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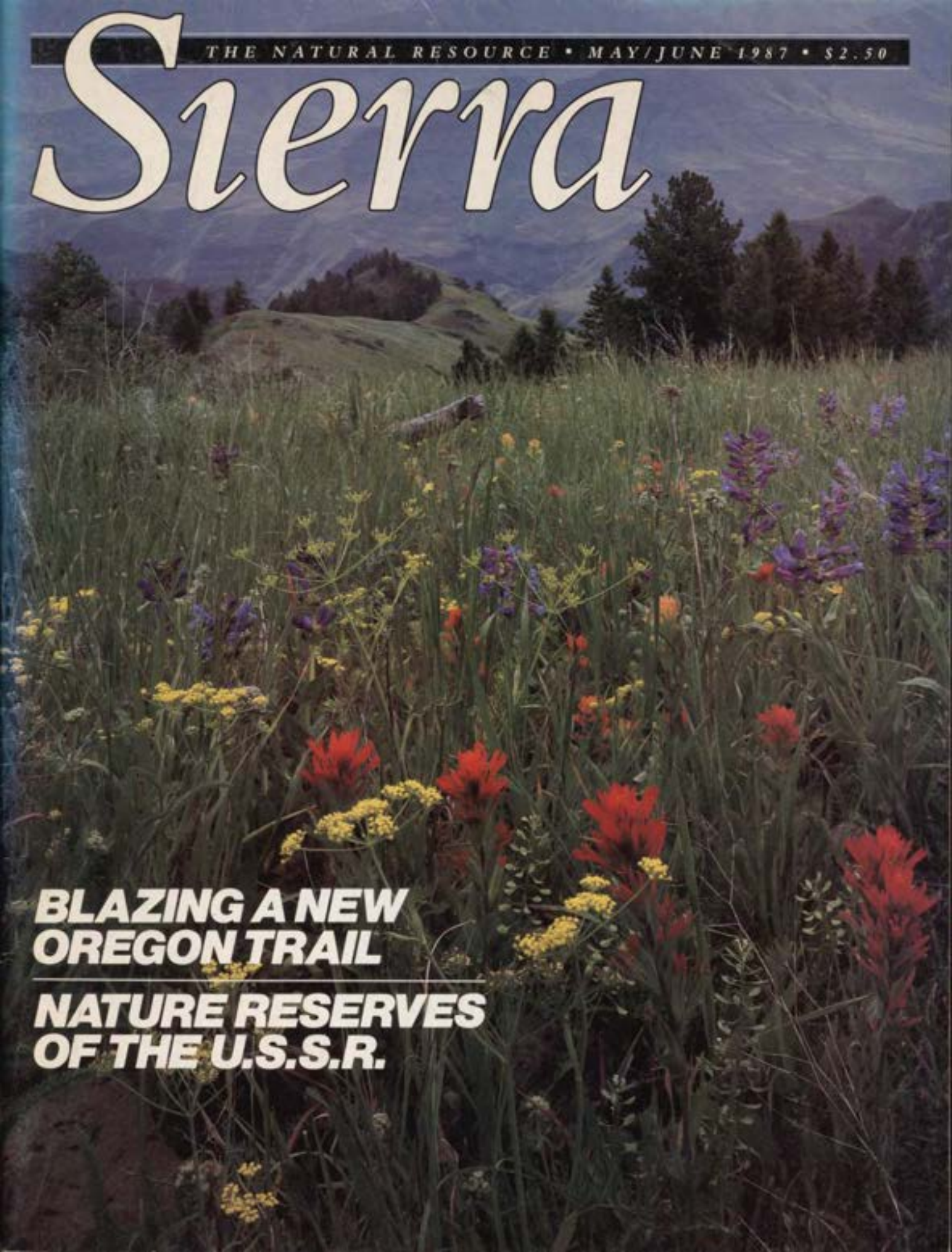

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VOL. 72/No. 3 MAY/JUNE 1987

Sierra

COVER: The view toward Hells Canyon from Buckhorn Springs—one of the last a trans-Oregon hiker enjoys before trail's end. For more, see page 54. *Photo by David Jensen.*

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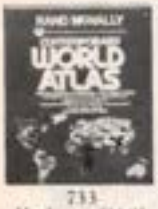

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LETTERS

WATER MARKETING

In discussing the views of the Environmental Defense Fund's Tom Graff ("In Depth," March/April 1987), James R. Udall writes, "It's a paradox that the West's most critical resource—water—has been allocated according to socialist rather than capitalist precepts."

This is nonsense. Here in California it is well recognized that the single most serious cause of our water problems is government's surrender to agricultural interests who buy irrigation water at ridiculously low prices. That is not "socialism" but its complete opposite: domination of government by private interests. It is "capitalism" at its grossest.

"Water marketing" sounds like, and offers support for, Ronald Reagan's campaign for deregulation—the substitution of market forces for social control. Let's just turn over our rivers, our lakes, our water tables, and our current dams to private interests to operate at a profit. They could then secure exemption from antitrust laws and charge whatever the traffic would bear, following the best free-enterprise procedures. "Such burgeoning metropolitan areas as Los Angeles, San Diego, Tucson, and Denver" will then be able, to quote Udall, "to satisfy their needs by buying water rather than building dams." At what a price!

Actually, though maybe I am blinded by the brilliance of Graff's conception, I can see no connection whatever between "water marketing" and the Sierra Club's campaign against building more dams. Privatizing water resources might just as well lead to more dams, if this proves profitable.

Whether the confusion lies in Graff's ideas or Udall's exposition of them, I cannot make out. But I am shocked that *Sierra* gave "water marketing" any of its valuable space.

Lincoln Fairley
San Francisco, Calif.

James R. Udall's article was one of the most balanced and informative stories yet on the topic of water marketing.

He pointed out the superficiality of early arguments relative to how "simple" marketing would be to accomplish, and his is one of the few articles correctly concluding that free-market transfers are not a panacea for our water distribution problems. Udall also was careful to underscore that there may be some detrimental environmental side effects to water marketing. These, too, need to be studied.

Transfers are worth exploring and likely will become an important source of badly needed urban water in the future if properly studied and managed.

Carl Boronkay, General Manager
Metropolitan Water District of Southern California
Los Angeles, Calif.

COVER CONTROVERSY

I was surprised by the conventionally sexist cover on the March/April 1987 issue. I can't understand why you chose a picture of a perfectly able-looking woman being *carried* across the stream by a male. It's a perfectly lovely photo, and would bring smiles in the photographer's album—which is where it belongs, not as an image of coy female helplessness on your cover.

Barbara Baer
Forestville, Calif.

Please pass the word: I can't stop enjoying the expressions on the faces of

those two people on your March/April cover!
Gertrude Pickett
Monroe, Wis.

POPULATION EQUALS PROSPERITY?

There is little factual and nothing scientific about the policies Anne and Paul Ehrlich, their academic credentials notwithstanding, leap to advocate ("Back From the Abyss," March/April 1987). In claiming that government control of reproduction is "morally required worldwide" they are only the latest in a long line of zealots, running as far back as the Puritans, who have insisted that government enter the bedroom to enforce their version of morality.

The Ehrlichs' juxtaposition of government and morality, in a piece that goes on to discuss universally "swollen military budgets," is incomprehensible. What government has ever demonstrated morality? While governments under Hitler, Stalin, and Pol Pot have shown efficiency in controlling or reducing whole populations, that cure would appear to be worse than the problem itself.

Wherever government is constrained, even in primitive societies, reproduction is subject to control through family, religion, taboo, and other social influences. Today these factors, where they are permitted to operate, are tending to level off the population growth that began with the Industrial Revolution, albeit at a higher level than the Ehrlichs would like. There is in fact no objective standard for an optimum population, and areas such as Japan, Singapore, Hong Kong, and Western Europe show that a dense population is not inconsistent with economic prosperity, freedom, and a high quality of life.
Timothy I. Molter
Alameda, Calif.

LEAVE BATS TO THEIR BELFRIES

I was distressed to read "A Place to Hang Your Bat" ("Afield," March/April 1987). As director of the San Antonio Metropolitan Health District, I oversee an ongoing program to teach the children of the district a very rational fear of bats. Not because of Dracula movies, but because rabies is endemic in the bat population in central Texas.

I agree with Dr. Merlin Tuttle, the president of Bat Conservation International, that bats are "gentle, clean, intelligent animals" that do much good in plant propagation and insect control. But I cannot agree that they are appropriate backyard pets. We try to teach our children a proper respect for wild animals. Animals should be left alone in the wild. A wild animal found around people or a nocturnal animal abroad in the daytime may be sick or injured and is therefore dangerous.

While we would all like to see the study and appreciation of bats continue, it must be done appropriately. Anyone who is untrained should use the same rule for bats, rodents, snakes, and predatory animals: Love them, but leave them alone.

Katharine C. Rathbun
San Antonio, Texas

MORE ON FOREIGN AID BANKS

Half truths are not good enough. Patricia Adams' "All in the Name of Aid" (January/February 1987) is short on fairness and long on generalizations. As the lead author and responsible officer for USAID's project design system, lauded in the article, I too believe in high standards of social and environmental analysis and consultation. And as a former chair of the Organization for Economic Cooperation and Development's aid evaluation group, I know at least as much about the skeletons in the donors' closets as anyone. But Adams goes far too far.

The famine in Africa was caused mainly by overpopulation (and hence overuse of soils) and by overcutting of vegetation. This probably intensified an historic cycle of marginal-to-poor weather. Dealing with fledgling, often far-less-than-efficient governments and nations often in turmoil, the World Bank has done well in Africa and is doing better.

It has certainly made mistakes, some unfortunately large. It can stand improvements . . . and indeed is currently making them in such areas as beefing up its staff of environmental experts. But to blame it for the famine in Ethiopia is farfetched and outrageous.

The World Bank is vitally necessary if Africa is to recover and find ways of

providing sustainable development with enhanced dignity for her people. The environmental movement must be careful that it does not enter into a Faustian bargain with those who would destroy foreign aid to the poor based on their extreme ideologies. Constructive criticism, surely. But slash-and-burn attacks are as harmful to needed institutions as they are to Africa's fragile land.

Robert J. Berg, Senior Fellow
Overseas Development Council
Washington, D.C.

Criticism from the Sierra Club has helped draw attention to deficiencies in some World Bank–financed projects. The World Bank's purpose is to reduce poverty in the developing countries, and criticism helps us do a better job. Progress against poverty requires vigorous efforts to conserve natural resources.

But the articles about Third World development in your last two issues ("All in the Name of Aid," January/February 1987; "One for the Spirits," March/April 1987) were one-sided and riddled with errors of fact.

As a citizen of a developing country, I cringe to see an influential magazine within the U.S. environmental movement carelessly attacking the international institutions which help us cope.

Jose Botafogo Goncalves
Vice President, External Relations
The World Bank
Washington, D.C.

TO BEE OR NOT TO BEE SUBSIDIZED

The "Afield" section of your January/February 1987 issue contained a lovely and interesting quotation from Sue Hubbell's book *A Country Year, Living the Questions*. In part it read: "[Beekeeping] is an unruly, benign kind of agriculture, and making a living by it has such a wild, anarchistic, raffish appeal that it unsuits me for any other, except possibly robbing banks."

Hubbell will never have to rob a bank. She and all other beekeepers are subsidized under a program administered by the U.S. Department of Agriculture. Never mind that the honey surplus is large—the subsidy is not expected to be discontinued.

Eugene Crowe
Singer Island, Fla.

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CLEAN WATER, THE NEXT ACT

As usual, it all depends on where you're sitting. "Waste and pork," declared President Reagan when he vetoed the Clean Water Act earlier this year. "Lots of grits on the plate," says Carolyn Carr, chair of the Sierra Club Clean Water Campaign. Persuaded by tremendous popular support for the law, Congress saw more grits than pork and overrode Reagan's veto.

Here's what the Clean Water Act puts on the table:

- A total of $18 billion in grants and loans for the construction of local sewage-treatment plants. Funding will decrease annually beginning in 1992 and will end in 1995.
- A program to control the toxic runoff from farms, roads, mines, and construction sites. An EPA study found that this "nonpoint" source pollution is a major water-pollution problem in 26 states.
- A program to identify and clean up areas with so many sources of pollution that compliance with existing standards is not enough to achieve clean water. Thirty-four such potential "hot spots" have been named by the EPA.
- Special projects that include research and cleanup at specific bays, estuaries, and lakes, including Chesapeake Bay, Boston Harbor, San Francisco Bay, and the Great Lakes.

Obviously, passage of the act does not create instant clean water. Rules and regulations must be formulated, and—as Carr points out—it is easier to lobby Congress than it is to keep careful watch over the regulations printed in the *Federal Register*. Since the individual states are responsible for putting the law into practice, varying interpretations and bureaucratic inertia can be expected.

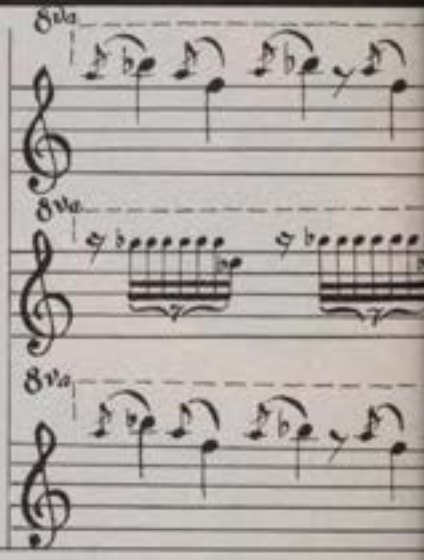
Carr sees follow-up as essential to a meaningful Clean Water Act. "Our challenge is to take the Sierra Club's wonderful grassroots activism and use it to make the law work," she says. "We've got our foot in the door; now we have to walk on through."—***Annie Stine***

LISTENING IN ON THE LOONS' TUNES

When Cree Indians heard the loon's haunting cry, they believed it was the voice of a dead warrior; the Chippewa regarded the sound as an omen of death. Henry David Thoreau, while at Walden Pond, wrote that the call of the loon was "perhaps the wildest sound ever heard here."

