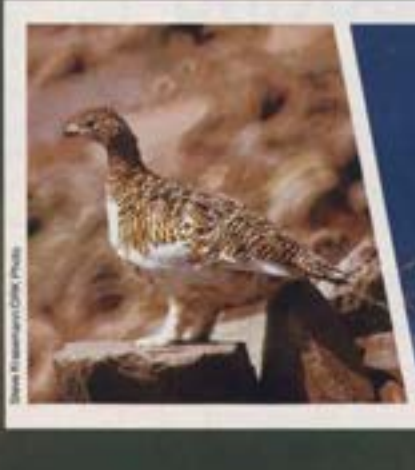
Next time you go shopping for a new coat, remember what the other mammals will be wearing this season. They may look funny while they're molting, but nature will give them just the coat they need . . . in animal fashion. □

Today the musk ox is found only in the Arctic regions of North America and Greenland. Adults have a coat of long shaggy hair that reaches almost to their feet. Underneath this is a layer of warm wool that is shed in summer.

Steve Kaufman/Dot Photo

E.J. Kaufman/Dot Photo

RON HIRSCHI *is a freelance natural-history writer based in Washington state. His credits include* Owl, Ebony, Jr., *and* Field & Stream.



Steve Kaufman/Dot Photo

The elephant seal, or sea elephant, is the largest of all seals, reaching up to 2,000 pounds in weight. Adult elephant seals molt twice a year, shedding both their short, hairy coats and outer layers of skin.

When penguins molt, the tip of each new feather grows into the end of an old one, and the two grow out joined together. The birds then pick the old feathers off with their bills and feet.

Like other hares and rabbits, white-tailed jackrabbits have different colored molts depending on where they live. In snowy climates they may turn from brown to white in winter, while southern hares and rabbits will often turn from brown to gray.

This American goldfinch is molting from a dull gray to a bright yellow coat, which will probably help him to attract a mate.

The ptarmigan, a game bird similar to the grouse, changes from a speckled brown coat to a snowy white coat in winter. Like many animals that can be found in both cold and warm climates, the ptarmigan does not change to a white coat in the southern end of its range.

The mountain goat lives on cold, steep mountainsides. In winter its shaggy white coat helps it hide from predators as it searches for food beneath the snow. This thick coat becomes unnecessary in spring, when chunks of the wool beneath its long guard hairs zip off as they catch on branches and rocks.

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1986 SPRING OUTINGS

The many wonders of spring await you on a 1986 Sierra Club Outing! Once again we offer a variety of ways to see and experience the special beauty of spring: from backpacking in the canyons and deserts of the Southwest to dayhiking in the Coast Mountains of Canada; from whalewatching in Magdalena Bay in Mexico to ski touring in New York's Adirondacks. We have trips to suit every taste and experience level. ▲ Sierra Club trips average 12 to 25 members and are generally cooperative ventures. Trip members help with camp chores, including food preparation and cleanup, under the direction of a staff member. ▲ The following pages give you a brief description of the exciting possibilities for your winter or spring vacation. To order supplemental information on individual outings, please send in the coupon on page 96 entitled "For More Details on Outings." Reservations are being accepted now for all spring trips, but be sure to read the Reservation and Cancellation Policy carefully before applying. Watch for a complete listing of 1986 trips in your January/February issue of *Sierra*.

[388] Death Valley at Christmas, California—December 18–28. *Leader, Bob Miller, 11713 NE 150th Pl., Bothell, WA 98011. Cost: $335.* Warm days, blue skies, and holiday cheer await us in this fascinating, varied desert environment. Day trips allow us to explore deep canyons, sand dunes, ghost towns, and snow-capped peaks. Daily excursions under the professional guidance of our naturalist will be tailored to the wishes of the group, using participants' vehicles to reach the trailheads. Hikes will be leisurely to moderate, allowing time for photography, nature study, or relaxation in the sun.

[26-E] Arroyo San Pablo, Sierra San Francisco, Baja, Mexico—January 27–February 7. *Leader, Daniel Plambeck, 1171 Virginia St., Berkeley, CA 94702. Anthropologist, Roger Newman. Cost: $540.* Along goat trails and portions of Camino Real, we climb 1,700 feet and descend 2,000 feet to two base camps in the deeply eroded arroyos of volcano San Francisco. Among palms and pools of water our *vaquero* guides lead us to shallow caves vividly painted with giant and ancient representations of humans and hunted animals. Featured is a visit to famous Gardner Cave. Interviews with mission descendants, Baja's unique desert ecology, and spectacular scenery make this a memorable trip to a rarely visited region.

Leslie & Gary Young

Sailing with new friends.

[27] Island of Hawaii—March 21–29. *Leaders, Lynne and Ray Simpson, 1300 Carter Rd., Sacramento, CA 95825. Cost: $520.* From volcanic cinders to emerald forests to white sand beaches, this trip will emphasize rural Hawaii. We will car camp at three remarkably varied locations. Hikes and swimming will be available daily with at least one overnight hike planned. Transportation will be by rental car. Fresh food and island menus will be jointly prepared by a commissary staff and trip participants. Springtime in Hawaii is spectacular! Lush green is enhanced by riots of blossoming jacaranda and bougainvillea—truly a tropical paradise.

[28] Rogue River Trail Lodges Base Camp, Oregon—March 23–29. *Leader, Mark Minnis, 410 NW "E" St., Grants Pass, OR 97526. Cost: $645.*

[32] Rogue River Trail Lodges Base Camp, Oregon—April 27–May 3. *Leader, Mark Minnis, 410 NW "E" St., Grants Pass, OR 97526. Cost: $645.*

[39] Rogue River Trail Lodges Base

Camp, Oregon—June 1–7. *Leader, Mark Minnis, 410 NW "E" St., Grants Pass, OR 97526. Cost: $645.* Starting near Agness, we will hike two days along the Rogue River Trail, about six miles each day, staying overnight at a wilderness lodge. Our gear will be carried by boat. The second day we will reach Half Moon Bar Lodge, where we will spend the next four nights. Here we can relax, dayhike along the river, fish, and enjoy the peace of the wilderness and the lodge's marvelous food. The last two days we will hike back along the river trail, stopping again at a lodge. This trip features easy hiking and plenty of time for relaxation. A naturalist will accompany us, leading field trips to discuss the flora and fauna of the canyon.

[29] East Mojave Scenic Area, California—March 22–29. *Leader, Joanne Barnes, 960 Ilima Way, Palo Alto, CA 94306. Cost: $205.* Spring vacation provides us with a perfect opportunity to visit the desert region between Death Valley National Monument and Joshua Tree National Monument that contains more that 20 proposed wilderness areas. There will be 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. Visiting naturalists and local desert experts will be joining us throughout the week.

[30] Panamint Mountains Burro Trek, Death Valley, California—March 29–April 5. *Leader, Steve Akeson, 129 Lake Ave., Piedmont, CA 94611. Cost: $390.* The Panamint Mountains form the western boundary of Death Valley. They rise abruptly from the desert with peaks in the 6,000- to 8,000-foot range, so we will have panoramic views of Death Valley to the east and Panamint Valley to the west. Long ago Indians spent their summers in this desert of sage and pinion pines, and in the mountains' recent history, gold and silver mining played the major role. Spring is an ideal time to visit the area; the snow will have cleared and the wildflowers should be beginning to bloom.

[31] Grand Gulch Primitive Area Highlight, Utah—April 20–26. *Leaders, Marlo and Ron Miller, 13636 Durango Dr., Del Mar, CA 92014. Cost: $1,165.* Starting on the high cedar mesa in southeast Utah, we will descend and explore one of the most colorful and historically significant

Relaxing at Tilden Lake, Yosemite Park.

canyons in the area. Using packhorses to carry supplies, we will hike 40 miles, stopping frequently at Anasazi ruins, pictograph sites, and natural arches. Our relaxed itinerary will allow time for a layover day exploring the wonders of the Gulch. A good trip for hikers of all ages.

[33-E] Zion/Bryce Photo Base Camp, Utah—May 2–9. *Leader, Bob Miller, 11713 NE 150th Pl., Bothell, WA 98011. Instructor, Martha Murphy. Cost: $335.* Savor and photograph nature's colors at their brilliant, contrasting best. From our base camp at Zion National Park, we'll experience spring on dayhikes within the park and on daily car shuttles to the attractions of Bryce Canyon, Cedar Breaks, and Kolob Canyon. Weather permitting, we will be able to explore the Zion Narrows and its side canyons on an overnight trip. Our hikes will be leisurely to accommodate the interests of photography buffs. This is a trip to satisfy the senses and provide lingering memories.

[34] Hells Canyon Leisure Highlight, Oregon—May 8–17. *Leader, Len Lewis, 2106-A Clinton Ave., Alameda, CA 94501. Cost: $720.* The Hells Canyon Wilderness was established in 1975 to preserve and protect this wild and scenic area. Its 652,000 acres straddle Hells Canyon of the Snake River from the peaks of Idaho's Seven Devils Mountains to the east to Oregon's rimrock and mountain slopes to the west. Our trip takes us through the heart of this region, and our five layover days give us time to explore and savor its archaeological, historical, and ecological values.

[35] Rogue River Trail Wilderness Lodges, Oregon—May 12–17. *Leader, Mark Minnis, 410 NW "E" St., Grants Pass, OR 97526. Cost: $600.*

[38] Rogue River Trail Wilderness Lodges, Oregon—May 28–June 2. *Leaders, Susanna and Jim Owens, P.O. Box 5, Agness, OR 97406. Cost: $600.* Come hike the historic Rogue River Trail through the Wild Rogue Wilderness carrying only a daypack. Other gear will be carried by raft, which will follow our trail along the river. We will stay in rustic wilderness lodges each night with all the comforts of home—clean beds, hot showers, and fabulous hearty meals. Two layover days will be spent at Half Moon Bar Lodge, where we can enjoy the beauties of spring and the abundant wildlife of the Rogue River Canyon. Support services will be provided by an authorized Rogue River outfitter.

[36-E] Oregon's High Desert: Llama Trek and Natural History Field Seminar—May 18–24. *Leader, Tom Landis, 36670 Courtney Creek Rd., Brownsville, OR 97327. Instructor, Stosh Thompson. Cost: $535.* The high desert of southeastern Oregon is a little-known area comprising a great diversity of natural environments that are particularly alluring in late spring. Llamas will carry our loads for relatively easy hikes. Our instructor, an expert on the natural history of the area, will take us to roadless wilderness areas that encompass mountains, deserts, marshlands, and hot springs. We'll study volcanic and glacial geology as well as wildflowers at the peak of their bloom. Wildlife will include antelope and bighorn sheep, along with the great profusion of migratory birdlife that uses this area in spring.

[37] Spring in Canada's Coast Mountains, Tweedsmuir Park, British Columbia—May 26–June 1. *Leader, Dennis Kuch, Tweedsmuir Park, Box 10, Via Bella Coola, British Columbia, Canada V0T 1C0. Cost: $610.* While the peaks above are still blanketed with snow, the deep, glacier-carved valleys of the Coast Range spring to life with blossoming orchids and nesting eagles. Based at the rustic and comfortable Tweedsmuir Lodge in the Atnarko Valley, we will make daily forays into the valley and surrounding Tweedsmuir Park. A leisurely introduction to springtime in Canada's Coast Range wilderness.

Backpack trips offer the greatest freedom for exploring the wilderness, because everything you

need is on your back. Young and old are today showing an eagerness for the adventure, solitude, and personal challenge of backpacking. Sierra Club trips provide these rewards as well as an example of how to backpack knowledgeably and comfortably. Backpacking is a strenuous activity, however. For a trip of a week, the starting load may weigh from 35 to 40 pounds, but the exhilaration and extra physical effort make you feel more a part of the wilderness. With today's new designs in backpacking equipment, almost anyone in good physical condition can enjoy backpacking. ▲ All trips require members to help with the cooking and camp chores, although the leaders provide commissary equipment and food. Trip members bring their own packs, sleeping bags, shelter, and clothing. ▲ Trips are rated by the individual leader as leisurely (L), moderate (M), strenuous (S), or levels in-between. The ratings are made as accurately as possible on the basis of total trip miles, cross-country miles, the aggregate climb, the difficulty of the terrain, and its elevation. ▲ Strenuousness is also measured in less obvious ways. On desert trips members are often required to carry liquids that significantly increase their pack loads. Canyon trips entail steep descents and climbs, and temperatures may vary considerably from top to bottom. ▲ The demands of backpacking require that the leader approve each trip member based on responses to questions about previous backpacking experience and equipment. If you lack experience or have never backpacked at high elevations for any length of time, you may qualify for one of the less strenuous trips by going on weekend backpack outings prior to the trip. Unless otherwise stated, minimum age on backpack trips is 16, although qualified 15-year-olds are welcome if accompanied by a parent.