Today the common loon, which may be the most ancient bird on Earth, is threatened in several parts of its range by acid lakes, chemical contaminants, motorboats, and lakeshore development. Concern for *Gavia immer* has prompted many biological studies, but because traditional bird-study devices such as leg bands and wing tags are believed to disrupt social behavior, no one knows what the loons' migrations patterns are, whether they return to nesting sites, or even exactly how long they live.

Some of these avian mysteries may be solved by William Barklow, a professor of biology at Framingham State College in Massachusetts. Barklow discovered that each male loon's yodel is so distinctive that it is easily recognized in spectrographs made from tape recordings. Barklow plans to analyze these spectrographs (biologists and volunteers will provide the tapes) at a new bioacoustics laboratory established for



CLIMBERS GO OUT ON A LIMB

GERALD BERGKAMP

Tall hardwood trees may not rate a solid 5.13b, but they can offer a challenge to climbers in the flatlands. And thanks to a tree trimmer in Atlanta, tree climbing may soon become a legitimate sport.

Peter Jenkins has been up a tree almost daily for eight years, and a few years ago friends asked him to teach them his climbing skills. Through word of mouth, interest grew to the point that Jenkins decided to form a tree-climbing organization. The result is Tree Climbers International, which boasts some 200 members. (Jenkins says the group is keeping a semi-low profile until it publishes tree-climbing standards.) The organization, which is open to climbers of all levels, offers training sessions in Atlanta and expeditions to champion trees in other parts of the country.

"We use the same techniques and precautions that rock climbers use," says Jenkins. "We just don't have the mountains." Jenkins says that because tree climbers use only ropes, no harm comes to the hardwoods.

John Muir wrote of the powerful sensation he had while riding out a thunderstorm in the top of a large fir. Jenkins knows the feeling. "Once you get into the crown of a large tree, you feel like part of the environment," he says.

For information on branching out, contact Tree Climbers International, 299 Ferguson St., Atlanta, GA 30307; (404) 659-8733. ***—Steve Harrington***

HINTS FROM A HIKERS' HELOISE

In these ultralight, high-tech days, outfitting for a wilderness trip can cost a small fortune. The $500 tent, $200 rainsuit, and $6.95-a-pouch freeze-dried delicacies can quickly flatten a paycheck. But some items need cost no more than a little imagination and a few minutes of your time. Begin by looking over—but not buying—the specialty knickknacks and equipment in the camping stores. Then figure out what functional equivalents can be found in your own home or in grocery, drug, and hardware stores. They may not be chic, but they're cheap.

Here are a few thrifty tips:

Film canisters. Watertight, half-ounce 35mm film canisters make ideal medicine dispensers, lotion bottles, and spice jars. Some camping suppliers sell plastic lids that convert film containers into salt and pepper shakers. A toothbrush case can be improvised by cutting a slot in the canister lid and punching a few holes in the body to aid ventilation.

If you don't have your own collection, a photography or camera store will be happy to deluge you with film canisters.

Pickle barrels. The trash heaps of fast-food emporiums are the place to go for larger watertight containers. Pickles are packaged in five-gallon plastic barrels sealed with rubber-lined lids. Fast-food outlets such as McDonald's polish off the contents of five to ten of these barrels a week.

LOUROS LIVINGSTON ILLUSTRATIONS

Scrub the barrels out with soapy water and let them bask in the sun for a day. Adding a metal handle makes for easy carrying, and the rubber-lined lid will keep your gear dry.

Eyedrop bottles. Take the

PETER M. ROBERTS PHOTO

the project at Framingham. This non-invasive investigation will enable him to identify and track large numbers of loons.

A loon's yodel sends a warning about potential aggression. Since it is longer, more complex, and has a wider frequency range than the loon's other calls, there's an opportunity for the bird to say a lot. Because the yodel identifies the loon, other loons know which bird is being threatened and what it plans to do about the situation. And Barklow will know which loons are where, and when.

Because loons, like humans, are long-lived, high-level predators, the emerging facts about their travels and sojourns will be useful to investigations into environmental contaminants. More important, what Bill Barklow overhears may be crucial to the loons' own preservation.

—Sabra Morton

spill probability out of priming your white-gas stove by using empty eyedrop bottles. Fill the bottles with white gas and they're perfect for applying a few drops of fuel to a stove burner. (Eyedroppers from a drugstore also work well.)

Lens-cap leash. Once removed from the camera, lens caps often disappear from the face of the Earth. To avoid losing your cap, poke a small hole through the center of the cap with a heated pin or paper clip. Next, tie one end of a six-inch piece of fishing line to an eyelet on the camera body. Thread the other end of the line through the hole in the lens cap and tie a large knot on the end.

LOURDES LIVINGSTON ILLUSTRATIONS

Whetstones. Store-bought knife sharpeners can cost $10 or more, but an alternative may be right at your boot tip: Those petrified aggregates of minerals that lie along the trail may be the perfect honing tool for your metal blades. Just a few strokes against hematite (or sandstone, or any other siliceous-clay rock) will transform a dull knife into a keen cutting tool.

—Edward J. Joyce

FIELD NOTES

"Between the arrival of the finches and the first call of the cuckoo, our spring appears in all its beauty as subtle and complex as the intertwining branches of a still leafless birch. During this time . . . the waters will swell into torrents and the land will be strewn with the first and sweetest flowers, and the buds of the poplar will burst open and the fragrant sticky leaves will part, and then will come the cuckoo. And only then, having missed all the miracle of it, people will say: Spring has come. Isn't it beautiful!"

From Nature's Diary by Mikhail Prishvin, with introduction by John Updike. Penguin Nature Books Series, 1987. The diary was first published in the USSR in 1925.

JUST BETWEEN FRIENDS

It seemed like a good idea in a world about to go to war. In 1932 the governments of Canada and the U.S. voted to tie together Waterton Lakes and Glacier national parks, thus creating Waterton-Glacier International Peace Park. It was a gesture of camaraderie, intended to be a symbol of the bond of friendship between the people of each nation. As the current visitor's map states, "Like the trails, streams, and valleys of the Rockies, these bonds recognize no boundary."

Yet there is a boundary at the peace park—and it's an eyesore. The International Border Commission requires that a 20-foot strip of land be cleared along the border between the two nations, and the 40-mile border that runs through Waterton-Glacier International Peace Park is no exception. All trees must be cut every 15 to 20 years, and the swath is scheduled for clearing again this year.

"You're out on Waterton Lake looking at the beautiful forest, and then there's this huge scar," says Gil Lusk, Glacier's superintendent. "The law says it must be there to delineate the boundary, but we're dealing with the underlying concept of a peace park. I think discreet granite markers—which are already there—are sufficient."

JANE EASTER BAHLS

With Waterton Lakes Superintendent Bernie Lieff, Lusk has been pushing for legislation in both the U.S. and Canada that would allow an exception to the law to be made within the boundaries of the park. He thinks the chances for passage are good, but because it involves changing a treaty the exception will take time.

Meanwhile, Glacier officials had the contract for this year's clearing awarded to the U.S. National Park Service, thinking that the agency will minimize damage to the land and wildlife.

Lusk hopes this is the last time the swath will have to be cleared. "It's a glaring example of political necessity being imposed on a natural system," he says.

—Jane Easter Bahls

WATCH THAT SNAKE

An obscure and scaly creature is again the focus of a dam debate. This time it's not Tennessee's snail darter but the Concho water snake of central Texas.

The snake, listed as threatened under the Endangered Species Act, lives only in the Concho and Colorado rivers. Dam de-

Your Bank

City & State

Account Number

PAY TO THE ORDER OF Save the Children

19

$ 16.00

Sixteen and 00/100 DOLLARS

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MEMO: *U.S. Income Tax Deductible Monthly Sponsorship*

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Fill out this check (or use your own) and save the children

For only 52¢ a day (just $16 a month) you can befriend a needy child through Save the Children. Your money, combined with that of other sponsors, can breathe new life into an impoverished village…help hardworking people in their fight for dignity…turn despair into hope for a child who has known only disaster. 52¢ may not buy much where you live. But for the poorest of the poor, where the need is so desperate, it can work miracles.

For your first monthly sponsorship contribution, just fill out and sign the check at the top of this page (yes, as long as you indicate your bank name and account number, it is negotiable). Mail the entire page to Save the Children. Of course, you may use your personal check if you prefer.

TELL US HOW YOU WANT TO HELP BY ANSWERING THESE QUESTIONS.

Your name _____ (please print)

Address _____

City _____ State _____ Zip _____

1 What kind of child would you like to sponsor?

☐ Boy ☐ Girl ☐ Either

2 What geographical area are you interested in?

Urgent need exists in all the areas listed below. Select an area, or let us assign a child where the need is greatest.

☐ **Where the need is greatest**

- ☐ Africa
- ☐ American Indian
- ☐ Appalachia (U.S.)
- ☐ Bangladesh
- ☐ Colombia
- ☐ Dominican Republic
- ☐ Gaza Strip
- ☐ Honduras
- ☐ Indonesia
- ☐ Inner Cities (U.S.)
- ☐ Israel
- ☐ Lebanon
- ☐ Mexico
- ☐ Nepal
- ☐ Philippines
- ☐ Southern States (U.S.)
- ☐ Southwest Hispanic (U.S.)
- ☐ Sri Lanka
- ☐ Thailand

3 Would you like a picture of your sponsored child?

Shortly after we select a child for you, we can send you a photograph and brief personal history, if you desire.

☐ Yes ☐ No

4 Would you like to correspond with your sponsored child?

If desired, correspondence can help build a meaningful one-to-one relationship. Translations, where necessary, are supplied by Save the Children.

☐ Yes ☐ No

5 Would you like information about the child's community?

Because 50 years of experience has taught us that direct handouts are the least effective way of helping children, your sponsorship contributions are not distributed in this way. Instead they are used to help children in the most effective way possible—by helping the entire community with projects and services, such as health care, education, food production and nutrition. Several times a year you can receive detailed reports on these community activities which provide permanent improvements to the child's environment. Would you like to receive such information?

☐ Yes ☐ No

6 Do you wish verification of Save the Children credentials?

Save the Children is indeed proud of the handling of its funds. Based on last year's audit, an exceptionally large percentage of each dollar spent was used for program services and direct aid to children and their communities. Due to volunteered labor and materials, your donation provides your sponsored child with benefits worth many times your total gift. Would you like to receive an informative Annual Report (including a summary financial statement)?

☐ Yes ☐ No

(A complete audit statement is available upon request.)

7 Would you rather make a contribution than become a sponsor at this time?

☐ Yes, enclosed is my contribution of $ _____

☐ Check here for general information about our unique programs for aiding impoverished children.

Mail to:

Save the Children.

50 Wilton Road, Westport, Connecticut 06880

Attn: David L. Guyer, President

YOUR SPONSORSHIP PAYMENTS AND CONTRIBUTIONS ARE U.S. INCOME TAX DEDUCTIBLE. SCB 5/1/7A

Established 1932. The original child sponsorship agency. Member of American and International Councils of Voluntary Agencies.

velopers are eyeing a site just below the rivers' confluence for the proposed Stacy Dam, which would inundate half the Concho snake's known habitat.

Last May, Fish and Wildlife Service biologists determined that the dam could lead to the snake's extinction. The agency reversed itself seven months later and announced (to the disdain of some independent biologists) that new habitat created for the snake would actually enhance its chances of recovery.

Anti-Stacyites are wary of jumping into a situation reminiscent of the Tellico Dam controversy that caused big-dam boosters to ridicule tiny-fish lovers, but there is an important difference: The snail darter wasn't discovered until Tellico was half built, but the Concho snake has been known for 40 years. And planners had their eyes wide open.—*Tom Turner*

NO END TO KODIAK'S ILLUSTRIOUSNESS

As if it weren't enough to be home of the world's largest man-eating animal and America's second-largest Coast Guard base, Kodiak, Alaska, has been selected as the site of the nation's most scenic garbage dump.

Kodiak was the winner of a competition sponsored by the chamber of commerce in Moab, Utah, where Arches and Canyonlands national parks form a backdrop to the city dump. Confident that its dump was the comeliest in the nation (and anxious to draw visitors to the economically depressed area), Moab issued a beauty challenge to America's wasteyards. Kodiak emerged at the top of a heap of 17 entrants. "It really is a nice dump—mountains, trees, and wildlife," says Frank Byrt, the winning photographer.

Moab bestowed sister-city dump status and scavenging privileges on Kodiak; noting that the honor was nothing to sniff at, Kodiak returned the compliment.

—*A.S.*

SOME STATES WON'T WAIT ON ACID RAIN

While Congress plods toward legislation that would impose national controls on the sources of acid rain, several states have resolved to address the problem—at least within their own borders.

Last July, Minnesota's Pollution Control Agency voted 8–1 to adopt the nation's strongest acid-deposition standard, designed to protect the state's most sensitive lakes from damage. Two of Minnesota's largest utilities are now required to achieve significant reductions in sulfur-dioxide emissions from two coal-burning power plants by 1990.

The toughest law in the nation is said to be Wisconsin's 1986 measure, which requires the state's utilities to reduce their SO_2 emissions by 250,000 tons per year by 1993. Co-authored by state Rep. Spencer Black (D), the bill passed with support from three of Wisconsin's five large utilities.

SCORECARD

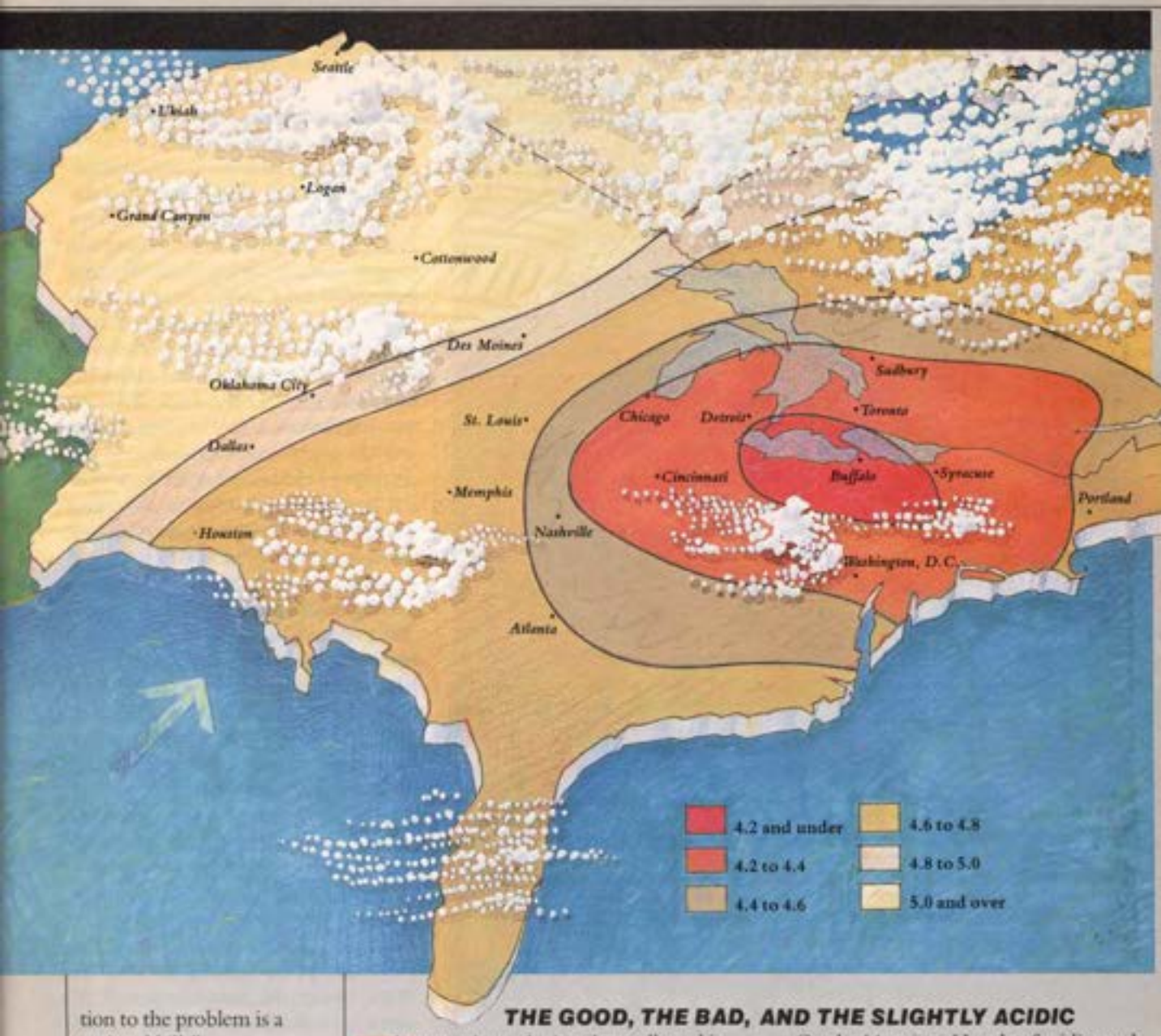
- *The Arctic National Wildlife Refuge* is besieged as the Interior Department has recommended opening the coastal plain to oil and gas drilling. Rep. Morris Udall (D-Ariz.) is sponsoring wilderness legislation for the area.
- *The Kings River* in California will be given wild and scenic river status under a compromise approved by the House Interior Committee.
- *Appliance standards* were signed into law by President Reagan, who vetoed a similar measure passed by the last Congress.

In Michigan, a regulation dating back to 1973 requires that utilities significantly reduce their use of high-sulfur coal, a major contributor to acid rain. As a result, one large facility, Detroit Edison's Monroe Power Plant, has cut its emissions from 270,000 tons to 125,000 tons of SO_2 per year.

Several states in the Northeast have also instituted controls. Among them is New York, whose 1984 law will cut SO_2 emissions by 40 percent, and Massachusetts, which in 1985 passed a measure that imposes a cap on utility emissions and provides half a million dollars a year for acid rain research.

Activists in all these states agree that no final solution to the acid rain problem is achievable without cooperation from the large-scale polluting states. "With our neighbors," says Michael Oppenheimer of the Environmental Defense Fund (EDF) in New York City, "we have a sort of 'northern tier' strategy to reduce sulfur deposition in the region by about 20 percent. What we *need* is 50 percent—and you can't get that without the Midwest."

Another point of agreement is that a federal law is definitely required—and the sooner, the better. "We consider our bill a stopgap measure, necessitated by the deplorable lack of action by Congress and the Reagan administration," says Wisconsin legislator Black. "Acid rain is no respecter of state lines or international boundaries. The real solu-



EARTHSURFACE GRAPHICS SOURCE: NATIONAL CLEAN AIR COALITION

tion to the problem is a national bill."

Several such bills, designed to achieve a 50-percent reduction in sulfur dioxide emissions, have been introduced in the 100th Congress. Meanwhile, the independent actions of Minnesota, Michigan, Wisconsin, Massachusetts, and New York will show the rest of the country that some states are, as the EDF's Oppenheimer put it, "willing to put their money where their mouths are."

—Jonathan F. King

THE GOOD, THE BAD, AND THE SLIGHTLY ACIDIC

The map above depicts data collected in 1984 by the U.S. government's acid deposition monitoring network at 116 sites nationwide. The broad bands (called isopleths) indicate areas within which rain of greater-than-normal acidity, indicated by pH values below 5.6, was recorded.

It's clear that the eastern states receive the most acidic precipitation of any region; the isopleth of 4.2 extends from eastern Ohio to western New York and Pennsylvania. Several sites in this part of the country—where many legislators and industrial leaders are among the firmest opponents of measures to control acid rain—yielded average pH measurements 20 times or more acidic than normal.

On the 14-point pH scale of acidity and alkalinity, a perfectly neutral sample of water would have a 7.0 rating. Unpolluted rainwater, which registers a pH of 5.6, may be described as slightly acidic because of the combination of carbon dioxide with water vapor.

A one-point increase in acidity on this logarithmic scale means a tenfold boost in that critical measurement, so a pH of 4.10—such as was recorded at Penn State University's monitoring station—shows that rainfall there is 31.6 times more acidic than normal. The state of Minnesota has determined that a pH of 4.6 is acidic enough to cause damage to the state's most sensitive lakes. *—J.F.K.*

HEALTH AND SAFETY

Food That's, Like, Totally Rad

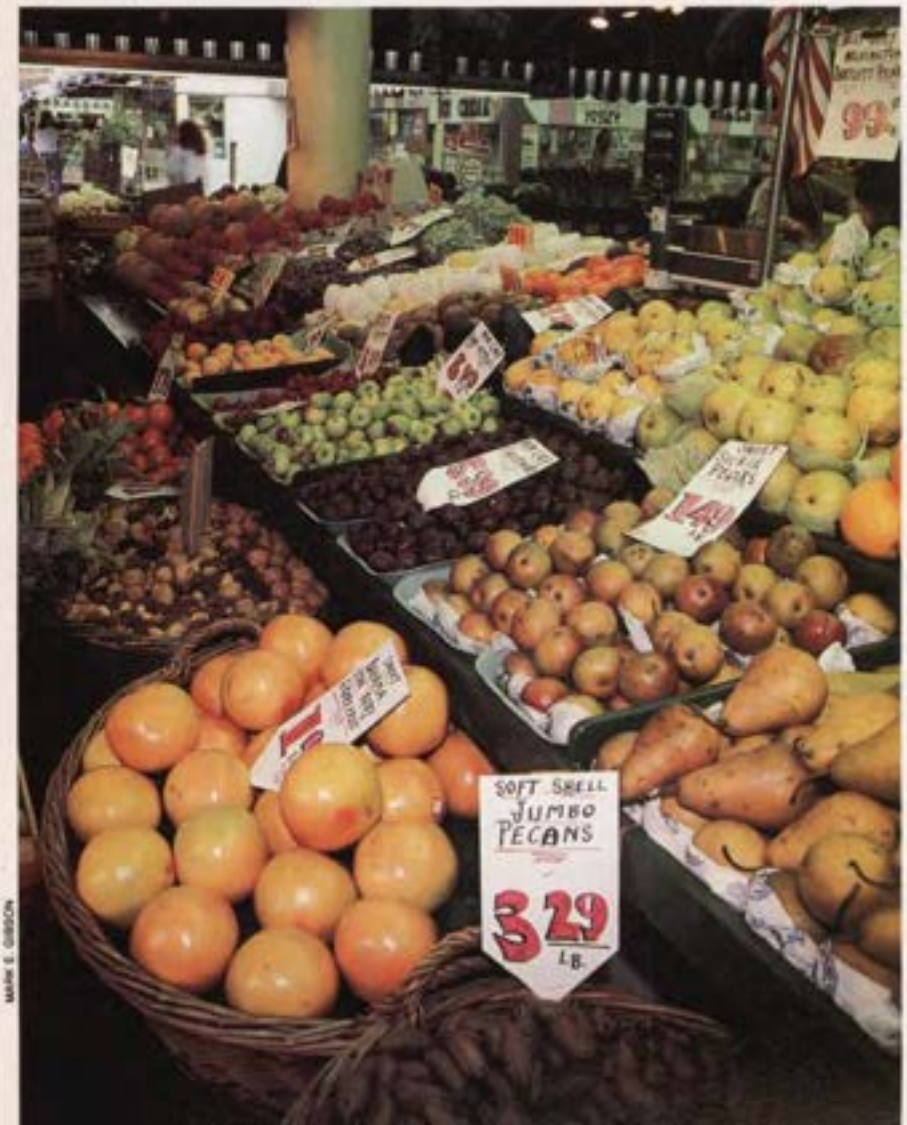
The government has given food irradiation its approval, but the controversial process is still no safer or cheaper.

Anne Witte Garland

THEY LOOKED LIKE any other mangoes. From their appearance, no shopper could have known that before they left Puerto Rico the tropical fruit had been loaded on a conveyor belt, moved into a sealed room, and beamed with radiation. Once in North Miami Beach, the mangoes (having been rejected by grocery chains fearful of consumer reaction) were sold in an independent market beneath signs identifying them as irradiated. It was a test of a new technological promise: fresh foods that last forever . . . almost.

A year has passed since the U.S. Food and Drug Administration (FDA) ruled to allow the irradiation of fruits and vegetables to kill insects and retard spoilage. (The agency had already approved the process for pork, spices, and some grains.) Yet the controversy over the process continues. Proponents, ranging from large food corporations to companies that currently irradiate medical products and are eager to expand, say that both the technology and the irradiated foods themselves are safe. They assert that the wonders of food irradiation will do everything from reducing the need for pesticides and replacing chemical preservatives in food to alleviating world hunger. Critics counter that not enough is known about the chemical changes wrought by the process to guarantee the safety of irradiated food, that the irradiation industry is poorly regulated and has been plagued by mishaps, and that claims of extended shelf life and practicability are exaggerated.

Has this food been nuked? If proponents of food irradiation succeed in abolishing the requirement for explicit labeling, consumers will have a hard time telling.



MARK E. GIBSON

While only the future will reveal the long-term hazards of eating irradiated food, the past and present raise questions that are also of great concern to irradiation opponents. The foremost is why this expensive technology is being advocated at all.

The federal government has been a powerful, not-so-behind-the-scenes proponent of food irradiation since the 1940s, when the Army explored the procedure's feasibility as a way of preserving troop rations. Most of the safety testing on the process has been subsidized by the Pentagon—testing that was largely discredited when the company that conducted it, Industrial Bio-test Laboratories, was found to have defrauded the government in other safety research.

The military connection goes beyond research subsidies, however. Currently, the radioactive substance that irradiation facilities use most often for sterilizing medical products is cobalt 60, supplied primarily by Atomic Energy of Canada. But the Department of Energy (DOE), which oversees the manufacture of nuclear weapons, is promoting the use of an alternative, cesium 137, a waste prod-

uct of weapons production. Through its Byproducts Utilization Program, the DOE has already begun leasing cesium 137—obtained from the Hanford, Wash., military production reactors—to private irradiation companies. "An artifically created demand for cesium for food irradiation will give the DOE the option of pushing more radioactive wastes onto the rest of society," says Robert Alvarez of the Environmental Policy Institute (EPI). "Thus the agency will be able to externalize the real costs of making nuclear weapons."

Another method of obtaining cesium 137 is to reprocess the used fuel from nuclear power plants. Since reprocessing also yields weapons-grade plutonium, it is currently illegal to reprocess spent fuel from commercial reactors. Critics of irradiation offer a sinister explanation for the government's enthusiasm for the process: If enough demand is created for food irradiation (and thus for cesium 137), there will be considerable pressure to overturn the law. And *voilà*: A very real waste problem and a perceived plutonium-shortage problem will be solved.