[386] Clear Creek, Grand Canyon, Arizona—December 15–20. *Leader, Bob Madsen, 3950 Fernwood Way, Pleasanton, CA 94566. Cost: $225.* Come join this winter hiking trip on the sunny side of the canyon. We will have two layover days to explore narrow Clear Creek Canyon and Cheyava Falls. This 38-mile trip will be entirely on traveled trails. (Rated M)

[40] Phantom Valley, Zion Park, Utah—March 9–15. *Leader, Dave Mowry, 3848 W. Lawrence Rd., Phoenix, AZ 85019. Cost: $220.* Explore the slickrock wilderness in this seldom-visited area of Zion National Park. We will hike through narrow side canyons and along the base of high sandstone walls. This trip is off-trail with most elevations above 6,000 feet. There is a possibility of a spring snowstorm. (Rated M-S)

[41] Galiuro Wilderness, Galiuro Mountains, Coronado Forest, Arizona—April 6–12. *Leader, Sid Hirsh, 4322 E. 7th St., Tucson, AZ 85711. Cost: $200.* Very wild, very rugged, and still primeval—that's the seldom-visited Galiuro Mountains in southeastern Arizona. Our route is over dry, brushy ridges with brightly colored rocks on the way up, and into heavily forested canyons with running streams on the way down. We'll hike past interesting rock formations, an irresistible desert waterfall, and some old gold mines in Rattlesnake Canyon. Travel will be on difficult, overgrown trails, off-trail, and on some good trails. There are no layover days, but, except for the second and last days, there will be time to explore and enjoy. (Rated M-S)

[66] Grand Gulch Primitive Area, Utah—April 6–12. *Leader, Randy Klein, 5208 Gravenstein Park, Salt Lake City, UT 84123. Cost: $195.* Near the west edge of Cedar Mesa in southern Utah's redrock canyon country winds Grand Gulch. The trail starts at 6,400 feet and drops quickly into an immense canyon dotted with Anasazi dwellings, pictographs, and petroglyphs. Freshwater pools, dayhikes to ancient ruins, and exploring side canyons complete the trip. (Rated M)

[42] Devil's Peak, Ventana Wilderness, Los Padres Forest, California—April 18–26. *Leader, Bob Berges, 974 Post St., Alameda, CA 94501. Cost: $170.* This circle trip out of Boucher's Gap will provide spring backpackers with a chance to warm their boots up early. It will be leisurely to moderate in difficulty with one layover day that may provide an opportunity to soak in a hot spring. The time is right for many wildflowers and long, clear views from the ridgetops. We will experience many microclimates of the wilderness. It should be too late for the rainy season and too early for really hot weather. (Rated L-M)

[43] Canyons of Navajoland, Utah—April 20–26. *Leader, Jim De Veny, 5307 E. Hawthorne, Tucson, AZ 85711. Cost: $310.* On this exploratory trek through sandstone-dome country, we will pass through a maze of deeply incised canyons in the Navajo sandstone. This mostly cross-country trip will pass near Music Temple, Nasja Mesa, and Zane Grey's "surprise valley" on the way toward the Rainbow Bridge. The trip will begin and end by boat on Lake Powell. (Rated M-S)

[44] Kanab Canyon/Thunder River, Grand Canyon, Arizona—April 26–May 3. *Leader, Peter Curia, 1334 W. Willetta, Phoenix, AZ 85007. Cost: $190.* The scenery in this area is perhaps the best that the Grand Canyon offers to the off-trail adventurer. There's the expanse of the Esplanade, the redwall narrows of Jumpup, the usually muddy but always sinuous Kanab Creek, the sculptured floor in Scotty's Hollow, the murmur of Whispering Falls, and finally, the explosive headwaters of Thunder River. The terrain is difficult and there are no layover days, but the memories that go with you are forever. (Rated S)

[45] King Range Lost Coast and California Coastal Redwoods—April 28–May 4. *Leader, Bob Posner, 838 San Luis Rd., Berkeley, CA 94707. Cost: $145.* This Northern California backpack trip

includes majestic coastal redwoods, spring wildflowers, spectacular isolated beaches, and the sounds of surging surf and barking sea lions. Ocean angling, stream fishing, photography, birding, and exploring Spanish and Big flats are among the many pleasures of this trip. As a last-day option we may skirt No Pass Point and climb Chemise Mountain (2,598) for the magnificent views, or enjoy beachcombing and the meadows of Shelter Cove. (Rated L-M)

[46] Sierra San Pedro Martir, Baja California, Mexico—May 5–14. *Leader, Wes Reynolds, 4317 Santa Monica Ave., San Diego, CA 92107. Cost: $405.* This is the highest mountain range in Baja California. From Vallecitos, a grassy meadow with pines and aspens, we will pass through boulder-strewn rolling hills and arroyos, visiting the alpine meadows of La Encantada and La Grulla. There are also oak woodlands mixed with western slope chaparral and aspects of human history to be seen. On a layover day it may be possible to see both the Pacific Ocean and the Sea of Cortez from a nearby peak. Two nights in Mexico will be at the Meling Guest Ranch in the chaparral-covered foothills of the Sierra San Pedro Martir. (Rated L-M)

[47] Nankoweap Canyon, Grand Canyon, Arizona—May 10–17. *Leader, Bert Fingerhut, 177 E. 79th St., #10, New York, NY 10021. Cost: $155.* This trip will explore the Nankoweap Canyon area located on the north side of the Colorado River, just downriver from Marble Canyon. While the terrain is difficult and off-trail hiking will be encountered, total mileage is not high and we will have ample time to explore side canyons and Anasazi ruins. We will probably spend at least two nights along the Colorado River. (Rated S)

[48] Snowbird Wild Area, Nantahala Forest, North Carolina—May 17–24. *Leader, Bob Temple, 8357 Four Worlds Dr., #7, Cincinnati, OH 45231. Cost: $240.* Participants in this leisurely late-spring trip will explore the swift-flowing streams, ridges, and high meadows around Big Snowbird Creek—the last native brown trout stream. This rugged, remote area just south of the Great Smokies was once the refuge of the Cherokees who escaped forced relocation to Oklahoma in 1836. We will cover 22 trail miles with plenty of time for another ten miles of optional dayhiking, swimming, enjoying

Deep snow and shadows—a perfect day.

the wildflowers, and relaxing. This trip is suitable for novices. (Rated L)

[49] Fish and Owl Creek Canyons, San Juan Resource Area, Utah—May 25–31. *Leader, Pete Nelson, 5906 Dirac St., San Diego, CA 92122. Cost: $255.* The Fish Creek–Owl Creek canyons near Natural Bridges National Monument cut deeply through Cedar Mesa sandstone. Cliff-dwelling ruins remain from once-numerous Anasazi settlements. Springs, cool pools with small fish, and flowing streams intersperse with dry canyon sections. We will travel cross-country into and along the bottom of deep (500-foot), narrow, scenic canyons, climbing around short sections blocked by rockfall or pour-offs. The 20-plus-mile trip distance permits us to climb to cliff dwellings and natural arches and to explore side canyons. (Rated L)

SERVICE TRIPS

[50] Superstition Wilderness Cleanup, Arizona—March 16–23. *Leader, John Ricker, 2610 N. 3rd St., Phoenix, AZ 85004. Cost: $90.* The Superstition Wilderness, situated 50 miles from Phoenix, is one of the oldest wilderness areas. It is composed of three rugged mountain ranges from lower Sonoran desert to pine-clad peaks. In the spring-time wildflowers and blooming cactus abound, streams are running, and the nights are cool and the days warm. Several thousand acres have recently been added to the wilderness. Our cleanup trip will be in this new area, tearing down fences and cleaning up after demolition of farm buildings. If there isn't enough to do we may build or repair some trail. There will be ample time to explore the region, climb a few peaks, or hike through Haunted Canyon.

[51] Alder Creek Trail Project, Four Peaks Wilderness, Tonto Forest, Arizona—March 29–April 5. *Leader, Rod Ricker, P.O. Box 807, Cottonwood, AZ 86326. Cost: $90.* Alder Creek is the principal drainage of a lush basin formed by the 7,600-foot Four Peaks. The trail follows the creek from the wilderness approximately 15 miles to Apache Lake of the Salt River. We will be working the middle section of the trail, having worked the upper and lower sections in past years. Our camp will be at 4,000 feet (with the roadhead at 6,000 feet), about 40 miles east of Phoenix.

[52] Red Rock Trail Maintenance, Coconino Forest, Arizona—April 27–May 3. *Leader, Jim Ricker, 525 S. Elden, Flagstaff, AZ 86001. Cost: $90.* This will be our fifth anniversary trip to the spectacular Red Rock country. The trails in this land of sandstone canyons and pine-covered mountains are in much need of repair. This year's trip will return to Dry Creek Basin at elevations of 4,800 to 6,600 feet. We will work every other day and there will be ample time to explore, take photographs, or just soak up the beauty of the wilderness. Expect warm days in the lower elevations with a chance of snow higher up.

[53] Owyhee River Cleanup, Oregon—May 28–June 1. *Leader, c/o Bill Gifford, 3512 NE Davis, Portland, OR 97232. Cost: $200.* We will help maintain the pristine beauty of this remote area as we follow the Owyhee through a series of dramatic canyons. The river offers superb whitewater and geography that will remind you of the Grand Canyon. Our work will consist primarily of removing trash, debris, and excess fire circles. No prior rafting experience is necessary, only a willingness to work and a love of the wilderness. Our guides will provide all river gear and instruction in rowing.

SKI TRIPS

[396] Adirondack Ski Tour, New York—February 2–7. *Leader, Walter Blank, RD*

1, Box 85, Ghent, NY 12075. Cost: $335. This trip takes us through the heart of the Adirondack forest preserve with a different destination each night. We traverse hidden valleys, ski through high mountain passes, and cross frozen wilderness lakes. Some of the scenery is the most spectacular in the eastern United States. Your baggage will be transported for you from inn to inn. The trip leader is a certified Nordic instructor.

[397] Zealand Valley Cross-Country Ski, White Mountains, New Hampshire—February 15–19. *Leaders, Craig Caldwell and Jeanne Blauner, 12028 Gaylord Dr., Cincinnati, OH 45240. Cost: $275.* North of Franconia and Crawford notches, the Zealand Valley provides outstanding cross-country touring. We can visit iced-over Thoreau Falls, climb Mt. Hale or Zeacliffs for the long winter views, and ski across the beaver ponds and through groves of white birches. Without city lights nearby, we should have good views of Halley's Comet. We'll make our plans each day when we leave our lodging at AMC's Zealand Hut. Day one is tough: seven miles with full packs. Thereafter the trip is moderate with strenuous options. Skiers should be of intermediate level with experience off groomed tracks.

[380] Dog Sled Ski Tour, Kenai Peninsula, Alaska—March 3–13. *Leaders, Beverly and Les Wilson, 570 Woodmont Ave., Berkeley, CA 94708. Cost: $890.* The Kenai Peninsula juts into the Gulf of Alaska south of Anchorage and offers a relatively mild winter climate. The western part is a lake-covered plain supporting a large population of moose and several wolf packs. The Kenai Mountains rise on the eastern edge, their tops barely projecting through the Harding Icefield, from which icefalls tumble 5,000 feet into the sea. Two dog teams will pull our gear as we ski up onto the icecap, north among the peaks of the Kenai range, and then down the glaciers and westward across the moose range. Possible air-charter expense not included in trip price.

[54] Backcountry Ski Tour, Little Lakes Valley, Inyo Forest, Sierra—March 22–29. *Leader, Bob Paul, 13017 Caminito Mar Villa, Del Mar, CA 92014. Cost: $490.* We will spend a week exploring the grandeur of the Sierra wilderness in winter. From a comfortable base camp, we will day-ski into alpine areas surrounded by 12,000-foot peaks. The trip is moderately strenuous; we will ski with loaded backpacks only into and out of our base camp hut. Skiers should have beginning-to-intermediate skills with some experience in off-track travel. Expect lots of snow and good skiing.

[55] Crater Lake Cross-Country Ski Tour, Oregon—April 6–12. *Leader, Marriner Orum, 2389 Floral Hill Dr., Eugene, OR 97403. Cost: $215.* Crater Lake National Park has an average yearly snowfall of 50 feet and offers outstanding spring ski touring with views of the lake's deep-blue water, cornice-topped cliffs on the crater's rim, and the mountains of southern Oregon. The first three days will be spent touring from a base camp. We will come out for a night in a lodge, and then spend four days on the 38-mile tour around the lake. Skiers must have intermediate skills and backpacking experience. This trip will be moderately strenuous.