Even proponents of irradiation admit that the industry has gotten off to a slow start in the year since FDA approval. While enthusiasts earlier projected that as many as a thousand food-irradiation plants might be in operation by the end of the century, today's optimism is more restrained.

"I should live to see the day when there are a thousand plants," says George Giddings, director of food irradiation services at Isomedix, the New Jersey-based company that treated the Puerto Rican mangoes last year. "I see this as a very gradual, leisurely, niche-finding exercise."

Other industry advocates agree with that assessment. "It doesn't look like anybody's in a big hurry to use food irradiation," says Bill Pritchard, editor of *CRA Info*, the newsletter of the Atomic Industrial Forum's Council on Radiation Applications. "It's available as an option, and irradiators are ready and willing to go—but they can't without clients. The big food companies aren't sure that the public will accept it. The bottom line is that the industry is waiting for a market. Without one, food

irradiation isn't going to go anywhere."

On this point, opponents agree with the industry. "Food processors will avoid it because consumers will avoid it," says Kathleen Tucker, director of the Health & Energy Institute, a nonprofit organization based in Washington, D.C. "Irradiated foods will be more expensive, and there will always be valid concerns about safety. Given existing food processing choices, food irradiation just isn't going to be used broadly in the U.S. as long as honest labeling is required."

The labeling issue has been one of the most contentious in the debate. In approving irradiation for produce last year, the FDA required that irradiated food be explicitly identified as such, labeled with the words "treated with radiation" or "treated by irradiation"—a provision that many proponents of the process opposed. But the labeling requirement expires in April 1988, when the FDA may require only that irradiated foods be identified with the international radura symbol, a stylized flower inside a circle.

Meanwhile, critics are doing their best to keep the market from ever materializing. Grassroots organizations against food irradiation are springing up nationwide. According to the EPI's Alvarez, "Because of citizen opposition, commercialization is really slowing down." The Health & Energy Institute is planning a legal challenge to the FDA ruling and has requested public hearings on the issue.

In Congress, Rep. Douglas Bosco (D-Calif.) introduced legislation last year to revoke FDA approvals of fruit, vegetable, and pork irradiation, and to require safety studies of the health and environmental effects of the technology. The measure quickly gained 52 cosponsors and was reintroduced this February as H.R. 956. In the Senate, George Mitchell (D-Maine) has introduced a companion bill, S. 461.

On the pro-irradiation side, last year Rep. Sid Morrison and Sen. Slade Gordon, both Republicans from Washington (home of Hanford), introduced bills that would finance a federal promotional campaign for food irradiation. Although Gordon was defeated in the election last fall, and Morrison may not

reintroduce his legislation this year, some pro-irradiation bill is expected in the 100th Congress.

But as most everyone agrees, the true contest will take place in the grocery store. For unlike many federally subsidized programs, this is one that won't go down an unwilling throat.

ANNE WITTE GARLAND *is a freelance writer living in New York City.*

TRANSPORTATION

Manhattan Highway Plan Resurfaces

New York City's latest West Side highway proposal solves some, but far from all, of Manhattan's waterfront problems.

William F. Hewitt

A DESCENDANT of New York City's dinosaurian Westway proposal crawled out of the Hudson River and onto Manhattan's western waterfront in late November.

The new highway plan avoids the massive tunnel and landfill requirements that in 1985 deep-sixed blueprints for Westway, a 4.2-mile, $4-billion, 10- to 14-lane superhighway that would have run from Manhattan's southern tip to 42nd Street. At $15,000 an inch, it would have been the world's costliest road.

Westway was dealt its stongest blow in ten years of conflict by a successful 1981 lawsuit, brought by the Sierra Club and a dozen community groups, that challenged the project's permits by showing that officials had camouflaged the proposed landfill's devastating effects on the Hudson River's striped bass population.

Westway never got back on its feet after federal court decisions in 1982 revoked landfill permits and barred dredging and filling in the Hudson. In September 1985, the highway's backers pulled the plug on Westway when they announced that they would ask the federal government to apply Westway's $1.72 billion in federal funds to other transportation projects in the state.

The scaled-down plan, prepared by the 22-member state-appointed West Side Task Force, calls for a cheaper ($800-million) six-lane highway that would fit within existing streets and provide a 68-acre riverfront esplanade with pedestrian and cycling paths. The highway's reduced bulk and its riverfront park are significant gains, but the task force, comprised largely of former Westway supporters, failed to resolve key issues that since 1972 have accompanied all attempts to replace the crumbling West Side Highway. The new proposal promotes a costly highway project at the expense of mass transit, fails to resolve the air-pollution problems a new regional highway will produce, and dodges the larger issue of waterfront land development.

At its heart, the original Westway proposal was a land-development project rather than a highway project. Two miles of highway tunnels and 165 acres of landfill (out of a project total of 234 acres) would have provided prize real

THE STAR LEDGER

Plans are still afloat to extend property lines into the Hudson to accommodate new construction.

estate for new office buildings and luxury apartments. The burrowing interstate simply provided a way to qualify the massive landfill project for 90-percent federal funding.

With the new road proposal, land-development issues remain paramount —and unresolved. Ignoring the recommendation of 35 community groups that all Hudson River landfill and platform (pier) development be prohibited, the task force tacitly encouraged this type of growth by recommending that the governor create a waterfront-development agency.

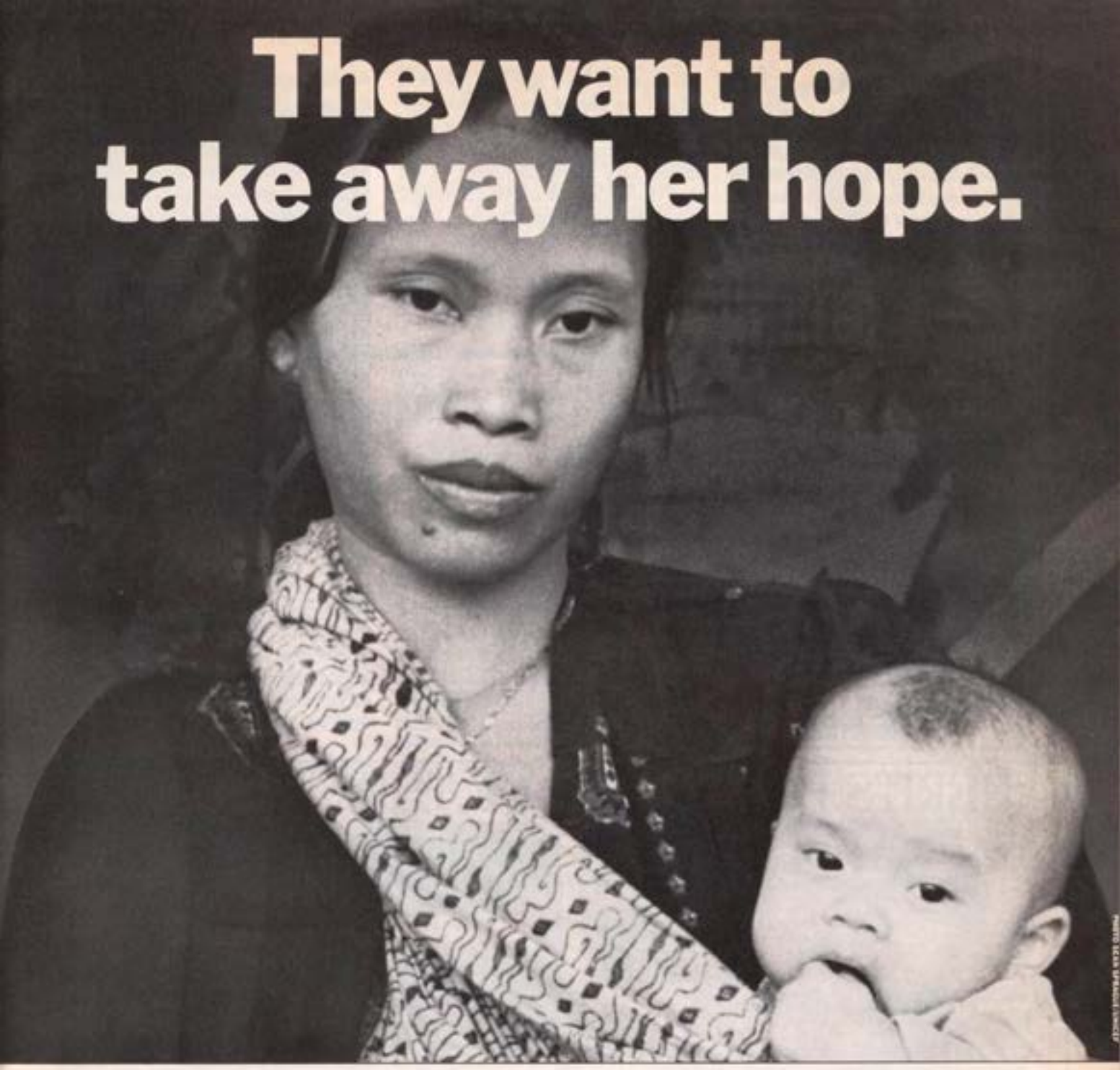
Despite the panel's sidestep, land-development issues will not disappear into the Hudson. Instead, parts of the Hudson itself may disappear. Although two federal court decisions struck down Westway landfill permits, and a congressional vote barred use of federal highway funds for Westway landfill, it's unlikely that development advocates will give up their real estate dreams.

Millions of public and private dollars have been spent studying and proposing landfill and platform-based developments in the Hudson. To circumvent Westway's legal precedents barring landfill, however, most current proposals call for construction on platforms. One proposal calls for construction on barges —to take advantage of lax requirements concerning floating platforms.

The task force's recommendations upset mass-transit and clean-air advocates as much as they disturb land-development opponents. Unwilling to give up plans for a high-speed regional highway, the task force proposed costly tunnels or elevated sections across four major Manhattan intersections. This would make the project eight times more expensive than a simple surface roadway. The estimated price tag—excluding the esplanade—tops off at $800 million in inflation-adjusted 1994 dollars, the year that construction is expected to be at its midpoint. (The task force expects that it will be five years before construction begins, and that it will take another decade to complete the project.)

At the same time, the Metropolitan Transportation Authority, which oversees all New York City transit and operates commuter lines to Long Island and northern counties, desperately needs funds for mass transit. The 35-organization West Side coalition recommended that $1.6 billion of New York's $1.72 billion in Westway trade-in funds be allotted to mass-transit improvements, with the remaining $120 million ear-

They want to take away her hope.



Thanks to two decades of hard work and U.S. aid, almost half the women in developing countries now have access to family planning services. But about half still don't. The result is millions of unwanted pregnancies each year. Much more needs to be done.

Instead, a handful of extremists in the White House and the Agency for International Development (A.I.D.) have targeted America's international family planning program for destruction. They're trying to eliminate reproductive options for women in developing countries–just as they have tried and failed to do here at home. They want to cut off help to those who are doing the most to help themselves.

If they succeed, all the good we've done will be undone. With less family planning, there will be more abortions. Families–women and children–will suffer and die, needlessly. We're fighting back. And we need your help.

To protest the Administration's attack on international family planning, write M. Peter McPherson, Administrator, A.I.D., Room 5942, 320 21st Street, N.W., Washington, D.C. 20523. Send copies to your Senators and Representative.

If the extremists win, the whole world loses.
Help us fight back. Planned Parenthood

marked for the esplanade and repair of the existing surface street.

Highway proponents claim that the road will not generate an increase in automobile traffic, and that the tunnels and bridges will reduce air pollution by pulling cars out of the congested central business district. It's a generally accepted rule of thumb, however, that any road-capacity expansion in dense urban areas breeds an increase in car trips and, hence, in automobile emissions. The new highway is sure to spawn more automobile trips, and New York City already has no chance of meeting federally mandated air-quality standards for ozone and carbon monoxide by the December 31, 1987, deadline dictated by the Clean Air Act.

The project faces an uphill battle even among die-hard highway proponents. Because the task force is advisory, the mayor and governor must endorse the panel's recommendations before the plan can become a blueprint for a new highway. Already, Gov. Mario Cuomo has informally balked at public funding for any new Manhattan parks. His report is expected later this year.

Because the latest highway plan does not rule out landfill and platform development, the proposal satisfies few Westway opponents, and their work continues. Says Marcy Benstock of the New York City Clean Air Campaign: "It's outrageous that the Cuomo administration is still trying to resurrect the most expensive and environmentally damaging parts of the Westway boondoggle—the extravagant highway that would take too much money from mass transit, and the landfill and platforms for luxury real estate development in a critical Hudson River habitat." Whether or not Son of Westway is approved, anti-Westway activists are already focusing on the most important issue—making sure it's never safe for West Side land developers to go back into the water.

WILLIAM F. HEWITT *is conservation chair of the Sierra Club's New York City Group.*

AGRICULTURE

Keeping Soil Down on the Farm

Soil-rich America could wind up dirt poor if efforts to control erosion are compromised by budget cuts and second thoughts.

Ward Sinclair

AT THE URGING of environmentalists, Congress included provisions in its 1985 farm bill that gave soil conservation enhanced status. Henceforth, federal subsidies would not be available to farmers who were not good stewards of their soil.

At the time, the law had broad political appeal. Two years later, however, the debate over soil protection is being replayed in the 100th Congress. The new provisions are in trouble for two reasons: the deficit-driven push to cut federal spending, which could result in inadequate funding for the law's conservation programs, and political backlash from some farmers who feel the bill's re-

NEAL & MARY JANE MISHLER

Erosion in Montana: In 1982 the state lost 21 tons of soil per acre farmed.

quirements are either unclear or unfair.

"There's still a big battle to be fought, both on the appropriations front and in keeping the integrity of the programs," says Ralph Grossi, a California dairy farmer who heads the American Farmland Trust in Washington, D.C.

Passage of the 1985 law was tacit recognition of the often overlooked link between the reeling farm economy and soil erosion. High prices and booming exports in the 1970s spurred farmers to expand and, in the process, take on more and more expensive debt. They put millions of acres of ill-suited land into crop production: In Montana, Colorado, and Nebraska, for instance, speculators converted vast expanses of rangeland to wheat and corn fields, depriving it of the permanent vegetative cover that held down its soil. The result has been soil losses that rival those of the Dust Bowl era, despite federal spending of close to $20 billion for erosion control in the intervening years.

To ease some of the pressure on erosive soil, the 1985 law included "sodbuster" and "swampbuster" provisions that protect fragile rangelands from the plow and ban the conversion of wetlands to crop production. It also established a federally funded "conservation reserve" that makes yearly payments to farmers who plant their highly erodible fields with grasses or trees and keep them out of production for at least ten years. The U.S. Department of Agriculture (USDA) enrolled almost 9 million acres of erodible land in the reserve in 1986, and expects to sign up an additional 11 to 15 million acres this year.

The farm bill ensured funding for the first two years of the reserve program, but for fiscal 1988—the budget now being debated—the reserve becomes subject to the same appropriations pressures as other government programs. Conservationists insist that the reserve must be fully funded if it is to reach its five-year goal of enrolling 45 million highly erodible acres.

"Overall the reserve has been a decent success, given the short lead time the USDA had," says Daniel Weiss, a Sierra Club lobbyist in Washington, D.C. "But there are still problems in the Midwest, where the department clearly is not offering farmers enough money to enter the reserve. Without adequate resources, this program can turn into paper promises."

The reserve has also had some unexpected economic impacts. For example, in Nebraska's Sand Hills, where speculators had a field day converting grassy dunes to cropland in the 1970s, landowners are being paid more to put land in the reserve than they could sell it for in today's market. In other cases, speculators are using reserve payments as a marketing tool to sell reserve land.

Probably the most controversial part of the 1985 bill is its provision for "conservation compliance," a life-or-death proposition for many farmers. They must have soil-conservation plans for their highly erodible cropland approved by 1990 and implemented by 1995 or face the loss of all federal farm assistance—from income subsidies to loans and crop insurance. A massive effort by the USDA's Soil Conservation Service (SCS) to help farmers comply with the new law will be required.

The SCS, already hit hard by budget cuts, is ill prepared for the task. According to the National Association of Conservation Districts (NACD), the SCS will need about 3,000 additional technicians to get the job done, at a cost of at least $95 million. By the association's estimate about one of every four acres of U.S. cropland is highly erodible. That

means that more than 1 million farms will need to develop conservation plans over the next two years to remain eligible for federal benefits.

The administration, resisting outlays of that magnitude, urges instead that local conservation districts find innovative ways to help the SCS provide technical assistance to farmers. Congressional conservation leaders, headed by Rep. Ed Jones (D-Tenn.), a coauthor of the tough 1985 soil provisions, insist that significant federal funding is needed to bolster those local efforts.

Bob Warrick, a Nebraska farmer who chairs the Sierra Club's farm-campaign steering committee, is concerned about the clock. He worries that tough conservation-compliance provisions may catch farmers by surprise and cause a major political protest.

"It scares me," Warrick says. "I'm terribly worried that the department is not doing enough to make farmers aware of these compliance requirements. A lot of farmers have given me hell over these provisions, because they want to continue to receive subsidies without doing anything in return. Some think that the law will never be enforced, or that by 1990 we'll have a farm program without strong conservation provisions."

Agriculture Department officials, pleading pressures to implement other parts of the conservation program, concede they have been slow in spreading the word about compliance. But the situation is improving: Conservation district and USDA information programs both are now well under way.

"Communication is a monumental task in a big country," says NACD Executive Vice-President Ernest Shea. "We've been encouraging our local districts to do outreach because 1990 is only a couple of years away. And we don't think the federal government should carry the whole load—the state and local governments must help."

As grumbling over the farm bill's conservation features rolls into Washington from the far corners of farm country, politicians are reopening old debates. The House Agriculture Committee held a field hearing in Texas on the law's conservation-compliance requirements in February. In the same month, Louisiana Rep. Jerry Huckaby

(D) introduced legislation to eliminate the compliance provisions.

"There are some pretty strong feelings out here," says Tommy Fondren, a Texas farmer. "We don't deliberately abuse the land. But sometimes the economics of farming won't allow us to do what we want to do in conservation."

The Sierra Club's Weiss says that farmers' complaints must be weighed against the public interest. "Taxpayers spent $26 billion in 1986 alone subsidizing all the various farm programs, which have traditionally had few conservation benefits. If Congress or the President attempts to change these conservation programs, it could spark a taxpayer revolt. We are not going to sit idly by and watch these important new approaches altered. Period."

WARD SINCLAIR *covers agriculture for* The Washington Post.

PUBLIC LANDS

Shale Shock on the Western Slope

The Interior Department fuels Wild West land speculation by parceling out the public domain under the 1872 Mining Law.

Stephen M. Voynick

ON NOVEMBER 6, 1986, a handful of energy companies, including Exxon, Union Oil of California (Unocal), Tosco Corporation, and Phillips Petroleum, took title to 82,000 acres of public land—for a nominal filing fee of $2.50 per acre. The land was worth at least $164 million by Interior Department estimates, but the exchange added only $205,000 to the federal treasury. The bargain, made possible by the 1872 Mining Law, raised the total of public oil-shale lands given out since 1920 to 431,000 acres (673 square miles).

Under that law, the government can grant a patent (full title rather than a lease) on oil-shale and other hardrock-mineral claims that require drilling. Written to promote frontier settlement in an era of pick-and-shovel prospecting, the Mining Law is the only remaining statute that allows the outright disposal of public lands.

"The law is a mineral, fiscal, and environmental failure," says Brooks Yeager, a Sierra Club Washington lobbyist, who points out that no significant amount of oil shale has been mined in over 67 years of land transfers. In fact, claim holders are not required to mine the oil shale and may develop the land for other commercial uses, such as residential subdivisions. Fiscally, the proceeds from patent sales generate virtually no federal revenue, and patents—unlike leases—bar the government from collecting royalties if and when oil shale is produced. Environmentally, the patents deny the government control over important wildlife lands on the Rocky Mountains' western slope, and they contain no requirements for the reclamation of lands scarred by mining that does take place.

Under the 1872 law (supplemented by the 1897 Oil Placer Act), shale land

could be claimed in 160-acre parcels by an association of eight claimants. In return for performing $100 of assessment work for each of five years, proving discovery of a valuable mineral deposit, paying a $2.50-per-acre filing fee, and not abandoning the land, claimants could receive a patent and own public land. By 1920 some 150,000 claims had been filed. Colorado's 30,000 claims alone encompassed 6,250 square miles.

In a well-meaning but belated attempt to halt speculative claim stakes and to conserve public resources, Congress in 1920 passed the Mineral Lands Leasing Act, making oil shale leasable through the Department of the Interior. However, the act upheld any pre-1920 claims as long as those claims were originally valid and continued to comply with the earlier law.

Speculation on these pre-1920 claims continues to this day. Few claims are held by their original owners. "Most pending oil-shale claims are held by major energy corporations," Yeager says, "and the claims not held by these corporations are, for the most part, held by speculators who hope to sell them to major energy corporations once they are assured of a patent."

Patent opponents charge that the Interior Department has failed to vigorously challenge the authenticity of old claims. "Many oil-shale claims awaiting patents were initiated based on invalid discoveries, or were obtained by fraud and manipulation, or have never received the required annual assessment work," Yeager says.

Interior and Justice department officials say that the negotiated court settlement that allowed the November land transfer—the first oil-shale land transfer in over 25 years—was the best deal possible. The settlement followed from a 1985 federal district court decision, which ruled that the oil companies' claims, dating from the 1900s, were valid. According to Pat Korp, an Interior Department spokeswoman, Interior originally considered appealing the 1985 decision but decided that a negotiated settlement would be the best course, avoiding the risk that the government might lose all control of the lands. (The government retained oil, gas, coal, and grazing rights, but these are secondary to any oil-shale rights.)

Yeager, however, says Interior disregarded a 1970 Supreme Court decision favorable to the government: "Interior caved in. Had they been seriously interested in cleaning up the oil-shale mess, they would have appealed the regional court's decision. There's no guarantee they would have won. But what would they have lost?"

The 82,000 acres in question were signed over less than a month after the

KENT & DONNA DANNEN

Oil is locked up in shale, and oil companies are locking up the shale lands.

Senate invoked (and Interior ignored) a six-month delay in the transfer of the disputed lands, an action that environmentalists and some congressmen fear may establish a legal precedent favoring the patenting of another 450 square miles of outstanding oil-shale claims. If that should happen, the Department of the Interior will have transferred to private interests oil-shale lands equal in area to the state of Rhode Island.

In the aftermath of November's land transfer, the Sierra Club—long an advocate of overhauling the Mining Law—threw its efforts behind passage of H.R. 1039. That bill would amend the 1920 Mineral Act to bar further patenting of pre-1920 oil-shale claims (unless claim holders have "fully and completely" complied with annual assessment stipulations), require the Interior Department to "expeditiously investigate" the validity of all pending and dormant oil-shale claims, limit leases on valid claims to 20 years, ensure that the leases return fair market value to the public, and create land reclamation requirements. Claims determined to be valid could be converted to leases.

In March the bill was approved by the House Subcommittee on Mining and Natural Resources and sent to Congress. The Interior Department opposes the bill, according to J. Stephen Griles, assistant secretary for Lands and Mineral Management. If it is enacted, he says, "further litigation is a virtual certainty." However, the bill's proponents say the bill met minimal resistance from oil companies and passed through the committee with a quick voice vote.

To environmentalists active in oil-shale affairs, Interior's management of oil-shale lands is all too similar to James Watt's indiscriminate coal-leasing program in 1982. Both favor private over public interests, and both proceeded—for a time—without the benefit of public scrutiny. Says Yeager, "Despite the administration's efforts to the contrary, the Interior Department's intention to effect the quiet disposal of hundreds of thousands of acres of public lands has been thrown open for public examination and congressional debate." ■

STEPHEN M. VOYNICK *has written for* Outside, American Forests, High Country News, *and the* Los Angeles Times.

NUCLEAR ISSUES

To most of the world, New Zealand seemed a quiet nation, better known for its sheep than for its political clout. Then the government said "no nukes" to Ronald Reagan.

Kiwis Just Say 'No'

Jason Salzman

When David Lange became prime minister of New Zealand in 1984, the Labour Party leader kept a campaign promise: He declared the nation a nuclear-free zone.

Not long afterward, the Reagan administration asked Lange for permission to dock a nuclear-capable warship, the USS *Buchanan*, in Auckland harbor. Lange asked for assurances that the *Buchanan* would not be carrying nuclear weapons. Reagan refused to reassure him. So, early in 1985, Lange announced that the warship would not be allowed to visit New Zealand. The prime minister added, however, that he would welcome a vessel he knew not to be nuclear-armed or nuclear-powered.

And so the trouble began. By adhering to a long-held policy of not divulging, even to close allies, which U.S. ships carry nuclear weapons, the Reagan administration collided with New Zealand. The small South Pacific nation, with 3.2 million people and 70 million sheep, suddenly became a leader in the growing international movement against the nuclear arms race.

Stunned by the country's bold anti-nuclear stand, Reagan halted all military exercises and most intelligence-sharing with New Zealand. Then, in August 1986, after Lange refused to change his position, the U.S. terminated the ANZUS alliance, a 35-year-old mutual defense pact among New Zealand, the U.S., and Australia. Secretary of State George Shultz said that by banning nuclear ships from its ports New Zealand had "walked off the job," and therefore the U.S. would no longer consider itself obligated to defend its old ally.

Lange maintains that ANZUS is a conventional, not a nuclear, defense pact; thus, New Zealand's nuclear-ship ban has not violated the treaty. He asks why two democratic nations cannot tolerate differences of opinion and emphasizes that his country's stand is anti-nuclear, not anti-American.

"New Zealand does not ask, nor do we expect, to be defended by nuclear weapons," the 44-year-old Lange has said. "We would never ask an ally to defend us by annihilating the planet."

The hostility toward and rejection of nuclear weapons by the United States' allies has been labeled a "nuclear allergy" by the Reagan adminstration. In a variation on the domino theory, the administration argues that if the U.S. allows New Zealand to ban nuclear weapons, other U.S. allies with strong grassroots anti-nuclear movements—Japan, Australia, Britain, West Germany—would be more likely to reject them as well. "It would be a tragedy for freedom and Western values for the policy of New Zealand to spread," Shultz said when ANZUS was disbanded.

Lange is portrayed abroad as the prime mover behind his country's acute case of nuclear allergy. But a persistent and well-organized grassroots anti-nuclear movement has been gaining momentum in New Zealand over the past 10 years, a motivating element in Lange's decision to confront the United States.

According to Deputy Prime Minister Geoff Palmer, New Zealanders are particularly sensitive to the danger of nuclear war, a legacy of the nuclear testing that has been conducted in the South Pacific since World War II. More than 200 nuclear explosions have shaken the

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area, and Palmer says that the testing has fomented anti-nuclear sentiments.

New Zealanders worry in particular about France's testing program at Mururoa Atoll in French Polynesia, northeast of New Zealand. France has exploded 110 nuclear weapons there since 1966, and plans to continue its testing (which was conducted above ground until 1974) indefinitely. In 1973, New Zealand protested the French tests by dispatching a naval frigate to Mururoa to monitor the explosions.