[56] Three Sisters Wilderness Area Ski Tour, Oregon—May 11–17. *Leader, Tim Odell, 750 W. Broadway, Eugene, OR 97402. Cost: $180.* The Three Sisters are volcanoes. They are all over 10,000 feet and at least a dozen active glaciers cover their slopes. We will ski about 40 miles with our packs, crossing between the South and Middle Sisters, then circling back around the North. On our two layover days we can ski the open bowls above timberline, with views extending the length of Oregon and beyond. Skiers must have intermediate skills and backpacking experience. This will be a strenuous trip.

WATER TRIPS

[395] Baja Whalewatching, Magdalena Bay, Mexico—January 25–February 1. *Trip Coordinator, Wheaton Smith, 243 Ely Pl., Palo Alto, CA 94306. Cost: $1,105.* On this trip we will explore one of the three great calving and breeding areas of the California gray whale. Our mobile exploration base will be the 80-foot *Don Jose*, which we will board at the bay, avoiding the long sea voyage down the coast. From this base and its smaller skiffs we can hear whales breathe and watch them spyhop, breach, and fluke. Miles of mangrove channels provide excellent birdwatching opportunities. There will be time to hike in the giant rolling sand dunes that separate the bay from the Pacific Ocean, and to enjoy miles of isolated beaches. The trip price is from La Paz, Mexico.

[57] Gila River Raft and Class III Canoe Trip, New Mexico—March 23–29. *Leader, John Buchser, 606 Alto St., Santa Fe, NM 87501. Cost: $230.* Catching the peak spring runoff, we will experience the Gila River wilderness, whitewater, and possible snowstorms. We start at the forks of the Gila, run through about 50 miles of wilderness, and take out at Mogollon Creek. There will be at least one side trip to Turkey Creek Hot Springs. Acceptance of trip members will lean toward those with experience in whitewater, Class III canoeing (with flotation), and severe wilderness conditions. This will be primarily a row/paddle-it-yourself trip; however, outfitters could be arranged to take participants (at additional cost). Canoes, rafts, and other equipment can be obtained locally for those traveling too far to bring their own equipment.

[58] Dismal Swamp Canoe Base Camp, Virginia/North Carolina—March 23–29. *Leader, Connie Thomas, 128 Muriel St., Ithaca, NY 14850. Cost: $190.* Southward from Norfolk, Virginia, into North Carolina, the Great Dismal Swamp comprises an area of lowlands, lakes, and rivers fed by tributaries of swamp origin. The swamp isn't really "dismal," and we should see or hear spring warblers and other birds, frogs, snakes, and budding flora while beating 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 that participants have some previous canoe experience.

[398] Sea Kayaking, Baja—March 29–April 5. *Trip Coordinator, Kurt Menning, 997 Lakeshire Ct., San Jose, CA 95126. Cost: $730.* Kayak the Sea of Cortez along the Baja Peninsula between La Paz and Loreto, visiting offshore islands, isolated beaches, and remote *ranchos*. Opportunities abound for hiking, beachcombing, birdwatching, and exploring. The trip is designed for beginning as well as experienced paddlers. Expert instruction will be given and a safety support boat will

accompany us. This cruise offers an ideal experience with the sea kayak, unique in its agility and closeness to the sea.

[59] Salt River Raft Trip, Tonto Forest, Arizona—May 4–10. *Leader, Nancy Wahl, 325 Oro Valley Dr., Tucson, AZ 85704. Cost: $240.* Discover one of Arizona's best-kept secrets—the inner reaches of the Salt River Canyon. Enjoy six days on this beautiful and exciting river. Starting on the Apache Indian reservation, we will combine oar and paddle rafts to negotiate the many Class III and Class IV rapids. The trip will be leisurely paced, allowing plenty of time for hiking and exploring. Traveling down the river through the Sonoran desert means warm weather and possibly some desert flowers in bloom. Minimum age 13.

[60] Owyhee River "Row-It-Yourself" Raft Trip, Oregon—May 11–15. *Trip Coordinator, c/o Bill Gifford, 3512 NE Davis, Portland, OR 97232. Cost: $395.* Flowing through a series of dramatic high-desert canyons in southeast Oregon, the Owyhee offers superb whitewater and continually changing geography reminiscent of the Grand Canyon. This is true wilderness, perhaps the most remote river trip in Oregon. The river is on the Pacific flyway and is a birdwatcher's paradise. This trip is ideal for the beginning or intermediate rafter, and no rafting experience is necessary. Instruction in rowing and all river gear are provided. A geologist who has studied the area will accompany us.

[61] Birds of Prey Raft Trip, Snake River, Idaho—May 18–22. *Trip Coordinator, Robin Dunitz, 1015 Gayley Ave., #1050, Los Angeles, CA 90024. Cost: $615.* On this distinctive trip, we float through the Birds of Prey Natural Area on the Snake River. The area features the highest density of nesting raptors—prairie falcons, golden eagles, kestrels, hawks, and owls—in North America. Birding enthusiasts can observe and photograph these raptors as they court, mate, and fledge their young. Wildflowers are abundant and nesting is at its most vigorous at this time of year.

[62] Rogue River Raft and Lodges, Oregon—May 19–23. *Trip Coordinator, Mark Minnis, 410 NW "E" St., Grants Pass, OR 97526. Cost: $660.* Raft the Wild and Scenic Rogue River while staying in wilderness lodges with all the comforts of

Scott W. Wood

Nova Scotia canoe trip.

home. We will spend five days on the Rogue in oar boats led by experienced river guides. Each night will be spent in a wilderness lodge with home-cooked, family-style meals, clean beds, and hot showers. We will layover at Half Moon Bar and enjoy the awakening of spring. A naturalist will lead field trips to discuss the flora and fauna of the canyon. We hope to have a chance to hear the drumming of the ruffed grouse in the splendor of the Wild Rogue Wilderness.

[63] Upper Owyhee Raft, Idaho—May 19–25. *Trip Coordinator, Tris Coffin, 2010 Yampa Dr., Prescott, AZ 86301. Cost: $895.* Remote and flowing through a virtual wildlife sanctuary, this river is for those seeking solitude and desert canyon beauty. Thousand-foot canyons contain bighorn sheep, golden eagle, and waterfowl. Classified a wild river, only one launch is allowed per day. Demanding rapids and at least one portage have kept most away from this dramatic landscape that resembles the Grand Canyon. Minimum age 15. The trip starts and ends in Boise, Idaho.

[64] Grand Canyon Oar, Arizona—May 26–June 6. *Trip Coordinator, Ruth Dyche, 2747 Kring Dr., San Jose, CA 95125. Cost: $1,315.* The Colorado River, one of the greatest whitewater rivers in the world, provides an unforgettable experience for those who travel its 225 miles by oar-powered raft. Each of our rafts will carry three or four passengers and a professional oarsman. The quiet and natural flow of the rafts will allow us to fully appreciate the character and solitude of the canyon. We will stop frequently to study and explore features and creatures often missed on commercial trips. Minimum age 15 (18 solo). Cost includes round-trip transportation from Flagstaff, Arizona.

[65] Three Wild Rivers, California—June 3–7. *Leader, Kurt Menning, 997 Lakeshire Ct., San Jose, CA 95126. Cost: $505.* Thrill to this intensive Northern California whitewater experience on a sampling of three rivers, scheduled according to safe water levels. Professional river guides will take you for one day on the upper Sacramento, one day each on the upper Scott and the Scott Gorge run, and two days on the California Salmon. Base camps will be sited at Indian Scotty on the Scott and Oak Bottom on the Salmon. Previous rafting experience is desirable but not mandatory for the strong and brave.

FOREIGN TRIPS

[660] Kenya-Tanzania Wildlife Safari—December 28–January 16. *Leaders, Ruth and Jim DeMartini, 947 Lochness Ct., Fort Collins, CO 80524. Cost: $2,640.* Experience the natural wonders of East Africa by Land-Rover and on foot during the finest season of the year. This adventure safari will explore the alpine beauty of Mt. Kenya, the birds of the Great Rift Valley, and the incredible number and diversity of plains game and predators on the Serengeti Plains. We'll photograph wildlife in Ngorongoro Crater, view footsteps of ancient man at Olduvai Gorge, visit Masai villages, and tour the slopes of Mt. Kilimanjaro. We'll travel off the beaten path, spend a few days backpacking, and spend most nights in tented camps.

[665] Australia, Land of the Sun—December 30–January 19. *Leader, Kent Erskine, 272 Orange Ave., Ashland, OR 97520. Cost: $1,850.* We'll experience Australia as others rarely do: from the islands of the Great Barrier Reef through the lush coastal forests, along beautiful river valleys, and over the crest to the interior. This trip offers a range of exciting activities: a night at a sea-turtle nesting beach, a tropical river trip, visits to critical habitats to see unusual wildlife, and sojourns in Australian cities. Travel by boat, train, plane, and (most enjoyably) by

foot will bring us closer to this fabulous land.

[670] Bio-Bio River Run, Chile—December 21–January 3. *Leader, Blaine LeCheminant, 1857 Via Barrett, San Lorenzo, CA 94580. Cost: $2,335.* A clear, crisp course that cascades almost continuously, the Bio-Bio is Chile's largest river. Tumbling down the steep western slope of the Andes through the "Switzerland of South America," it surpasses all American rivers in raw beauty and powerful rapids. It seems the dream river actualized: clear, clean water, hot springs, an active volcano, tributary waterfalls, glaciers, unbelievable panoramas, alpine lakes, and summer weather. Look south to the Bio-Bio.

[675] Cross-Country Skiing in the Austrian Alps—January 5–19. *Leader, Anneliese Lass-Roth, 712 Taylor Ave., Alameda, CA 94501. Cost: $1,050.* We will spend 15 days cross-country skiing in the "Heart of Europe," Austria. This trip is designed for beginners and intermediates. Previous ski experience is not necessary. Accommodations will be in comfortable hotels. Trip price also includes equipment rental and cross-country ski instruction by a certified Nordic ski instructor.

[680] New Zealand, Featuring Fiordland—March 7–30. *Leader, Vicky Hoover, P.O. Box 723, Livermore, CA 94550. Cost: $1,660.* We will explore several of the South Island's spectacular fiords and mountain areas via three backpack jaunts between huts. Car-camping intervals plus auxiliary boat and air travel will help us to sample the remarkable variety of scenery Down Under. The last week of this 23-day outing will take us by ferry to the North Island and will include tramping in remote Urewera National Park. Leader approval required.

[685] Langtang Trek, Nepal—March 17–April 12. *Leader, John Garcia, 124 Romero Circle, Alamo, CA 94507. Cost: $1,285.* Just south of Tibet is Nepal's famous Langtang National Park, site of this moderate 22-day full-service trek. The trek will feature rhododendrons in bloom, Yosemite-like waterfalls and rock formations, glaciers, alpine lakes, yaks, local cheese factories, and of course, the very hospitable Nepalese people. Elevations will range from 2,000 to 15,000 feet. Leader approval required.

[687] Beginning Ski Touring, Austria—March 30–April 13. *Leader, Wayne R. Woodruff, P.O. Box 614, Livermore, CA 94550. Cost: $1,320.* This trip offers beginning instruction on ski-touring techniques and equipment, followed by easy ski tours and peak climbing away from the lifts of the Montafon Valley of western Austria. During our first week in Schruns, our training will be off the groomed runs at nearby ski areas. The second week we will stay at an alpine hut with our instructors, high in the Alps below Silvrettahorn and the Grosslitzner. There will be many opportunities for tours in the area, including a tour over the pass to Klosters, Switzerland. Ski-touring equipment is included in the trip price. The trip will be moderate; intermediate downhill skiing ability and leader approval are required.

[690] Manaslu Circle Trek, Nepal—April 21–May 24. *Leader, Pete Owens, 117 E. Santa Inez, San Mateo, CA 94401. Cost: $1,235.* Manaslu, one of the world's greatest peaks at 26,660 feet, can be circled to the north by crossing the 17,100-foot pass Larkya La. Following the Buri Gandaki, the Dudh Khola, and the Marsyandi Khola, this extended trek passes very near the Tibetan border. We will cross spectacular terrain and visit villages and *gompas* along the way. This is an economy trek.

[700] Leisure Bike and Hike in Holland—May 1–13. *Leader, Thelma Rubin, 899 Hillside, Albany, CA 94706. Cost: $1,330.* Take a leisurely bike tour in Holland at tulip time. We'll see monumental dikes protecting Holland from the sea and visit little villages, big cities, castles, and caves—all set in a variety of landscapes. Our first stop is Amsterdam. After a few days we will transfer to Arnhem, where we will make a loop biking into Germany and back to Arnhem, crossing the Rhine several times by ferry. We will then bus to Maastricht, the oldest city in the Netherlands with its architectural masterpieces from Roman and Renaissance periods. Six days will be spent biking 30–45 miles per day. Seven days will be spent walking. The terrain is essentially flat. Bicycles will be provided, and a sagwagon will carry our luggage. Leader approval required.

[705] Walking in the West Country and Lake District, England—May 10–24. *Leader, Dick Terwilliger, 7339 Pinecastle Rd., Falls Church, VA 22043. Cost: $1,105.* Staying in a different guesthouse for each of two weeks, we will be dayhiking in two of England's most interesting walking regions. The first week's hiking will be in Cornwall, the extreme southwestern part of England. A peninsula dominated by a spectacular coastline, Cornwall provides some of the finest scenery in all of England. Our base will be the town of Penzance, famed for its equable climate and spring flowers. In the second week we move to the northwestern county of Cumbria, an area of moors, fells, lakes, and waterfalls. Our footpaths and hiking routes will take us through some of the best walking country in Lake District National Park, England's largest park and ideal countryside for hikers of all calibers.

[715] The Mountains of Portugal for Walking and Hiking—May 25–June 14. *Leaders, Mildred and Tony Look, 411 Los Ninos Way, Los Altos, CA 94022. Cost: $2,055.* Ten major mountain ranges rising from 4,500 feet to the Serra da Estrola at 6,500 feet separate the deep river valleys that rise near the Spanish border. The walks and hikes in and around these mountain ranges take place in oak, pine, and fir woodlands. These hikes can be as moderate or strenuous as desired. Photography, nature study (including spring wildflowers), and historic interpretations will be an important part of our itinerary. Traveling in passenger vans, our route will be north and east of Lisbon. A valuable addition to the trip will be the Portuguese guide who will travel with our party.

[720] Peru: Land of the Inca—May 25–June 16. *Leader, David Horsley, 4285 Gilbert St., Oakland, CA 94611. Cost: $2,015.* This 23-day adventure is designed to give us a full experience of Peru, from past to present. It will offer sightseeing in the cities of Lima, Cuzco, and Huaraz, trekking through the magnificent mountain scenery of the Cordilla Blanca with peaks towering over 20,000 feet, and exploring extraordinary Inca ruins at Machu Picchu, Pisac, and Ollantayambo. We also plan a thrilling whitewater raft trip on the Urubamba River (through the "Sacred Valley of the Incas"), aerial viewing of the mysterious archaeological "Nazca Lines," and a visit by boat to the incredible seabird colonies on the Ballestes Islands. This unforgettable experience of the Peruvian people and country will prove to be richly rewarding.

Reservation & 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

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.

Before November 18 clip coupon and mail to:
Sierra Club Outing Department
530 Bush St., San Francisco, CA 94108

After November 18 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.**

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

Note: For foreign trips, the days before departure are counted in the time zone of the trip departure point.

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.

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.

Time or Event of Cancellation	Amount forfeited per person	Amounted 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

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. Except for foreign outings, cost 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. 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.

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 after November 18 to:
Sierra Club Outing Department
730 Polk St., San Francisco, CA 94109
(415) 776-2211

A Giant Stockingful of Children's Books

Nature Stories and Studies for All Ages

LINDA SPARROWE

These lesser mouse lemurs are but one example of the extraordinary appeal and quality of Large as Life, *illustrated by Kenneth Lilly and written by Joanna Cole (Knopf, 1985). The two large-format volumes ($9.95 each) depict both daytime and nighttime animals in their actual sizes. At first Lilly's illustrations garner all the (well-deserved) attention. Then slowly it sinks in: The tiny penguin, frog, owl, or antelope is actually no bigger in life than it appears on the page—what you see is what you get. Nature notes at the back of each book give detailed information about the various animals.*

DO YOU REALLY WANT to add one more model airplane or baby doll to the seemingly endless supply at the bottom of your children's toybox this holiday season? Consider books instead: They come in all shapes and sizes, cater to every age group, and address every imaginable topic. A well-chosen book can bring adventure and enjoyment to children of all ages with each rereading.

Many publishers of books for pre-preschoolers have found that a book can be educational as well as fun to look at when it combines bold, creative illustrations with carefully selected words. (Of course, it helps that very young children are always eager to learn about everything around them.) Take Grosset & Dunlap's "First Look Nature Book" series for the very young "reader" as an example. Each of these brightly illustrated board books ($2.95 apiece) by Hargrave Hands, as informative as they are indestructible, focuses on a baby animal that ventures away from its mother and explores its immediate surroundings for the first time. As a child finds out about a particular animal and its family, he or she learns in the process to recognize other insects and animals—turtles, snails, butterflies, and grasshoppers—in their natural habitats.

Youngsters who have graduated to books

with real pages will enjoy *A Children's Zoo* (Greenwillow Books, 105 Madison Ave., New York, NY 10016; $11.75), by Tana Hoban, an award-winning photographer and filmmaker. Hoban's collection of color photographs is a warm invitation to visit several well-loved zoo animals—the comical penguin, a languishing lion, gawky giraffes, and the sweetest, softest-looking panda bear imaginable. Juxtaposed with the photographs are three short descriptive words in bold white type against a shiny black background, followed by the name of the animal. Using these words, very young children can identify and describe each animal and then add descriptive words of their own, while the pictures can be used as vehicles for older children's creative writing projects.

In a guessing game for young—and not so young—nature enthusiasts, the question is *Whose Footprints?* This book, by Masayuki Yabuuchi (Philomel Books, 51 Madison Ave., New York, NY 10010; $8.95), provides a first lesson in natural adaptation. What does a footprint reveal about its owner? For example, we learn that the hippo's fat, flat feet actually prevent its massive body from sinking into the mud. Yabuuchi's simple text and clear paintings provide a stepping stone to further discussions about animals and their environments.

Owl in the Garden, by Berniece Freschet (Lothrop, Lee & Shepard Books, 105 Madison Ave., New York, NY 10016; $11.75), is a nature book that is also a simple but clever mystery story for younger readers and listeners. Two aspects of this fresh, upbeat book set it apart from many others. The first is the wonderful watercolor paintings by Carol Newsom that invite the reader personally into the garden; the other is the way Freschet gently anthropomorphizes each character.

Alfred Knopf has teamed with Sierra Club Books to publish the "Growing Up" series, a group of good "read aloud" books written by Derek Hall and illustrated by John Butler. The newest titles in this series of six are *Elephant Bathes*, *Gorilla Builds*, and *Polar Bear Leaps* ($4.95 each). In less than 20 pages children learn about the antics of very young animals: the elephant who sticks his nose where it doesn't belong and angers a nest of hornets, or the gorilla who tries to emulate his father by building a nest in a tree. (Unfortunately, the tree is a sapling, and it collapses, gorilla and all.) Then there is the polar bear stranded on a floating iceberg who must leap to safety before it's too late. Each baby displays its playful and inquisitive nature in an endearing way. Three previously published titles in this series are *Tiger Runs*, *Panda Climbs*, and *Otter Swims*.

Random House also has a nature series, called Early Bird Books. Of particular interest are the "Animal World" books in the series: *The Elephant*, *The Lion*, *The Giraffe*, and *The Chimpanzee* ($1.95 each). Designed for an older audience than the Knopf/Sierra Club books aim at, the strength of the "Early Bird" titles is their potential as a resource tool for school reports. Each book contains descriptions of the animal's habitat, its hunting and eating methods, and its mating and parenting behavior. We get a well-written overview of the animal's daily life, once again in a very few pages. The drawings, unfortunately, are not particularly memorable, though in each case they adequately depict the animal.

Although *Professor Noah's Spaceship*, by Brian Wildsmith (Oxford University Press), was originally published in 1980, a paperback version out this year ($4.95) retains the brilliance of Wildsmith's illustrations. The story, designed to instruct preschool and elementary-school children about the horrors of air and water pollution, is told from the animals' point of view. Their forest is no longer fit to live in; their food is tainted; the air is so heavily polluted that the cheetah has trouble running, and sunlight can no longer penetrate. Even the pelican's eggs break when she tries to sit on them. The animals gather together to decide what to do. That's when they meet Professor Noah and his amazing spaceship and head off in search of a better world. Where they go and what they find makes for a surprising and hopeful ending. The pictures alone are worth the purchase price; the fact that we get food for thought is an extra boon.

Older elementary-school children and junior-high students will be interested in the array of scientific nature studies on the market. *Koko's Kitten*, by Francine Patterson (Scholastic Books, $9.95), is an irresistible book about Koko, a lowland gorilla with a 500-word sign-language vocabulary, and a tiny tabby kitten named All Ball. In the preface Dr. Patterson, Koko's "mother" and trainer, reveals the history of her 14-year involvement with the gorilla, confessing that nothing quite prepared her for how Koko reacted when a small, gray, tailless kitten came to live with them. The remainder of the book, told in both Patterson's and Koko's (!) words, describes the relationship between All Ball and Koko, All Ball's death, and the arrival of a new kitten. Photographs show Koko bottle-feeding All Ball, tickling her, and tucking her into her thigh as if she were a baby gorilla. The most astounding photo of them all is of Koko's painting of the kitten.

Wallaby Creek, by Joyce Powzyk (Lothrop, Lee & Shepard, $11.75), is a case study

of a different sort. Unlike *Koko's Kitten*, this book doesn't focus on one animal, and its author is not a scientist or an animal expert. A watercolor painter with a strong interest in the outdoors, her several weeks in the Australian outback resulted in a collection of beautiful paintings of the birds and animals indigenous to Wallaby Creek. Accompanying each painting—whether it be of a kookaburra, a wallaby, or a possum—is an essay describing how Powzyk came upon the animal, what particularly intrigued her about its habits, or even how it reacted to her presence. All of her descriptions are done with an eye toward color, movement, and the relationship between an animal and its environment.

We Watch Squirrels, by Ada and Frank Graham (Dodd, Mead, $9.95), is aimed at the reader 7 to 10 years of age. Read it before going to the park: It will explain all the things you are likely to see a squirrel do, season by season, and why it behaves the way it does. Take it with you on your walk and it will help you discover the squirrels' hiding places, how best to feed these creatures, and how to tell when they are angry or frightened. The illustrations by D. D. Tyler depict squirrels' footprints, their nests, and their offspring. The book is a great addition to a child's nature library.

Lemurs, by Norman D. Anderson and Walter R. Brown, another Skylight Book from Dodd, Mead ($9.95), is a good example of how to use a book to advertise the plight of an endangered species. This gentle and unusual relative of the ape and monkey is dying out as the dense forests of its only home—Madagascar—are being cut down for farmland. Less than half of all the different kinds of lemurs still exist today; at least 20 varieties are extinct. Thanks to the work being done by scientists at Duke University's Primate Center (where the largest number of lemurs outside Madagascar live), there's hope that this interesting and beautiful animal will be able to survive—albeit in captivity. Anderson and Brown introduce us to a variety of lemurs, both in the wild and at the Primate Center. Chapters describing lemurs' eating, mating, and grooming habits are highlighted with handsome color photographs.

Two other examples of in-depth animal-study books are *Alligator*, by Jack Denton Scott and Ozzie Sweet, and *America's Bald Eagle*, by Hope Ryden, both published by G.P. Putnam's Sons ($11.95 each). Like lemurs, alligators are also endangered species whose worst enemy is the human who uses their hides for belts, shoes, wallets, and purses. Scott and Sweet's account of this prehistoric reptile's hunting and nesting habits and mating behavior is interesting and thorough, although it's a pity Sweet's

black-and-white photographs weren't reproduced on better-quality paper. All in all, *Alligator* is a good resource book that does much to acquaint the young reader with the ways of this dragonlike creature and to dispel the myths that give it a bad reputation.

Author/naturalist/photographer Hope Ryden treats the elementary-school researcher to a fascinating account of our national symbol, the American bald eagle. After spending two springs and summers observing and photographing pairs of eagles caring for their young, Ryden is able to provide some rare pictures of eagles nesting, eagle chicks breaking out of their eggs, and a funny-looking eaglet whose sprouted "feather tubes" make it resemble a pincushion with an open beak. Ryden's text is clear and informative and, like the books on lemurs and alligators, will draw the attention of a youthful public to the plight of yet another endangered species.