When the vessel returned from its mission, an Anglican priest and anti-nuclear activist named George Armstrong reasoned that if the government could send ships to protest French nuclear tests at Mururoa, the people of New Zealand could use boats to protest the visits of nuclear warships to Auckland, the nation's largest port.

Beginning in 1976, Armstrong and hundreds of other protesters on yachts, motorboats, and surfboards circled British and U.S. warships as they entered Auckland harbor. Calling themselves "Peace Squadrons," these seaborne protesters have provided an uncomfortable greeting for the nuclear ships that have visited Auckland since then.

"The Pacific Ocean has a special importance to us," says Armstrong. "The waters of the Pacific carry images of peace and health. One of the most ghastly things any government can do is bring nuclear warships here."

Pictures of small, colorful boats resisting gray or black submarines and cruisers spread across New Zealand. Inspired, activists began protesting warship visits at other ports.

From 1982 to 1984, record numbers of people filled New Zealand's streets to protest the arrival of nuclear ships. The largest of these demonstrations occurred when the USS *Texas* came to New Zealand during Hiroshima week in 1983. Some 30,000 people (the equivalent of more than 2.2 million in the U.S.) marched in Auckland.

Meanwhile, the anti-nuclear movement entered another arena. In 1981 a

number of peace groups—led by the New Zealand Nuclear Free Zone Committee, based in Christchurch—began a campaign to persuade city and county councils to proclaim their districts nuclear free. The goal was to establish as many nuclear-free zones as possible by the 1984 elections. As the anti-nuclear movement swelled, many local councils that had at first rejected the resolutions reversed themselves. The Auckland Regional Council, for example, passed a nuclear-free-zone resolution in 1983 by a vote of 22 to 10. The same council had rejected an identical resolution a year earlier by 23 to 9.

"Such was the magnitude of public opinion that if councillors did not endorse the nuclear-free-zone concept, they were likely to be in trouble in the elections," says Wallace Rowling, New Zealand's ambassador to the United States. Today, 72 percent of all New Zealanders live in locally declared nuclear-free zones, the largest percentage of any nation in the world.

Responding to grassroots pressure from an array of constituencies, New Zealand's Labour Party pledged to declare the entire country a nuclear-free zone if elected. Four smaller parties made the same promise. Only the governing National Party, which had been in power for eight years, said it would allow nuclear ships to continue visiting.

Labour politicians say that their 17-seat victory in the 1984 election (the country has a 95-seat unicameral parliament) resulted both from Lange's commitment to the nuclear-free policy and from his promises to bolster the nation's sagging economy. Former Prime Minister Robert Muldoon acknowledges that his National Party's nuclear policy "might have played some part" in Labour's victory, but adds that voters were also "tired of me as prime minister" and were looking for new solutions to economic problems.

New Zealand's anti-nuclear stand is a signal to grassroots organizers overseas that governments can be made to respond to public pressure, according to Larry Ross, director of the free-zone committee. "Significant numbers of people in the United States and Europe, majorities in some cases, support anti-nuclear initiatives," he says. "New Zealand is the first country in the Western Alliance where people's anti-nuclear sentiments are reflected in government policy. I think others will follow our lead."

Ross recognizes, however, that New Zealand's organizers have had it easier than their counterparts overseas: Theirs is a country with a small population, without major military bases or a defense industry. But Ross says that New Zealand's nuclear-free stand is particularly significant because his country and America have so much in common, including language, democratic traditions, and colonial history. "New Zea-

land is a friend telling the United States to take another look at its nuclear policies," says Ross. "Because we are so much like you, Reagan cannot categorize New Zealand as he does other anti-nuclear countries."

The Reagan administration's harsh and unexpected response to their nuclear-free policy has left some New Zealanders shaken. By disbanding ANZUS, Reagan has forced New Zealanders to choose between their alliance with the U.S. and the nuclear-ship ban. Polls show that about 70 percent of the population want both, and there is an even split of opinion as to which should be sacrificed.

Those who favor a return to ANZUS, with port visits by nuclear ships, argue that New Zealand needs U.S. protection and can do more to help prevent nuclear war by remaining within the Western Alliance. "Looking at it in hard reality, we can't defend ourselves," says Terry O'Cain, director of the Plains Club, one of a number of pro-ANZUS groups that has formed recently. "If the Soviets see that we're part of an alliance with the United States, they won't dare invade. Now we are isolated from our Western allies, and we have absolutely no influence over their actions. We've thrown away any chance we had to help stop the nuclear arms race."

The National Party has promised to reverse Lange's nuclear policy if it wins the next election, scheduled to take place by October. "We've lost friends around the world thanks to this government's policy," says Muldoon. "The people of New Zealand want a government that will restore their reputation."

But Canterbury University sociologist Kevin Clements, who recently completed a study of New Zealanders' attitudes on defense and security issues, says that the nuclear-ship ban is a manifestation of the country's emerging Pacific identity. "New Zealanders don't want to be America's poodle any longer," he says. "National will not be able to defeat Labour unless it changes its nuclear policies."

"If we lose our ship ban, the international peace movement will take a step backward," says Kate Boanas of the New Zealand Foundation for Peace Studies. "Our work here has succeeded because we've thought globally and acted locally. Now we hope people will act where they are to help us." Accordingly, anti-nuclear groups are asking people overseas to show their support by buying New Zealand products (kiwifruit, lamb, apples, Steinlager beer, orange roughy fish, Corbans wine) to boost the economy and to alleviate fears that the anti-nuclear policy will hurt trade.

As in the U.S., the anti-nuclear movement in New Zealand is connected to a strong environmental ethic. Ambassador Rowling feels that appreciation of his country's natural splendor contributes to the citizenry's aversion to nuclear weapons. "The fact that we live in one of the most beautiful countries in the world gives us a greater determination to say, 'Well, we've been blessed in this sense—therefore we should fight even harder to preserve what we have and share it with others.'" ■

DRAWN FOR SIERRA BY MIKE LUCKOVICH

JASON SALZMAN *is an American writer and peace activist. He has spent the past year in New Zealand.*

WIN FAME AND FORTUNE

Second prize, color (1986) "In Praise of Plants" Jacob R. Mau, Kula, Maui, Hawaii

Well, maybe not a whole lot of fame, but you can win some fabulous prizes in *Sierra*'s annual photo contest. Grand prize is an all-expenses-paid trip courtesy of Questers to the Galapagos Islands and the Peruvian highlands *plus* a Nikon N2000 35mm SLR camera with a 50mm f/1.8 lens. First-prize winners in each category will receive a pair of Nikon 9 × 25 binoculars; second prize is a special-edition folding knife from Buck Knives.

And there's still an outside chance you'll become famous: The winning photos will be published in *Sierra*'s September/October issue, then mounted and hung for a year in the Sierra Club's national offices in San Francisco.

The only real requirements are creativity and originality. So read the rules and instructions carefully, and start shooting!

Categories

Wildlife: Animals, excluding humans, photographed in their natural habitats.

People in Nature: Photos of people enjoying themselves in the out-of-doors anywhere in the world.

Abstracts in Nature: The focus should be on the form, symmetry, or asymmetry of natural objects, not on their function or their place in the biosphere.

The Meeting of Land and Water: Where the surf hits the shore, the ice greets the leaf, and the rain meets Spain.

How to Enter

SUBMISSIONS: No more than two color slides (or transparencies) and/or two black-and-white prints may be submitted in any one category.

Either original or high-quality duplicate slides and transparencies are eligible as color entries, but prizewinners must provide their original(s) for publication. No color prints or color negatives from print film will be considered.

Mark each slide, transparency, or print clearly with your name and address, and state the category being entered. *On a separate piece of paper, explain where each photograph was taken, and describe the subject briefly and accurately.*

Careful packaging is important. *Improperly wrapped submissions will be returned unexamined.*

- Color slides (2 x 2) and color transparencies (4 x 5 and 2-1/4 x 2-1/4) should be placed in 8 x 10 plastic sleeves (available at any camera shop).
- Black-and-white photos should be unmounted prints no larger than 11 x 14, packaged between two pieces of stiff cardboard in a simple manila envelope.

Send your submissions to Sierra Photo Contest, 730 Polk St., San Francisco, CA 94109. Include a self-addressed, stamped envelope for returning material and a check or money order for $2 made out to *Sierra*. (This fee covers all submissions by an individual entrant received in one package.)

ELIGIBILITY: This contest is open to all amateur and professional photographers. Sierra Club staff, their immediate families, and suppliers to *Sierra* are not eligible. Photos must be taken and owned by the entrant. Previously published work, photographs pending publication, or photos that have won other contests are not eligible. Void where prohibited.

DEADLINE: All submissions must be postmarked by midnight, June 1, 1987. Please include a stamped, self-addressed postcard if you wish receipt of your photo(s) to be acknowledged. The judges' decisions will be made by July 15, 1987, and photos will be returned within six weeks of that date.

PRIZES: In addition to a grand prize, first and second prizes will be awarded in each category. The judges reserve the right not to award a prize in one or more categories.

LIABILITY: *Sierra*'s responsibility for loss of or damage to any material shall not exceed the amount payable to the magazine under any insurance carried to cover its liability for such loss or damage. Information about the amount of coverage is available on request. We are not responsible for material lost or damaged in the mail.

Nature Reserv

EXCLUSIVE PHOTOS GIVE SIERRA'S READERS THEIR FIRST-EVER LOOK AT THE

The Union of Soviet Socialist Republics is a titan among nations, covering a sixth of the Earth's land surface, extending across 11 time zones, and providing a home—in its mountains, deserts, forests, plains, and waters—to an abundance of life forms, many of which are found nowhere else.

So large is the Soviet Union that for years its people have believed that they would never exhaust their natural legacy. In this the USSR is remarkably similar to the United States of the last century, whose pioneer ethic led to the wholesale extinction of numerous species in the name of progress, utility, and convenience.

But attitudes—even national ones—do change, and they are changing today in the Soviet Union. Although nothing resembling a spontaneous grassroots environmental movement exists there, in recent years Western observers have documented increasing concern over environmental and conservation issues. Economists, writers, midlevel industrial and agricultural managers, and others are finding new freedom to criticize large-scale resource management and development projects that cause severe environmental damage. On more than one occasion these criticisms have led to the rethinking or even abandonment of projects whose impacts were judged unacceptable.

Some in the West would point out that these critics never combine their objections to a specific project with a more general criticism of Soviet culture's dominant paradigm: an impulse to develop and consume resources that, as in many industrializing nations, characterizes both the typical citizen and the society at large. And in

es of the USSR

SOVIET UNION'S UNIQUE SYSTEM OF PROTECTED LANDS. ◆ JONATHAN F. KING

truth, the USSR's priorities have not changed dramatically since the eras of Lenin and Stalin, when industrial development was sanctified as society's primary goal. This point of view has had predictably negative impacts on the nation's environment. Even in the face of a growing awareness of natural limits to growth there remains a powerful ideological faith in the ability of technology to replace or supplant limited resources.

Unbridled industrialization and blind faith in technology are the same forces that have motivated our own society for more than a century, forces that environmentalists here are attempting to defeat. We should not be surprised, then, that the process is likewise a slow one in the USSR, where most people's material needs are still underfulfilled, and where reformist ideas normally trickle down to the public through official channels at glacial speed . . . when they move at all.

One approach to conservation has been pursued since the first months of the Bolshevik Revolution, when the new Soviet government began to protect certain critical natural areas within a growing system of nature reserves, or *zapovedniki*.

Although the system shrank alarmingly under Stalin, today there are an estimated 130 reserves throughout the 15 European and Asian republics that make up the USSR. Two thirds of these reserves occupy an area of 100,000 acres or less, although some 15 reserves totaling more than 5 million acres have been established since 1977, and more are planned.

While these reserves protect less than 1 percent of the nation's land mass (and sometimes are not large enough to perform their designated functions), their distribution throughout the Soviet Union's varied biogeographical zones—tundra, taiga (conifer forests), mixed forests, mountains, deserts, and steppes—represents a basic effort to preserve elements of these biomes. The reserves provide protection for threatened animal and plant species as well as opportunities for controlled scientific study of critical environments. Since 1979 the core areas of at least a dozen *zapovedniki* have been designated as biosphere reserves under UNESCO's Man and the Biosphere program for the role they play in conserving critical landscapes, ecosystems, and gene pools.

The *zapovedniki* are not directly analogous to any American land-management system, although one may at first be tempted to compare them to our national wildlife refuges. But the differences between the two systems are numerous, most significant of which is the Soviet prohibition against public access in virtually all instances. (A handful of the larger, more scenic *zapovedniki* are open for recreational purposes, but they are notable exceptions to the rule.) Nor is wildlife protection the primary objective of each Soviet reserve, although it is in some. In others, protection of an overall landscape—its soils, minerals, air, and water—or monitoring of environmental change is the primary purpose of the reserve designation. The unifying characteristic of all *zapovedniki* is their reservation for scientific study—one Soviet official has said that they are "the case studies of untapped nature against the background of man-converted landscapes." Some have proposed that the word *zapovednik* be adopted internationally to underscore this specialized approach to conservation and research.

The *zapovedniki* are not centrally administered by Moscow, but are under the control of various regional authorities and scientific institutions. Nearly all of them consist of two zones, a core area that is rigidly controlled and monitored, and a surrounding "buffer" zone that is less strictly managed, though still off-limits to tourism. This

TUNDRA

The relatively barren tundra zone extends along the northern region of the USSR, covering 15 percent of the country. It's a region of strong winds and extreme cold (temperatures can fall below -58°F. in the Siberian winter) in which lichens and mosses flourish where trees cannot grow.