Wolf of Shadows, by Whitley Strieber (Sierra Club/Knopf; $9.95), is about nuclear winter, destruction, and fear. It's also about hope and the will to survive. The story centers on a pack of wolves, most particularly on a male called Wolf of Shadows. After the nuclear bomb explodes, Wolf of Shadows meets a woman and her two children,one of whom has been badly burned and does not live long. The ensuing relationship between the humans and the wolves is one of mutual dependence. Whether or not this book is realistic—whether such a relationship could in fact ever develop—doesn't much matter. More important is the way this book can lead to discussions with your children about the insanity of nuclear war. Strieber, in an epilogue to the story, relates that his tale is based on research, conjecture, and Native American awareness of the ways of the wolf.

Finally, for that special gift for a preschooler or elementary-school child, give a subscription to *Zoobooks*, published ten times a year by Wildlife Education, Ltd. (P.O. Box 28870, San Diego, CA 92128; $14 for ten issues). Each magazine details the history and future of an animal (or group of animals), its bone structure, musculature, and anatomy, its eating habits and hunting instincts, and its method of giving birth to and caring for its young. The pictures and diagrams are as useful as they are beautiful, complete with informative captions. This is a present sure to please a young animal-lover all year 'round.

LINDA SPARROWE *teaches in the Hillsborough, Calif., school district.*

SAVING UTILITIES FROM THEMSELVES

FRYAR CALHOUN

Dynamos and Virgins, by David Roe. Random House, 1984. $18.95, cloth.

THE PLOT OF THIS Industrial Age David-and-Goliath story, set in San Francisco in the late 1970s and early '80s, is part thriller and part fairy tale. A handful of Environmental Defense Fund whiz kids—armed with a second-hand computer terminal, a couple of hand calculators, and some fresh ideas—duel the nation's largest utility to save California from more large nuclear power plants. Amazingly, the small band of heroes brings Pacific Gas & Electric to its knees. In the end the giant corporation gives up its elephantine projects, sheepishly admitting they weren't necessary after all.

Far-fetched? Not at all—it really happened. Though it's almost as entertaining as fiction, *Dynamos and Virgins* is the true story of one of the most significant environmental victories of the past couple of decades. This slender volume conveys an encouraging message for the environmental movement: In the struggle to save our planet, economic reality can be our ally.

Big power plants—nuclear, coal, even hydroelectric—no longer make good investments, but conservation, cogeneration, and other renewable energy sources often do. "Soft" energy saves hard cash, even in the short run.

The argument is not a new one; Amory Lovins and others have preached this gospel for years. The trick, however, is to persuade decisionmakers of its merits. Author David Roe, an environmental attorney, briefly tells one tale of successful persuasion by the organization he represented during years of hearings before the California Public Utilities Commission (PUC).

The Environmental Defense Fund (EDF) is a small coalition of lawyers, scientists, and economists that included 50 full-time employees and ran on an annual budget of only $2 million during the period covered by this book. Founded in 1967 by Long Island scientists opposed to the use of DDT, the organization filed the suit that ultimately led to the pesticide's ban. In the early 1970s the EDF's patient exposition of textbook economic theory helped convince the New York Public Service Commission to

eliminate bulk discounts for large electrical customers, a built-in encouragement to high use. The combination of technical and legal expertise brought to bear in these cases is typical of the EDF approach. The fund's briefs and testimony avoid standard environmental rhetoric, focusing instead on concrete, even mundane technical and legal problems with wide implications. The EDF's key argument against PG&E's proposed power plants never even mentioned the environment!

The EDF strategy in the PG&E case was conceived by attorney Tom Graff and economist Zach Willey. According to a one-page document they discovered in a 1976 "fishing expedition" at PG&E headquarters, the utility planned to quadruple its construction budget by spending $13 billion on ten mammoth nuclear and coal-burning plants over the next decade. It's a safe bet that if PG&E had taken the EDF seriously back then, the document would never have been made available, and without it the EDF might never have forced the utility—and the PUC—to face facts.

With the document in hand, Willey spent long days and nights at the EDF's Berkeley office developing an innovative computer program that would analyze the costs of PG&E's power-supply scenario and compare them to the costs of an alternative policy based on conservation, more efficient use of the existing system, and soft energy sources, especially cogeneration. Willey adopted a conservative point of view, concentrating on the utility's bottom line. He took PG&E's forecasts as givens, even though they exaggerated future power demand and underestimated coal and nuclear costs. He also made very conservative assumptions about how much electricity could be generated from alternative sources such as wind and geothermal steam.

But even with the dice loaded in favor of the utility's plans, Willey's analysis reached a surprising conclusion: If PG&E invested in conservation and alternative energy sources instead of the proposed new plants, the company would avoid huge construction costs and still meet demand, while consumers would pay lower electricity rates. But the bottom line was the clincher: *PG&E would make more money!*

According to Willey's "greenie," as the 125-page, green-bound typescript was nicknamed, the company would earn an additional $50 million a year in profits over the next decade, and its stockholders would receive higher returns on their shares. Conservation and alternative energy weren't pie-in-the-sky fantasies of featherheaded environmentalists; they were simply good business policies. Armed with the "greenie," environmentalists were miraculously

transformed into hard-nosed efficiency experts, while utility officials were caught with their heads in the clouds—or the smog.

Thanks to his lucky discovery of the planning document (along with a few lines of proconservation sentiment slipped into a 1975 rate-increase decision by one of Gov. Jerry Brown's appointees), Graff found a legal toehold that allowed him to call the utility's plans to the attention of the PUC.

Persuading the commission to consider PG&E's construction plans was no easy matter. In the never-never land of utility law and practice, the past has been studied more extensively than the future. For example, in 1978, two years after the EDF entered the picture, Public Utilities Commission hearings on the PG&E case were still limited to discussion of the utility's plans as of 1976. What had actually happened in the intervening years was inadmissible, because utility hearings were almost always limited to data from a recent test year. Usually, by the time a new power plant was eligible for discussion, it was already in operation. So while the regulatory agencies constructed an elaborate case for whittling a few tens of millions of dollars off the utility's proposed rate increases—saving pennies for the individual consumer—nothing was done to analyze the company's plans to spend hundreds of millions, or even billions, on new plants that ratepayers would one day have to amortize. The alarming result was that utilities did not have to submit their long- and medium-range plans to public scrutiny. In fact, the PG&E case may have marked the first time that a major American utility ever had to disclose its future investment program.

During the ensuing hearings, a startling fact emerged: PG&E did not really engage in serious planning. What author Roe calls the "dynamo reflex" governed policymaking. First, decisions were made; then the utility's experts constructed elaborate cases to justify them. Each department had its projects, but there was no overall corporate planning, no balancing of resources against financing. As a PG&E official later admitted to Roe, "The notion in the company was to provide service and spend whatever it cost. In the company's mindset back then, capital wasn't a problem."

Capital *was* a problem, of course—more of a problem than American utilities, including PG&E, realized at the time, though Willey's testimony pointed out the dangers. Reacting to the rise in oil prices in the 1970s, and working with inflated assumptions of future demand, utilities across the country were planning a huge round of plant construction—investments that would seriously stretch their financial resources in the near future and drive some to the verge of

bankruptcy a few years later. In the privacy of their 32-story San Francisco headquarters, PG&E chieftains must secretly give thanks today that the EDF's timely intervention prevented their company from wandering too far down that path.

Not so at the start. The first time Willey appeared at a PUC hearing, the examiner didn't bother to read his prepared testimony. Eventually, though, the incisive reasoning of Willey's "greenie" had an impact. On several occasions EDF witnesses successfully defended it against the critiques of the industry's highest-priced computer guns. By the early 1980s tremors were being felt in PG&E's executive suites, and the utility quietly began to abandon its plans for the new nuclear and coal plants. Ultimately the company dropped all ten projects—not to protect the environment, but because the alternatives made better business sense.

PG&E's shift in policy was accompanied by an internal shakeup, including changes at the top and the organization of the company's first full-fledged planning department. Soon it became apparent that some lessons had indeed been learned. In March 1983 the utility announced a ten-year plan to add 5,000 megawatts of electrical capacity from conservation, cogeneration, load management, wind, geothermal, and so on—but not one new watt from nuclear or coal. In contrast, PG&E's abandoned plan for expansion called for nearly $2 billion to be spent on nuclear plants in 1984 alone.

The EDF's case was revolutionary in more ways than one. It not only showed utility executives how to make money and spare the environment; it also helped change the terms of the national energy debate—a welcome development that deserves to be more widely recognized. The question is not whether growth will occur, but how it will be dealt with—and bigger is not necessarily better. (Just ask the American utility companies that invested so heavily in nuclear plants in response to the oil crisis of the 1970s).

Although this happy story offers solid grounds for optimism, persuading the powerful has not been easy. The EDF ultimately triumphed in California, but has not overcome the reluctance of regulatory commissons in other states, including Arkansas and New York. Few utilities around the country have adopted progressive policies. (Exceptions include New England Electric, Southern California Edison, and—belatedly, and with reservations—PG&E.) Most remain hostile to alternative energy, skeptical about conservation, and committed to an expensive advertising campaign favoring large-scale nuclear and coal plants. Obviously, much work remains to be done. But Zach Willey, Tom Graff, David Roe, and their EDF colleagues have fashioned the tools and pointed out the way.

FRYAR CALHOUN, *a writer in Berkeley, Calif., is co-author of* California Whitewater, *reviewed in the March/April 1985* Sierra.

WEALTH NOT LOCKED AWAY

JOHN ALDEN

Wilderness Mineral Potential: Assessment of Mineral Resource Potential in U.S. Forest Service Lands Studied 1964–1984, edited by S. P. Marsh, S. J. Kropschot, and R. G. Dickinson. U.S. Geological Survey Professional Paper 1300, 1984. $38 (two volumes), cloth.

CONSERVATIONISTS REJOICED in 1964 when the Wilderness Act was finally passed by Congress. However, the new law was not as strong as its authors had hoped it would be. It specifically stated that no new money would be appropriated to administer the wilderness areas the legis-

lation created. It offered no means for protecting potential wilderness on lands administered by the Bureau of Land Management (an omission Congress corrected in 1976), and included the threatening injunction, "Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established. . . ." Finally, the law listed several specific limitations on wilderness protection.

Each of these provisions is important. One is a grandfather clause allowing the established use of motorboats and aircraft to continue in otherwise inviolate areas. Another affirms the right of states to regulate water rights within national forest wildernesses, and allows grazing to continue on land where it has already been established. The most threatening exemptions, however, have to do with mining.

"Nothing in this Act shall prevent within national forest wilderness areas any activity, including prospecting, for the purpose of gathering information about mineral or other resources. . . ." Valid patented claims and mineral leases may be developed, and "facilities necessary in exploring, drilling, producing, mining, and processing operations, including where essential the use of mechanized ground or air equipment" are explicitly permitted.

Three limitations are placed on wilderness mining. First, the Secretary of Agriculture can establish "reasonable regulations" controlling access to mining operations. Second, miners must, "as near as practicable," restore the surface of the land to its original condition after their work is completed. Finally, after December 31, 1983, the lands of the wilderness system were to be closed to "all forms of appropriation under the mining laws" and all laws pertaining to mineral leasing.

In short, miners were given 20 years to do their dirty work. As long as they established valid claims or mineral leases before 1984, they would apparently be allowed to exploit lands that were otherwise protected. As if this weren't enough, the mining interests had wheedled one more prodevelopment position into the new law. So that no possible resource might be forgotten, every designated and potential national forest wilderness was to be periodically examined by the U.S. Geological Survey (USGS) and the results of their studies made public.

These surveys have been appearing for two decades, primarily in the USGS Bulletin series and as Open-File Reports. But their format is more useful to mining companies than to wilderness advocates, primarily because the reports are hard to find. They also vary so much in content that any effort to compile summary information has been virtually impossible. Fortunately, both prob-

lems have been obviated by the appearance of a two-volume summary of more than 300 individual surveys: USGS Professional Paper 1300, *Wilderness Mineral Potential*.

I say "fortunately" advisedly. The book appeared only days before the deadline for further claims, so it did not encourage any last-minute bursts of appropriation. But it gives wilderness advocates a valuable resource with which to answer the claim that wilderness designation is locking away the nation's mineral wealth. Indeed, the book reveals what much of the mining industry must have known all along: There is little to be gained from mining wilderness.

This conclusion is by no means official, for *Wilderness Mining Potential* contains no overall analysis of the data it discusses. It really couldn't: Geology, economics, and technology all influence evaluations of mineral resources, and the estimation of what is recoverable depends on factors beyond the merely mechanical. Still, after looking over the 332 summary articles and maps contained in these volumes, I can happily state that I saw no evidence that any wilderness should be opened for exploitation.

To begin with, approximately half the wilderness, primitive, and roadless areas examined by the USGS reveal no identifiable mineral resources. Some of these areas are small, but others are major blocks of land in western mining states. An additional 10 to 20 percent of the surveyed areas contain virtually nothing. A pocket of potential gold placer, a vein of low-grade flourite, or traces of copper mineralization might exist, but nothing resembling a significant mineral deposit.

North Carolina's Shining Rock Wilderness is a good example of this second kind of area. The survey report notes that "two commodities, quartz as a source of silica and gneiss and schist suitable for common building stone and crushed rock, are present in large quantities." It quickly adds, however, that such material is widely available elsewhere. Although the geologists mention such deposits, these reserves are in no way suitable for exploitation.

This leaves about 30 percent of the surveyed areas with some potential for genuine mineral resources. (Some areas, like Idaho's Gospel-Hump Wilderness, have not been examined.) These resources range from antimony to zinc, and include everything from sapphires to sand. But again, the great majority of deposits are too small to be economically attractive. Little pockets of ore may have grubstaked a few miners during the early years of this century, but they could not even produce enough to pay for restoring the land their extraction would damage. In most cases there are simply better places to dig.

This conclusion can be reached even without accounting for the wilderness and recreational values that mining would destroy. For example, a barite deposit in the Bob Marshall Wilderness could be mined, but "readily accessible barite resources occur in abundance elsewhere outside the wilderness." Deposits of peat, phosphate rock, iron, coal, low-grade mineral ores, and virtually all of the listed gold deposits fall into the same classification. Weekend "recreational miners" may object, but let them entertain themselves somewhere outside of wilderness boundaries.

Still, if recreational values and rehabilitation costs are minimized, between 2 and 5 percent of the areas examined in *Wilderness Mineral Potential* do appear to contain significant deposits of recoverable minerals, mostly in wilderness study areas. Where wilderness values do not clearly outweigh the potential mineral value of lands being considered for wilderness designation, judicious adjustments to the boundaries of the proposed areas can eliminate most of the genuine conflicts. But where wilderness values are high, there can be no compromise.

John Alden is writing a history of the National Wilderness Preservation System.

Programmed for Disaster

DANNY TANNENBAUM

Wilderness: A Survival Adventure. Program and documentation by Titan Computer Products. Available from Electric Transit (501 Marin St., Suite 116, Thousand Oaks, CA 91360). Software for Apple II, II+, IIe, IIc; $49.95. Color monitor suggested.

It was only a matter of time. Now, through the wonders of modern technology, you can freeze to death in the wilderness only a few feet from your own fireplace.

Wilderness is a new interactive simulation capable of duplicating many of the experiences you might undergo while attempting to survive in the wilds. A carefully worked-out package of wilderness obstacles has been programmed to occur randomly, although a preparatory questionnaire enables you to vary the frequency of storms or wildlife encounters before your journey begins. Your physiological traits—pulse rate, sex, height, and weight—are also taken into account, so your adventures will accurately simulate the way real events would affect

your body. For example, if you're a large male, you may stand a better chance of surviving the charge of an attacking bear than would a small female—but your extra weight means you'd better carry more provisions in your backpack, and food can be dismayingly difficult to find at times.

The game (though the designers disdain that term) offers two scenarios. In the first, a plane crash leaves you stranded in an unknown location, from which point you must find a ranger station located at certain coordinates. Alternatively, you may elect to search for the "Lost City of Gold," said to be the repository of the riches of Croesus. The supplied journey disk and information-packed manual allow you to develop your survival skills in the Sierra Nevada. An optional disk gives you access to adventures in Bolivia, Chile, New Guinea, British Columbia, and Burma.

Among the program's capabilities is the generation of different topographical maps, so you needn't explore the same landscape twice. Topo reading becomes a valuable skill, because if you can find the symbolic representation on the map that corresponds to your view on the monitor, you will understand where you are—a valuable piece of information for anyone lost in the wilds. The arresting Pangraphics™ "three dimensional" graphics-generating system allows you a 360-degree view of your changing surroundings. Should you travel for an hour, the view will change to correspond to your new position; shadows on hillsides change with respect to the sun's angle and your point of view. Along with the topo maps, this is an immense aid to orientation and navigation. Employing both these tools, you can discern landmarks, observe the azimuth of the sun, and eventually determine the direction in which you must go to reach your destination before hunger, thirst, heat, cold, drowning, rattlesnakes, and a host of other difficulties do you in.

The astonishing number of variables and details, as well as the startling graphics system, make this game durable entertainment, challenging and reasonably realistic. The instruction manual emphasizes the program's educational possibilities, for it teaches the same skills needed in real-life wilderness outings. Games often take hours, even days to play, but you can save your journeys on disk and resume them at your convenience. And the program offers so many permutations that surprises will always be in the offing. Available for the moment only to those with Apple hardware, the program will be offered in an IBM-compatible format early next year. □

DANNY TANNENBAUM is a technical writer and editor based in Oakland, Calif.

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The OBSERVER

Inner City Outings

Recruiting Allies for the Environment

STEVE GRIFFITHS

Scrambling up a sand bank so fast their shadows are hard pressed to keep pace, these Inner City Outings participants revel in a day at the shore.

"TAKE YOUR TIME," the instructor urged Inner City Outings (ICO) leaders as they lined up at the start of the 20-foot-long "unnatural" trail, "and count all the things you see that don't naturally occur in this habitat."

Slowly, with eyes fixed on the nearby bushes and grass, the ICO leaders moved along the trail. The red Christmas ornament hanging in the bush was obvious, but the green rubber band and the penny, lying in the grass like camouflaged insects, were more difficult to spot. And how about the shell? Obviously, it didn't belong, at least not here in the Sierra Nevada; but how about the pinecone? Was it in its natural habitat?

"Five," whispered one ICO leader to instructor George Stroud as he reached the end of the trail. "Did I spot them all?"

Stroud smiled and declined to answer. "Wait until everyone's finished," he said.

Gradually the crowd at the end of the trail grew larger than the crowd at the start. Everyone compared their counts in hushed tones: "twelve," "sixteen," "nineteen."

No one spied all 20 of the items Stroud and Tom Skeele, both on the staff of the Yosemite Institute, had placed along the trail, but everyone learned a new way to promote environmental awareness among inner-city youngsters on their next trip to the wilderness.

Inner City Outings is the Sierra Club's community outreach program. Working in cooperation with community agencies, trained ICO leaders provide wilderness experience for disadvantaged urban youth, senior citizens, and the disabled. Outings might include dayhikes to nearby state parks, weekend backpacking trips to wilderness areas, snowcamping, whitewater rafting, canoeing, or rock climbing.

"What we are doing is creating allies for the environment," said ICO leader John Bowen of Stillwater, Okla., at the most recent biennial Skills Sharing Conference. By targeting special groups that would not otherwise have the opportunity to experience the wilderness, ICO leaders help broaden the Club's constituency, develop mutually rewarding relationships with community agencies and participants, and learn to appreciate the culture of the inner city.

Members of the ICO Subcommittee of the Club's National Outing Committee gather at the Skills Sharing Conference every two years to set program objectives, learn new skills, engage in problem solving, and share their accomplishments. The subcommittee is made up of the chairs of regional ICO groups (there are currently 16), and is headed by Suzanne Ortiz.

This year's conference was held the first weekend in August at the Club's Clair Tappaan Lodge in Norden, Calif., and was open to all ICO leaders. More than 40 attended, including Club members from Austin and Detroit interested in establishing ICO groups in their chapters.

The subcommittee met all day Friday, August 2. Those not on the subcommittee could either attend the meeting or join a hike led by former ICO leader George Zuni to nearby Loch Leven lakes. After dinner everyone gathered to see slides by photographer Philip Adam that will be used in a new ICO slide show. The environmental education workshop, a special feature of the conference, began Saturday morning and continued through noon on Sunday. And for those who didn't have to report to work Monday morning, there was an optional two-day rafting trip on the South Fork of the American River led by the river section of the San Francisco Bay ICO.

At this year's meeting the subcommittee set goals of broadening the national program, achieving greater visibility for the section both within and outside the Sierra Club, establishing a new system of leadership accountability and evaluation, assisting local ICO groups to sponsor regional conferences, preparing an information packet for schools interested in the program, developing by-laws, publishing a national newsletter, and completing the new ICO slide show.

Every year, ICO leaders conduct about 200 trips for more than 2,000 participants. The number and type of trips vary according to the size of each group, its resources, and the expertise of its leaders. Some groups provide leadership training. The San Francisco Bay ICO, for example, conducts intensive, thorough training sessions in backpacking, snowcamping, and whitewater rafting.

All ICO groups try to offer outings to a wide range of participants and community agencies. The Los Angeles ICO conducts trips for elementary school students, developmentally disabled young adults, emotionally disturbed adolescents, and adults recovering from mental illness. In addition, most ICO groups take each group of participants on more than one outing. The New York ICO leads a trip every six weeks for each of the community agencies it works with, beginning with dayhikes and progressing to backpacking, cross-country skiing, and canoeing. That way participants can experience the wilderness during all four seasons, develop an enhanced appreciation for the environment, and gradually acquire a set of backcountry skills.

ICO leaders in San Jose, Calif., have developed a unique relationship with their city's Alum Rock School District. Supported by a grant from the David and Lucille Packard Foundation, ICO leaders work with the Youth Science Institute, which offers environmental education workshops in the school district. Students who participate in the workshop may go on an ICO backpack trip to a nearby state park or to the Sierra Nevada, to experience firsthand what they have learned in the classroom.

Because many ICO leaders had expressed an interest in developing similar relationships with their local school systems and sharpening their environmental education skills, the subcommittee asked the Yosemite Institute to conduct a workshop at this year's conference. (The cost was underwritten by a grant from the Sierra Club Council.) A pioneer in the field of environmental education, the Yosemite Institute recently received the National Wildlife Federation's National Conservation Award in recognition of its work.

Workshop leaders Stroud and Skeele effectively covered a number of topics at the conference by practicing "learning by doing," with ICO leaders assuming the role of trip participants. The "unnatural trail"

(from J. B. Cornell's *Sharing Nature With Children*) was an exercise in sensory awareness, but it also prompted discussion of another important issue: how to keep kids from littering on wilderness trips.

"I tell participants that if they pick up someone else's discarded candy or gum wrapper, it gives them clout," said Skeele. "At the end of the trip those who have clout get a reward.

"Kids are fascinated by the junk people leave in the woods and where people tend to hide it," Skeele continued. "They enjoy looking for these spots, and get satisfaction from cleaning them up. Sometimes we pretend that garbage is all that's left of a bygone culture, and use it as clues to reconstruct what the culture must have been like.

"I always tell the kids that national parks and forests are *theirs*. This concept of ownership blows them away. We also talk about stewardship—using and enjoying these resources responsibly."

Stroud and Skeele pointed out that any trip to the wilderness provides many opportunities to illustrate ecological principles, stimulate environmental awareness, and clarify values. A "meadow stride," for example, helps youngsters become aware of the diversity in nature as well as the concept of natural succession. Participants count the number of plants in each of three square meters: one in a nearby forest, one in the meadow itself, and one on the edge of the two. Which area has the most plants, leaders ask, and why?

"Don't hesitate to use analogies to make your point," Skeele advised. "You can illustrate chemical and mechanical weathering processes by giving each of your trip participants a piece of hard candy. The way saliva acts on the candy is analogous to chemical weathering, and chewing is similar to the mechanical kind."

ICO leaders also learned some "initiative tasks" and "trust activities," which help instill confidence at both the individual and group levels. Although they can be conducted any time a group is together, these exercises are especially appropriate when the group needs a boost in morale.

One example of this type of exercise is the "energy squeeze." Participants stand in a circle, holding hands, and try to transmit a hand squeeze around the circle as fast as they can. The group can set a goal for itself and try to meet it. Forty ICO leaders were able to pass the squeeze in less than five seconds—but only after numerous attempts and a good deal of concentration.

"Teaching is like gardening," Stroud quoted from D. Cavagnaro at the conclusion of the workshop; "one learns that seeds once planted do not make instant trees. But someday there is shade and fruit,

and the world is made more gentle by their presence."

The Inner City Outings program has already begun to bear that fruit. Some former youth participants have assumed leadership roles in their Sierra Club chapters; others are majoring in ecology or recreation at colleges and universities. Many have become full-fledged ICO leaders. Through the program, the Sierra Club has succeeded in cultivating "allies for the environment."

STEVE GRIFFITHS *is the Sierra Club's Inner City Outings Coordinator.*

EXPLORING CORDELL BANK

ROBERT ROBINSON

IN 1977, WHILE STUDYING a chart of Northern California's coastline, physicist/diver Robert Schmieder became intrigued by an underwater mount 20 miles west of Point Reyes called Cordell Bank. The chart showed at least one shallow area, just 20 fathoms deep, that could be reached using regular scuba equipment. Schmieder assumed that it must have been dived on before, but when he talked to diving friends, he found that none of them had ever been there. After spending months talking with a number of public agencies and private organizations, Schmieder realized to his amazement that none of them knew much about the place. Before long he was obsessed with the idea of exploring Cordell Bank.