There are three major tundra zones: the far northern (or Arctic), the northern, and the southern. The Arctic tundra experiences extreme climatological conditions during the year: The winters are long, cold, and dark, discouraging vegetation and animal habitation, but in summer food plants flourish during the nearly constant sunlight, which penetrates the thick layer of permafrost, and mean temperatures rise to near 40°F. As the observer moves south toward the border between tundra and taiga, the number of plant and animal species increases. Birds, which migrate up from the south to breed, are the most conspicuous form of tundra wildlife, though a few species of insects, mammals, and even reptiles are also found there.

Because of the fragility of the landscape, tundra *zapovedniki* tend to be larger than reserves in other biological zones. The Taimyr Peninsula reserve, created in 1979, is the largest in the Soviet Union, covering more than 13,000 square kilometers. It has 16 mammal and 50 bird species; among the latter are 2,000 to 3,000 of the total world population of the endangered red-breasted goose. The 7,800-square-kilometer *zapovednik* on Wrangel Island (Ostrow Vrangela), created in 1975, hosts the USSR's only colony of snow geese and is an important denning area for polar bears.

A. KNYSTAUTAS

The total world population of Siberian white cranes (Grus leucogeranus***) is estimated at 2,000 birds. Their decline is attributed to hunting (during migration) and habitat destruction. In 1978 the bird was the focus of an international preservation effort initiated jointly by Soviet ornithologists and the International Crane Foundation in Wisconsin.***

A. KNYSTAUTAS & A. BLAZHYS

The habitat of the threatened red-breasted goose (Rufibrenta ruficollis***) has been affected by agricultural development and wetland drainage. The migratory goose breeds in widely separated small colonies on the Taimyr, Yamal, and Gydan peninsulas, nesting on cliffs in river valleys and on rocky islands.***

P. TOMKOVICH

These walruses (Odobenus rosmarus***), the world's second-largest pinnipeds, are now protected throughout their range in the Soviet Union, for ivory hunters have much reduced their numbers. The males use their tusks as levers to drag themselves up onto the ice along the Arctic coasts of the USSR.***

MIXED FORESTS

The mixed forests of the densely populated European USSR are similar to those of Europe proper. The nation's other mixed-forest region is in the southern Soviet Far East, along the Amur and Ussuri river valleys, and remains relatively unknown in the West despite its fascinating variety of endemic and exotic life forms. (Half the USSR's breeding bird species inhabit this region.) Although most mixed forests in the Soviet Union have been exploited for their resources for centuries, considerable tracts of virgin forest can still be found.

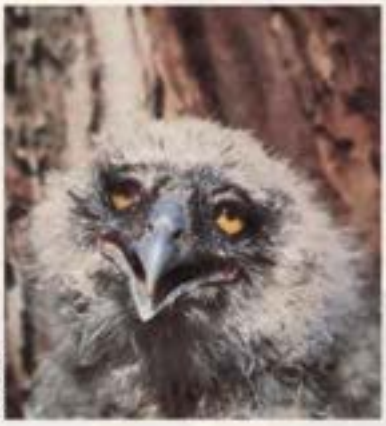
Just as mountain biology is understandable primarily in terms of zonation by altitude, the distribution of life forms in the mixed forests can be looked at in terms of the forests' tiers, from subsurface to canopy. The first of the four main layers in this environment is the ground layer: Below the surface, invertebrates thrive in leaf litter and soil, while on the forest floor itself mammals, birds, reptiles, and still more invertebrates live. The next layer is the understory (not an element in all Soviet forests), where shrubs and herbal plants provide shelter and food for numerous animal species. The lower trees—those that can survive with little sunlight—constitute the third layer, while the canopy formed by the highest trees is inhabited mostly by birds and some butterflies. Middle-latitude forests in the USSR tend to consist of a very few tree species, while those further south tend to be populated by a greater variety of trees and plants.

Y. SHIBNEV

*One of the rarest birds in the USSR, the reed (or Yangtze) parrotbill (*Paradoxornis heudei*) is listed in the Soviet* Red Book. *This sparrow-size bird is a secretive species known to nest only among the thick reed beds at Lake Khanka on the Soviet-Chinese border, north of Vladivostok.*

Y. SHIBNEV

Ginseng is among the wealth of endemic species that inhabit the herbal layer in mixed forests of Korean pine and deciduous trees such as Manchurian ash and Amur cork oak. Valued by millions of people around the world for its curative and restorative properties, ginseng is listed in the Soviet Red Book *and protected in certain* zapovedniki, *including Kedrovaya Pad in the Ussuri region, where this photograph was taken.*



Y. SHIBNEV

*When this newborn Blakiston's fish-owl (*Ketupa blakistoni*) matures, it will snatch fish, frogs, and crabs from the water with its long talons like an osprey does. Nonmigratory and endangered, the species ranges throughout the Soviet Far East.*

*The crested honey-buzzard (*Pernis ptilorhynchus*), another rare and secretive migratory species, nests in the tall trees of southern Siberia and the Soviet Far East. The nestlings feed on insect larvae until the fall migration.*

A. KNYSH

*Schrenck's grass snake (*Elaphe schrenkii*) is an East Asian nonpoisonous species that can grow to six and a half feet in length. The snake climbs high into trees (and even onto the roofs of houses) in pursuit of birds and their eggs.*

Y. SHIBNEV

enforced isolation is considered critical to the research function of the reserves, particularly when efforts are being made to re-establish wildlife species that have flirted with extinction in the Soviet Union. Among these species are the snow leopard (the focus of efforts at the Alma-Ata reserve in Kazakhstan), the European bison (at Kavkaz and Oka Terrace in Russia), the red-breasted goose (at Taimyr in northern Siberia), the polar bear and snow goose (on Wrangel Island), and—perhaps best known in this country—the Siberian crane, the focus of a well-publicized recovery effort organized by scientists in America and the USSR.

The Soviet Union's nature reserves are not free from management problems. For one thing, there are indications that widespread hunting and poaching persist, even within many of the supposedly off-limits areas of the reserves. Furthermore, economic considerations are still uppermost in the minds of virtually all government officials—and when there's a conflict between economic goals and wildlife or habitat preservation, the conflict is often resolved in favor of the economy.

According to Philip R. Pryde, a geography professor at San Diego State University and one of the few American scholars with first-hand knowledge of the *zapovedniki* system: "The ownership of land by the state in the Soviet Union doesn't any more guarantee that preserved areas will be free from economic incursions than it does in the United States. Theirs are just different types of economic threats, stemming from competing ministerial priorities rather than from corporate or private initiatives. Continuous vigilance is necessary in both countries." Pryde cites as an example of such vigilance on the Soviet side the controversy over a proposal to construct a large pumped-storage hydroelectric facility in an Armenian *zapovednik*, a proposal that met with a strong outcry from local people who wished to defend the reserve. The Armenian Council of Ministers responded by setting up a special commission to

DESERTS

A continuous desert occupies more than 10 percent of the Soviet Union's land surface, from the lower reaches of the Ural River and the Trans-Caspian region to the foot of the Tian Shan Mountains. Four primary soil types prevail. The deserts covering large areas of Kazakhstan and Central Asia are primarily sand: These include Muyun-Kum, west of Lake Balkhash; Kyzyl-Kum ("red sand"), southwest of Muyun-Kum; and the vast Kara-Kum ("black sand"), much farther to the southwest, mainly in Turkmenia. The clay deserts of the Soviet Union lie to the north and south of the sandy deserts and provide habitat at favorable times of year for grasses and a variety of ephemeral plants, which thrive in early spring before the sun gets too hot and while rainfall is relatively frequent. Stony deserts are fairly widespread throughout the desert belt, while extremely salty and gravelly *solonchak* deserts, with their seasonal and permanent salt lakes, occupy a relatively small area. The greatest faunal variety is found in the sandy deserts, while the salty *solonchak* types support the fewest life forms. In all of these difficult environments, animal populations have developed highly specialized adaptive strategies to enable them to survive.

Zapovedniki in desert regions range from the 39-square-kilometer Kyzyl-Kum reserve, which supports 255 bird and 37 mammal species, to the vast (5,720-square-kilometer) Kaplankyr reserve in Turkmenia, created in 1979 to protect an area of gravelly, stony, and clay-desert ecosystems.

A. KNYSHUTAS

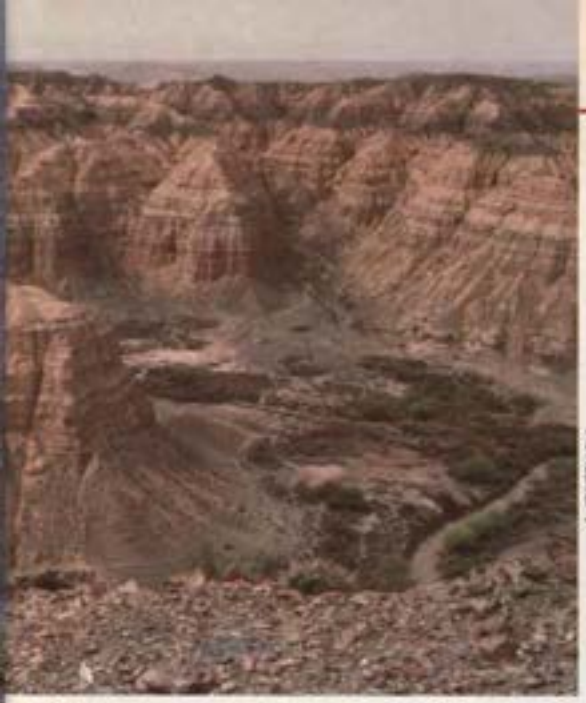
The canyon of the Charyn River, in the desert mountains of southern Kazakhstan.

*A pair of Horsfield's tortoises (*Testudo horsfieldii*) mating in the Kalkan Mountain region of southeastern Kazakhstan. This photograph was taken in April; by June the adults begin to hibernate as the ephemeral plants on which they feed start to dry up.*

A. KNYSHUTAS

*Siberian spruce (*Picea obovata*) is one of the dominant trees of the western taiga. The permanent shade these dense stands create has conditioned the plants of the taiga understory to abandon annual flowering in favor of vegetative reproduction strategies.*

Y. SHIBAEV



*The rare and deadly Central Asian cobra (*Naja oxyana*) enjoys a diet of birds, rodents, and amphibians as well as other reptiles. The snake in this photo has evidently eaten fairly recently.*

Toad-headed lizards such as Phrynocephalus maculatus *can bury themselves almost instantly, pushing sand aside with quick sideways movements. Their varied diet includes insects, spiders, flowers, fruits, and leaves.*

*Lake Alakol, near the deserts of Kazakhstan, is the site of one of the Soviet Union's (and the world's) two known colonies of relict gulls (*Larus relictus*). The birds nest—at no small risk to their eggs and hatchlings—on several small islands located in the middle of the windy, rain-swept lake.*

*A number of understory plants have adapted to growth in the perennial shadow of the dense spruce forests of the eastern taiga, among them the delicate wood sorrel (*Oxalis acetocella*).*

*The red-flanked bluetail (*Tarsiger cyanurus*, also known as orange-flanked bush-robin), a small relative of the thrushes, is a lively perching bird whose call is a loud "fyeet-trr." It breeds in the southern tall-forest taiga, then winters in southeast Asia.*

TAIGA

A large number of the Soviet Union's nature reserves are in the taiga, the world's largest conifer forest. From the Baltic in the west to the Sea of Okhotsk, a third of the USSR's land surface—and 80 percent of its wooded area—is taiga. A relatively small taiga region exists in European Russia, but the Siberian taiga, which ranges east to the Sea of Okhotsk from the Urals, is far more extensive.

The western taiga's climate is cloudier than the eastern, with more rain and snow. Its vegetation is dominated by dense stands of Norway and Siberian spruce, Siberian fir, and Siberian stone pine. In the eastern taiga, where the climate is generally drier, the larch dominates. This zone experiences the greatest temperature range in the world—varying as much as 180 degrees between summer and winter.

In addition to the differences between the western and eastern taiga zones, there are significant north/south variances. The best soils are in the south; there the forests are carpeted by rich populations of lichens, mosses, and shrubs. The milder climate of the southern taiga makes the area more hospitable to plants and animals. Many bird species flourish in the taiga; it's also a stronghold for deer, sable, and bear.

MOUNTAINS

Mountain ranges of varying heights cover a third of the Soviet Union's land area. Some 50 reserves have been established to protect the natural values of segments of different ranges, among them the 2,644-square-kilometer Kavkaz *zapovednik* in the Caucasus and the smaller Chatkal unit in the Tian Shan Mountains, both of which have been converted to UNESCO biosphere reserves.

The mountains of the USSR are home to diverse forms of animal and plant life, many of which are also found in other habitats occurring within the mountain ecosystem, such as plains, forests, tundra, and deserts. The striking phenomenon of biological succession—familiar to mountain visitors around the world—occurs in all the Soviet Union's major ranges: the Caucasus, Tian Shan, Pamir, Altai, Kopet-Dag, and others. As one ascends a given mountain, temperature and humidity are the crucial variables in determining the limits of these zones. The zones, in turn, are affected by the mountain's altitude, latitude, and orientation toward the sun. (Most of the USSR's mountain ranges run east/west.) Particularly in the southern ranges, these variables can be quite significant.

Though zonation patterns vary from mountain to mountain, even within the same range, there are two distinct zones of true mountain vegetation above treeline: subalpine and alpine. Where subalpine meadows occur (and they are not ubiquitous throughout all Soviet ranges), a profusion of grasses and colorful wildflowers abounds. The alpine plant community, on the other hand, is characterized by a short growing season and extreme temperature variations. The cold and wind of the heights encourage plants to grow low to the ground. Furthermore, many species reproduce asexually because pollinators are scarce in these harsh conditions.