One group of people that did know the bank well were the fishermen in Bodega Bay, so Schmieder lined up a boat and skipper. He knew that exploration would require a large support group, so after extensive discussions with several of his regular diving partners, he announced his plans to the dive section of the Sierra Club's Loma Prieta Chapter in October 1977. The group elected a divemaster at an organizational meeting held at the Menlo Park, Calif., office of the U.S. Geological Survey, and nearly all of the 40 people in attendance pitched in $40 apiece to start the project rolling.

They expected many dangers. Deep diving is always hazardous, especially so with ordinary-air scuba because of the possibility of nitrogen narcosis and decompression problems. The group also knew that a cold, fairly stiff current—flowing at one or two knots—was common off Cordell Bank. To make matters worse, they expected to encounter lots of sharks, including great whites, which are frequent inhabitants of nearby waters.

After a few practice dives at Monterey and the Farallon Islands, Schmieder felt that his group was ready. But by this time many of the divers had dropped out of the group, and he had trouble gathering enough people together to make the voyage. Finally, on October 20, 1978, Schmieder made it to Cordell Bank with just five divers.

"What we saw on that day absolutely astonished us," he recalls. "We were totally unprepared for the level of light. Not only was it not dark, it was incredibly light. After I made the first dive with a buddy, I told the other divers not to take their lights, because they wouldn't need them. It was so light that you could almost read, and we were at a depth of about 150 feet!

"There was an enormous aggregate of 12-inch fish swimming around above the pinnacle," he continues. "When we finally broke through this on our way down, our entire field of vision was suddenly filled with a miraculous sight. We could see colors—

reds and oranges and yellows—and rocks were covered, inundated with organisms, sponges especially; strawberry anemone, pink hydrocoral, hydroids, and a lot of large-bladed algae. It looked as if someone had landscaped it. We were just overwhelmed." The team collected nearly 50 species on that dive, including at least one new genus and one new species of algae.

Since that first, member-supported dive, Cordell Bank Expeditions has evolved into a tax-exempt nonprofit research organization that carries out fieldwork and publishes the results in technical journals. Beginning in 1979, a series of grants from organizations such as the National Geographic Society, the Explorers Club, the San Francisco Foundation, and the National Oceanic and Atmospheric Administration (NOAA) has provided funding.

When they realized that available charts of Cordell Bank were hopelessly inadequate, group members bought a LORAN-C receiver and carried out surveys of the area, measuring depths and recording positions. This data enabled them to generate their own set of charts, which proved invaluable for locating specific dive sites on the mount's tiny pinnacles and ridges.

By working closely with professional biologists from the University of California at Berkeley, the California Academy of Sciences, the Los Angeles County Museum of Natural History, the U.S. Geological Survey, the Smithsonian Institution, and others, they have sorted and identified their biological collections, which now include about 450 species.

Schmieder's group took a big step forward last May when the NOAA carried out a full survey of Cordell Bank using state-of-the-art equipment. Schmieder and expedition member Bill Kruse were on board the 178-foot ship and were able to record raw data directly onto magnetic tape. Under contract with the NOAA, they have developed computer programs that will be useful to them in analyzing the data and generating topographic images.

Exploration has shown that the Cordell Bank seamount is roughly elliptical and about 9 miles long by 4½ miles wide at the 50-fathom depth. Its flat top rises to about 30 to 35 fathoms deep and is topped with many steep-sided ridges and pinnacles. Six distinct points distributed over the bank are accessible to divers. Lying right on the edge of the continental shelf, the plateau is the northernmost seamount of any significance between the United States and Canada.

One early discovery was the existence of a hitherto unknown ridge on the northeast side that reaches a relatively shallow depth of 18 fathoms or less. Growing on this peak is a dense cap of whitish barnacles and red

Cordell Banks Expeditions diver Tom Santilena surveys diving conditions and sets up a guide line near the end of a ridge. Sponges, strawberry anemone, and California hydrocoral dominate the seascape here at less than 135 feet down.

algae. Below this, from 20 to 25 fathoms, nearly foot-thick piles of sponges, anemones (including the common strawberry anemone), California hydrocoral, tunicates, and hydroids abound. The organisms are very brightly colored, with reds, yellows, whites, and pinks in profusion. At 30 fathoms the community thins to a few large, widely spaced sponges, urchins, and anemones. At 35 fathoms, algae-covered rock dominates the scene.

The California current brings clean, clear, cold water (50 to 55 degrees Fahrenheit) upwelling to the relatively shallow bank, and the sun's rays penetrate the water to a depth that allows divers to take photographs using available light at 25 fathoms. Visibility is normally greater than 60 feet, and sometimes more than 100 feet. Because of the water's clarity, photosynthesizing organisms support a vast and complex food web that includes invertebrates, fish, birds, and mammals.

Cordell Bank has long been known as a superb fishing area. Groups of rockfish congregate around the pinnacles so thickly sometimes that divers report white-out conditions. In addition to rockfish, sportfishermen regularly catch lingcod, yellowtail, salmon, albacore, and shark. Oddly enough, divers have yet to see great whites, although the shark's favorite prey, seals and sea lions, can be found at the bank. But blue and mako sharks have been spotted.

Like rockfish, seabirds often congregate around pinnacles, and it was just such gatherings that initially enabled the expedition to home in on shallow points. Since Schmieder's early expeditions, volunteer observers from the California Marine Mammal Center and San Francisco State University have recorded sightings of seabirds and mammals at or near Cordell Bank. Thirty-three seabird species have been seen there, including surf scoter, black-footed albatross, northern fulmar, south polar skua, common murre, pigeon guillemot, tufted puffin, and the endangered brown pelican, which was sighted on about two thirds of the trips.

Observers have also recorded 14 kinds of marine mammals at the bank. Of special interest are two endangered cetaceans, the humpback and blue whales, both of which feed there. The team's most exciting encounter with humpback whales was on October 10, 1982, when a pair approached from off the port bow, surfaced 30 yards away, swam under the ship, and surfaced again several hundred yards astern. Mammal observers Marc Webber and Steven Cooper have stated that the substantial number of blue whale sightings recorded over the continental shelf in the Cordell Bank area suggests that it is an important autumn habitat for the species. Other mammals that have been seen at the bank are Minke whales, Dall's porpoises, harbor porpoises, orcas, Pacific white-sided dolphins, California sea lions, Stellar sea lions, northern fur seals, northern elephant seals, and harbor seals.

The greatest mystery that Schmieder and his divers have encountered during their explorations is a series of large, cylindrical holes that lie on the sharpest, highest parts of the ridges. Some holes appear to be manmade, although others look natural. It is rumored that they were made by the U.S. Navy about 15 to 20 years ago in a project related to underwater communications and submarine detection. But in spite of his security clearance, Schmieder has been un-

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successful in learning anything about these holes from the Navy.

Primarily because of its unusually productive biological community, Cordell Bank is being considered by the NOAA for designation as a national marine sanctuary. The bank was established as an active candidate in 1983, a step that begins the formal designation process. Draft documents, including an environmental impact statement, the designation document, and the management plan, are scheduled to be released by the NOAA this September. To date, only seven such sanctuaries have been designated in the United States, including two in California—the Channel Islands and Pt. Reyes–Farallons. But Schmieder is optimistic about the future of the Cordell Bank.

"It is incumbent upon those of us who wish to preserve certain areas of our environment to set up the legislation to protect them," he says. "I hope and believe that 50 or 100 years from now, areas like the Cordell Bank, which will long since have been designated marine sanctuaries, will be as much a part of our national heritage as Yosemite and Yellowstone, and considered equally inviolate."

ROBERT ROBINSON *is a freelance writer in Sacramento, Calif.*

MARTINA AND THE CLUB
NO BACKHAND ENDORSEMENT

MARK VAZ

RADIO LISTENERS around the country will soon be hearing from tennis champion Martina Navratilova, talking not about her sport but about environmental protection and the Sierra Club.

This year's Wimbledon women's champ made the 30-second public-service announcement (PSA) on behalf of an education campaign being conducted through the Club's national office.

"Hi—I'm Martina Navratilova," the PSA begins. "You know, tennis is just about my whole life, but it's not all I think about. I care about the air I breathe, the water I drink, and everything that makes America beautiful. But I'm worried, because toxic waste dumps are polluting our air and water and poisoning our land. If you're worried too, do something about it. Call the Sierra Club today!"

PSAs are recorded messages that provide access to media for organizations that might not otherwise be able to afford it. While a good PSA can mean high exposure, at 30 seconds (or less) it must be produced to exacting standards to be successful. Once the spot is ready, its proper dissemination is essential. The Navratilova spot is a good example of how the PSA process works.

Navratilova, a world-class celebrity, was tapped as a highly visible spokesperson for the Sierra Club. The radio medium was selected as the most effective way of getting her message on toxics across to the greatest number of people. After a master tape was recorded, the PSA was reproduced on professional-quality audio tapes. An announcer's voice giving the local Sierra Club information number for each targeted market was added to the end of each tape.

To date the Navratilova PSA has been distributed to Club activists in about 50 major U.S. media markets, ranging from Los Angeles and New York City to Albuquerque and Chattanooga. It is expected that these activists will contact their local stations' program directors about the spot, encouraging frequent broadcasts. Because most radio programs replay PSAs on a rotating basis, Navratilova's message has the potential for repeated broadcasts on hundreds of radio stations reaching millions of people.

Sierra Club media specialist Adrienne Weissman explains that PSAs must provide information, not take stands on political issues. A spot could support the concept of national parks, for example, but could not advocate specific parks legislation. The goal, Weissman says, is to "raise awareness."

In the past, Sierra Club television and radio PSAs have targeted such issues as acid rain, strip mining, and wild-river preservation. Other spots have been more esoteric. One installment in a series of radio PSAs called "Earth's Original Music" taped the mating-ritual sounds of bullfrogs recorded in upstate New York.

Sierra Club PSA spokespersons have ranged from actors Lorne Greene and Ted Shackelford to the late North Carolina senator, Sam Ervin. The Ervin effort, a 60-second TV spot, is an example of the arresting visual impact such a PSA must carry.

The spot opened with Senator Sam, famed champion of the Watergate hearings, peeling off hundred-dollar bills from a huge

wad of cash and handing them to the viewer. "Here's a hundred-dollar bill for you—go on, take it!" the senator encouraged.

Ervin then asked if the viewer drove a car. If so, another hundred was proffered. If the viewer had a habit of needlessly burning electric lights, a $50 bill was extended. The point being made was that wasted energy translates into cold, hard cash lost.

"It really pays to conserve," Sen. Ervin concluded. "Save energy. We'll all be the richer for it."

In addition to the national Sierra Club office, many local Club groups and chapters have discovered the benefits of a good PSA in informing the public about both important issues and the Club itself.

The Northeast Ohio group, for example, is in the sixth year of a regular series called "Notes From the Sierra Club." The group has found that the series of 60-second spots, broadcast twice a day seven days a week on Cleveland's fine-arts radio station, has been important in publicizing local, as well as national, environmental events and projects. One Ohio "Notes" spot attacking Defense Department funding at the expense of environmental programs exhorted listeners: "Have you written to your elected representatives lately? Tell them the Earth is trembling!"

Public-service announcements can spread a message—and for the Sierra Club, getting the word out on environmental-protection issues has always been of paramount importance.

MARK VAZ *is* Sierra*'s editorial intern.*

SIERRA NOTES

• Sierra Club Books has announced the publication of several new titles: *Rivergods: Exploring the World's Great Wild Rivers*, by Richard Bangs and Christian Kallen ($37.50, $30 for Club members); *The Sierra Club Guide to the National Parks of the East and Middle West* ($13.95, $11.15); *The Arctic World*, by Fred Bruemmer, ed. William E. Taylor ($39.95, $31.95); *Earthly Delights*, by Rosalind Creasy ($19.95, $15.95); *X-Rays: Health Effects of Common Exams*, by John W. Gofman and Egan O'Connor ($25, $20); *Islands of the West: From Baja to Vancouver*, photographs by Frans Lanting, text by Page Stegner ($35, $28); *Public Domain, Private Dominion*, by Carl J. Mayer and George A. Riley ($25, $20); *Dwellers in the Land: The Bioregional*

Vision, by Kirkpatrick Sale ($14.95, $11.95); *The Politics of Food*, by Joel Solkoff ($17.95, $14.35); and *Isak Dinesen's Africa: Images of the Wild Continent from the Writer's Life and Words*, introduction by Judith Thurman ($35, $28).

The books may all be ordered through the Sierra Club Catalog. Nonmembers may order *books only* from Sierra Club Store Orders, 730 Polk St., San Francisco, CA 94109; phone (415) 776-2211. Include $2.50 postage and handling for orders up to $20, and $4.50 for orders over $20. Please allow four weeks for delivery.

• The Sierra Club of Western Canada has prepared three regional nature guides: *Hiking Alberta's Southwest*, by Joey Ambrosi ($6, $9.95 Canadian); *Victoria in a Knapsack: A Guide to the Natural Areas of Southern Vancouver Island* ($4.80, $7.95); and *The West Coast Trail and Nitinat Lakes*, 4th edition ($5.40, $8.95). The guides are available from the Sierra Club of Western Canada, 314-620 View St., Victoria, B.C. V8W 1J6. Please include $1 postage and handling per order.

• The Sierra Club Atlantic Chapter's Americans Against Acid Rain Campaign will hold a fundraising dinner on November 19 in Flushing Meadows Park in Queens, N.Y. New York Governor Mario Cuomo is scheduled to speak at the event. Sponsors include former Representative Richard Ottinger (N.Y.), New York Attorney General Robert Abrams, Sen. George Mitchell (D-Maine), Reps. Gerry Sikorski (D-Minn.) and Sherwood Boehler (D-N.Y.), entertainers Tony Randall and Dick Cavett, and former EPA Administrator Chuck Warren. Tickets for the dinner cost $100 per seat. For invitations and information, phone Bill Hewitt at (718) 956-0671.

• Each year the nonprofit Student Conservation Association offers three- to twelve-week volunteer positions for high-school students and adults in national parks and forests, wilderness areas, wildlife refuges, and public lands. Internships focus on biological, archaeological, or wildlife research; natural history interpretation; trail maintenance and construction; habitat restoration; and other fields. Volunteers work under the supervision of the National Park Service, the U.S. Forest Service, the Bureau of Land Management, and private agencies.

Fifteen hundred internships will be available during 1986 for high-school students and adults. Application deadlines vary by program; summer programs have a March 1 deadline. For an application and listing of available positions, contact the Student

Conservation Association, Dept. RM, P.O. Box 550, Charleston, NH 03603; phone (603) 826-5741.

• The Center for Renewable Resources, an educational affiliate of the Solar Lobby, has published a listing of free sources for classroom information on renewable energy technologies. The 32-page report features more than 200 listings and a grade-level/topic index. *Alternative Energy: A Guide to Free Information for Educators*, by Janet White, is available for $4 from the Center for Renewable Resources, 1001 Connecticut Ave., N.W., Suite 510, Washington, DC 20036. Bulk rates are available.

• The National Gallery of Art in Washington, D.C., is showing an exhibition of photographs by Ansel Adams through January 12, 1986. The exhibit features the "museum set," 75 photographs selected by Adams to represent the best of his work. Also on display are large images, mural prints, and screens loaned by Mrs. Ansel Adams and others. For more information contact Carolyn Amiot, Deputy Information Officer, Information Office, National Gallery of Art, Washington, D.C. 20565; phone (202) 842-6353.

• An exhibition of Indian wildlife photography has opened at the American Museum of Natural History in New York City. The show "Tiger, Tiger" includes 64 color photographs by nine artists that publicize the plight of endangered species and the success of the Indian wildlife conservation program.

"Tiger, Tiger" is presented in cooperation with India's Department of the Environment and the National Museum of Natural History in New Delhi. After closing in New York on January 12, 1986, the exhibit will travel to the Los Angeles County Museum of Natural History and the New Mexico Museum of Natural History in Albuquerque.

For further information contact Patrice Benneward, Office of Public Affairs, American Museum of Natural History, Central Park West at 79th St., New York, NY 10024; phone (212) 873-1300.

• The Emmy Award–winning production *Water Wars: The Battle of Mono Lake* is available for purchase or rental from the University of California Extension Media Center. This 39-minute video, produced by Maria Taylor and Dan Wohlfeiler, explores the Mono Lake water-diversion issue. For more information contact the University of California Extension Media Center, Dept. ML, 2223 Fulton St., Berkeley, CA 94720; phone (415) 642-1340. □

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QUESTIONS ? ANSWERS

Q: How should I dispose of the garden pesticides I've been storing in my shed? (Arthur Dutton, Syracuse, N.Y.)

A: "First of all, don't mix pesticides in with your other trash," says Andy Hicks of the California Department of Health Services' Toxic Substances Control Division. Most counties and municipalities have designated sites for collection of used pesticides and other toxic wastes. Containers of toxic wastes are put into barrels that are usually filled with an absorbent (such as vermiculite) and buried at licensed toxic waste disposal sites.

"In many areas it's difficult to get rid of toxic wastes," Hicks admits, "but it's important to contact the proper agencies and hold on to dangerous household wastes until collection day."

Laura Roberts

Q: Why does the Sierra Club oppose the use of aerial firefighting planes and helicopters over wilderness areas? (Margaret Q. Wehinger, Oakland, Calif.)

A: The Sierra Club does not oppose the use of planes and helicopters in fighting fires over wilderness areas if private property or human life are in danger. If there is no danger to either, the Club would prefer that natural fires be allowed to run their course, in keeping with the natural cycles of the ecosystems.

"Where fire can harm areas, the Club has been supportive of using fire-suppression techniques for control," says Bruce Hamilton of the Club's Conservation Department. "In these instances the use of aerial firefighting methods such as slurry bombing is probably preferable to ground techniques, which tend to cause more environmental damage."

Q: Are there any caribou left in the lower 48 states? (Maxine Helm, Louisville, Ky.)

A: The last vestiges of the mountain caribou, a subtype of the woodland caribou, still exist in the Selkirk Mountains of northwestern Idaho and southern British Columbia. Although they once ranged throughout the northern United States, only 26 of these animals (at last count) remain today. The mountain caribou were first hit by a brainworm, a parasite harmless to its carrier, the white-tailed deer, which roamed much of the same habitat as the caribou.

Since the brainworm's demise, the caribou's main nemesis has been humans. Hunting and large-scale logging operations in the Selkirks helped reduce the caribou population to around 100 by the early 1960s. Their numbers dropped as low as 15 at one time, but the outlook for the future became a bit brighter in February 1984, when the mountain caribou was granted protection under the federal Endangered Species Act. The magnificent animal is still susceptible to poaching, however, particularly outside the part of its range that is within the United States. (Not long ago a radio-collared bull was found butchered for its meat; the culprits received a $1,600 fine and a five-year suspension of their hunting licenses—the maximum penalty permissible under British Columbia law.)

Biologists estimate that a genetically viable herd of mountain caribou would include at least 100 animals. Thus the future of the continent's remaining 26 mountain caribou—three calves, four bulls, three immature bulls, eleven cows, and five of unknown age and gender—is in the hands of those charged with the animals' survival, the U.S. Forest Service and the U.S. Fish and Wildlife Service. Conservationists hope these agencies will quickly draft the mountain caribou recovery study, the document that will determine which areas of caribou habitat will be protected from the intrusion of hunters, loggers, and recreational users.

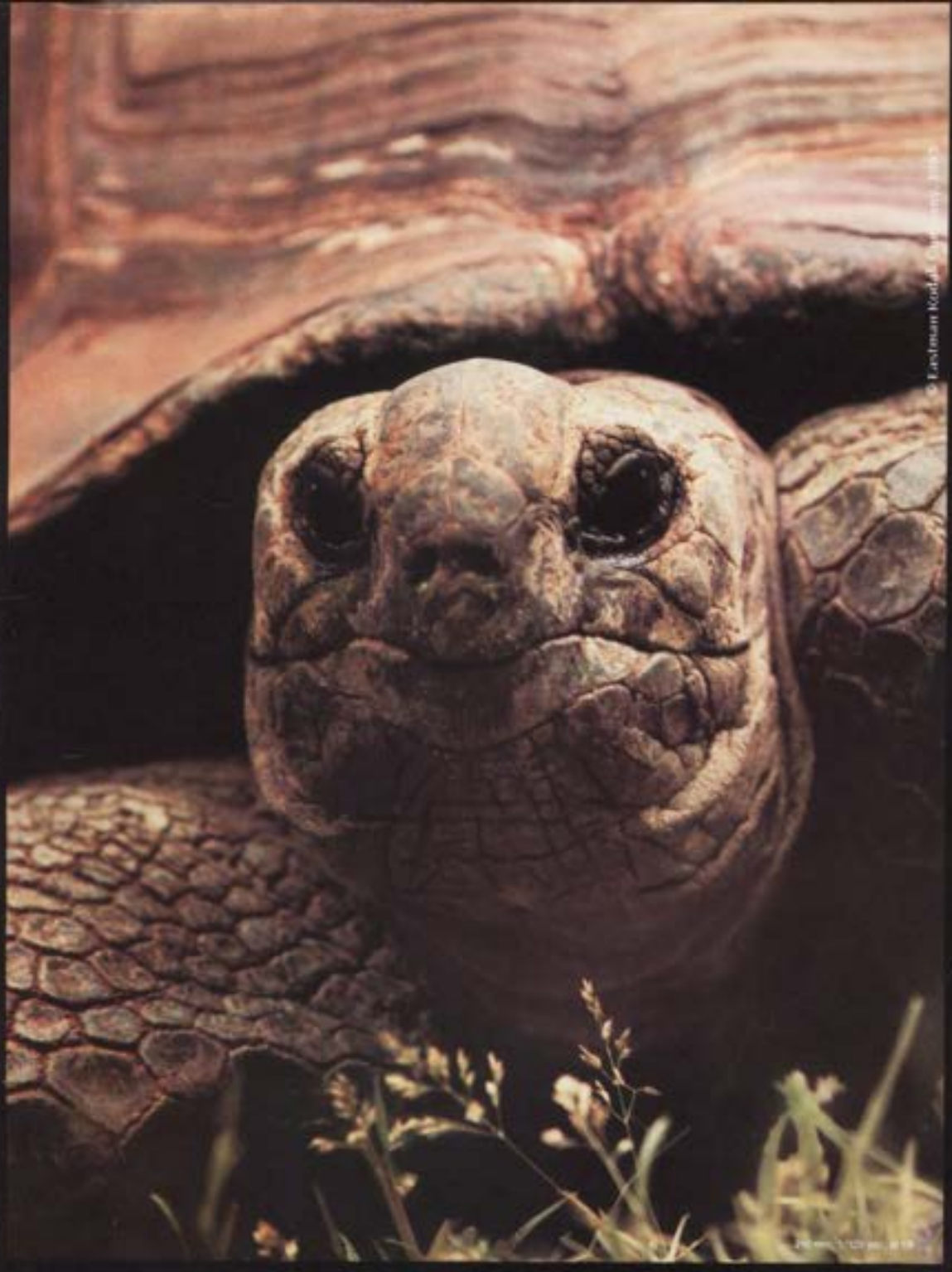
Q: What is the status of the fight against the proposed Circle Cliffs and Tar Sand Triangle projects? (Harry Nelson, Phoenix, Ariz.)

A: The Sierra Club's Utah Chapter has joined with other groups actively opposing these projects, which propose to produce oil from the tar sands found in deposits beneath two national parks and thousands of acres of Bureau of Land Management wilderness study areas in southeastern Utah.

"Tar sand" is viscous, dirty oil trapped in underground deposits in sandstone. Depending on its depth, a deposit can be extracted by either strip mining or steam-injection wells—both of which techniques are environmentally unsound in the highly sensitive, arid canyonlands. The proposed Tar Sand Triangle project is located within Glen Canyon National Recreation Area, in wilderness study areas, and adjacent to Canyonlands National Park. The Circle Cliffs project shares its boundary with Glen Canyon and Capitol Reef National Park.

According to Lori Potter, staff attorney for the Rocky Mountain office of the Sierra Club Legal Defense Fund, draft environmental impact statements indicate that the two projects would have an adverse effect on recreation, wildlife, water, and air quality in this spectacular region of red sandstone canyons. "In fact," she adds, "the documents state that tar sand development will probably cause impermissible air-quality deterioration and visual impairment in Canyonlands and Arches national parks as well."

While the Park Service is opposed to these potential environmental disasters, the Bureau of Land Management is lobbying hard for their approval, leaving the future of the canyon country in limbo. Readers wishing to voice their opinions are urged to write to Secretary of the Interior Donald Hodel (18th and C Streets, N.W., Washington, DC 20240), the ultimate decisionmaker. Copies of your letter—and letters supporting the Park Service position—should go to William Mott, Director of the Park Service, at the same address.



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