A. KNYSHOV

H. SAKALAUSKAS

A *profusion of plant and animal species thrive in the Talass Alatau range of the western Tian Shan Mountains (above), the site of the Aksu-Dzhabagly* zapovednik, *Kazakhstan's oldest (created in 1927). Plant life in the reserve is exceptionally varied, with 1,300 species, including many rare and endemic ones. At last count, some 240 bird species have been sighted here as well.*

***T**his is the first known color photograph of* Eublepharis turkmenica, *a gecko that was discovered in the stony desert foothills of the Kopet-Dag Mountains in 1977. No more than 20 individuals have been seen so far.*

A. KNYSHOV

A *portion of 78-kilometer-long Lake Têletsk is protected within the 8,671-square-kilometer Altai Nature Reserve.*

V. BRABOV

A *recently established—and highly controversial—* zapovednik *is located on the volcanic Kurile island of Kunashir (left), part of the Pacific "ring of fire" that includes the Cascade volcanoes of the American Northwest. Kunashir is only 15 kilometers from the Japanese island of Hokkaido, and possession of the Kuriles (ceded to the USSR by the Yalta Conference in 1945) is still a matter of dispute between the two nations.*

STEPPES

Because the grassy plains that once covered vast areas of the Soviet Union have been intensively cultivated for centuries, the best examples of original steppelands now survive mainly in *zapovedniki*, at least in the European republics. Additional virgin steppelands have been preserved in *zapovedniki* in the Asian USSR.

The steppe zone lies between the forest and desert zones. Even today, much transformed, it stretches from the Ukraine and Moldavia to Siberia. (A discontinuous steppe zone also exists in the mountain valleys of Mongolia.) It's a zone of little moisture: Annual rainfall averages between 12 and 20 inches. Not surprisingly, therefore, steppe vegetation is drought-resistant, and there are areas, particularly in the northern steppes, that are rich in plant life. (As many as 73 plant species can be found occupying a square yard of soil in some northern areas.) Animal species are not so amply distributed, however; most typical steppe animals are found today in the Asian part of the zone.

A. KNYSTAUTAS

The globe-shaped flowers of Allium rotundum, *a wild onion species, are common in the southern steppes. This photo was taken near the Sea of Azov.*

H. SAKALAUSKAS

*The steppe lark (*Melanocorypha calandra*) ranges across the Ukraine, lower Volga, western Kazakhstan, and Central Asia. This female with nestlings was photographed near the delta of the Atrek River in south Turkmenia.*

restudy the siting of the plant.

The Soviet government has stepped up efforts in the last ten years to inform its citizens about endangered species, Pryde observes. But it's too early to say whether this educational process will prove effective in curtailing pesticide abuse, industrial pollution, poaching, and other contributors to wildlife decline. Since 1974 an inventory of rare and endangered species has been published, with periodic revisions; the last edition was in 1985. This *Red Book* (*Krasnaya kniga*) lists and evaluates the status (rare, endangered, threatened, recovering, or unknown) of mammals, birds, and reptiles according to the classification system established by the International Union for the Conservation of Nature. Pryde praises the thoroughness of the *Red Book* even as he points out that the listing of endangered species is but a first step. Listing needs to be accompanied by legislation to enforce the kind of protection embodied in our own Endangered Species Act.

The Western world will get its first comprehensive look at the *zapovedniki* and their wealth of wildlife species this year. Algirdas Knystautas, a Lithuanian photographer who is one of the relatively few officially sanctioned visitors to the Soviet reserve system, has contributed text and hundreds of color photographs to *The Natural History of the USSR* (to be published in this country in October by McGraw-Hill). It is a colorful, ambitious, and authoritative book that will be welcomed by natural historians, zoologists, and others who previously have been unable to gather much information on Soviet wildlife and conservation efforts.

In these pages, *Sierra* offers its readers a preview of the book's many high-quality photographs, most of which have never been published in the West. The accompanying text and captions are based in part upon the detailed text prepared by Knystautas and his editors at Century Hutchinson in London. ■

JONATHAN F. KING *is* Sierra's *managing editor.*

At a table in the front of the room are two admirals, a manufacturer of components for nuclear power plants, a lawyer, and a nuclear physicist. Except for the lawyer, who reclines in his chair, the men sit gray and squarely. An audience of about a hundred is listening to the five men discuss the weather.

The conversation is not the usual one about sun or rain or snow, but rather about the meteorological conditions after a nuclear accident, conditions that would contribute to the deaths of tens or hundreds or thousands of people. When it is the lawyer's turn to speak, many observers lean forward. He asks for a few points of clarification. When he says he has no further comments, the anticipation in the room dissolves into vague disappointment. Another 15 minutes and the meeting on reactor risks is over.

"Asselstine seemed subdued today," someone says in the elevator. Several other passengers murmur agreement. Passivity is not what people have come to expect of Commissioner James K. Asselstine.

Asselstine and the other four men at the table make up the Nuclear Regulatory Commission (NRC), the federal agency whose primary responsibility is to protect the public from the dangers of nuclear power. The NRC was born of the Atomic Energy Commission in 1975, when Congress recognized the need to separate those who promote nuclear power from those who regulate it. But 12 years later, with the promoters supposedly in the Department of Energy (DOE) and the regulators in the NRC, many observers question whether that division ever really took place.

"Congress broke up the Atomic Energy Commission to ensure that there would be a regulatory agency vested with the mission of protecting the public," says Rep. Edward Markey (D-Mass.), who for four years chaired the subcommittee that watches over the NRC. "But with the sole exception of Jim Asselstine, the commissioners now at the NRC have forgotten that basic fact."

Commissioner Asselstine believes that

ART STEIN

The Case of the Dissenting Commissioner

During his five years on the Nuclear Regulatory Commission, Jim Asselstine has argued tirelessly to make public safety the agency's foremost concern. So why is he about to lose his job?

ANNIE STINE

memory lapse is partly to blame for the nuclear industry's decline. No new reactor has been ordered since 1978, and all those ordered since 1974 have been canceled. Public confidence in the technology has fallen as the number of "events," the industry's euphemism for near accidents, has risen. And trust in the agency that supposedly regulates the industry has dissipated as the NRC repeatedly undermines its own regulations.

It is ironic that Asselstine, who as a vigorous advocate of stringent nuclear safety regulations seems well suited to his NRC role, often finds himself opposing his colleagues on the commission. But Alice-in-Wonderland thinking thrives in NRC country. "Asselstine is in favor of safety because he wants the industry to make it," says one agency staffer. "But here, pro-safety means anti-nuke."

Appointed in 1982, Asselstine will complete his term on June 30. Friend and foe alike say the chances of his reappointment range from slim to none. "I'd like to stay on, for there is much more to do," he says, "but the industry and the commission think they can solve their problems if they just get rid of the people who raise the disconcerting questions." That means getting rid of Asselstine.

Jim Asselstine began raising disconcerting questions long before his commissioner days. After law school and several years of legal work for the NRC, in 1978 he moved to Capitol Hill. There, as counsel to the Senate Subcommittee on Nuclear Regulation, he helped shape the Nuclear Waste Policy Act, the most complex piece of nuclear legislation since the Atomic Energy Act of 1954.

"Jim was extraordinarily open and committed to a process where everyone would have a say," recalls Brooks Yeager, a Sierra Club Washington, D.C., lobbyist who worked on the nuclear waste bill. "More than any other person he was responsible for transforming a weak Senate bill that mandated only surface storage into one that included permanent underground repositories, public participation, and state veto power over proposed disposal sites."

While working on the waste bill, Asselstine found himself face to face with an uncompromising opponent: the military. Up until 1981 the House and Senate Armed Services committees had staunchly defended the proposition that no portion of the military waste-disposal program should be open to civilian scrutiny or the NRC licensing process.

Those who wanted civilian control over military wastes saw an ally in Asselstine. They went to him, and he went to Sen. Alan Simpson (R-Wyo.), who as chair of the subcommittee was Asselstine's boss. The young subcommittee counsel persuaded Simpson to lead the fight against an Armed Services Committee amendment that would have exempted military re-

positories from most of the regulations of the bill. The amendment was defeated, and military wastes are now subject to the same environmental regulations and licensing procedures as civilian waste.

"Jim was one of the first people who attempted to bring order to the nightmare of defense waste," Yeager says. "It took a lot of courage in a Republican-controlled Senate to ask Alan Simpson to go to work against the Armed Services Committee. I've always admired Jim for that."

> "The consistent message from the commission is that it doesn't care for procedural niceties, it doesn't want to hear bad news, and it will defer to the industry even when significant safety issues need attention."

Simpson remembers his former employee with wry tenderness. "When I wandered on the scene in 1978," he reminisces, "I found there a fascinating staff member of facile mind and owlish demeanor. He was superb. I knew next to nothing about nuclear regulation, but Jim taught me in a way that was quite remarkable." When a vacancy appeared on the NRC in the spring of 1982, Simpson suggested to President Reagan that he appoint Asselstine to fill it.

The drama that followed is legendary in NRC history. The NRC had just turned down by a 3-2 vote the Department of Energy's request to begin site preparation for the Clinch River Breeder Reactor in Tennessee. The departing commissioner had voted no.

Now the DOE was back with the same request. The administration—and its industry advisors—were looking for an appointee who could be confirmed quickly and who would presumably swing the commission in favor of the DOE. Given his association with a committee dominated by conservative Republicans, they thought they had their man in Asselstine.

Asselstine received Senate confirmation on a Thursday night. On Friday, Nunzio Palladino, who was then chairman of the NRC, told Asselstine he wanted him sworn in Monday morning in preparation for a meeting Monday afternoon. The swearing in could occur anywhere in the district, he was told. "I had visions of a ceremony down at the corner drugstore," Asselstine recalls.

The two remaining commissioners who had voted against the DOE were out of town, and Asselstine was adamant that they be notified of the meeting. He was also blunt with Palladino: "I told him this was bad business."

Asselstine was sworn in (in Palladino's office, not the local pharmacy) at 11 a.m. on Monday. One commissioner was still out of town, and a tie vote would mean denial of the DOE's request.

Asselstine spent his first hours as a commissioner writing an explanation of his upcoming vote. "I am convinced that the timing of the request and the importance of my position to the outcome of the request for reconsideration would raise serious concerns regarding my own independence and objectivity, and that of the commission, should I vote today in favor of the department's motion to reconsider."

He voted against the DOE's request. "They thought they were appointing one of their own, but he shocked them by voting to deny the permit," says the Sierra Club's Yeager. "In hindsight it was a test of the integrity with which he was going to approach the job."

One person who was not shocked was Simpson. "Clinch River, that's where they made their mistake with Jim," Simpson recalls with the sorrow of a father who has seen his son misused. "When all this was happening he came to me and said, 'They have prejudged my ability to think and form my own opinion. That offends me.' Unfortunately, they did not recognize that they had a man who was terribly bright, inquisitive, and dedicated to procedure."

Five years later, not so securely ensconced in his spacious office, the 38-year-old Asselstine now sees his first day as having set the stage for what was to come. He is often a minority of one on a commission whose current members have all been appointed by Reagan. He has written scathing dissents to many of the majority's decisions, including the restart of the damaged Three Mile Island reactor and the licensing of the Diablo Canyon plant in California, a decision, he wrote, that "ignores fundamental principles of emergency planning, offends common sense, and abuses the legal process."

His verbal prose is calmer, and he makes his points with lawyerly acumen. "The heart of my disagreement with the other members of the commission is over the role of the agency and the importance of regulation," he says. "I believe that if this industry is to survive, it has to be carefully regulated by an agency that is perceived as independent and effective. The perception of the other members of the commission is that the industry has to be protected and deferred to."

Asselstine also parts company with his colleagues over the issue of citizen involvement, which he sees not only as a legal requirement but as an aid to the adoption of meaningful safety standards. "The others see public participation as an opportunity for people who are opposed to nuclear power to delay or stop a plant," he says. "I think there has been a pattern of bias against citizen intervenors in many NRC proceedings."

Despite their differences, Asselstine

characterizes his relationships with his colleagues on the NRC as at least civil. "The other commissioners are decent and sincerely believe they are doing what's right," he says. "For the most part they, and the NRC staff, have grown up in this field. They have been part of nuclear energy since the beginning. But that's why nuclear power has gotten into trouble—there's been a tendency to protect it, rather than seeing that the best thing that could happen to nuclear power would be for it to be regulated fairly and objectively. Unfortunately, the consistent message from the commission is that it doesn't care all that much for procedural niceties, it doesn't want to hear bad news, and it will defer to the industry even when there are significant safety issues that need attention."

Since procedural niceties and bad news are of vital concern to Asselstine, his opinions have not been well received by his colleagues. "The other commissioners feel that he takes a hard line and is unwilling to compromise," says an NRC staffer. "And it's not just that he disagrees with them. He makes it public in his lengthy, legalistic dissents. That's not appreciated by those who didn't want to hear his opposition in the first place."

As he approaches the end of his term on the NRC, Jim Asselstine is a pessimistic man. During the last few years, he says, the commission has taken four actions that have set the NRC and the nuclear industry on a dangerous course. "These four actions are the basis for judging whether we are doing enough to prevent severe nuclear accidents in this country," he says, "and whether we are pursuing the kinds of improvements necessary when we see deficiencies." In short, they are the test of whether the NRC is doing its job.

The first action took place in May 1985. The commission was considering shutting down two units at Indian Point, located 30 miles north of New York City, because of safety problems and inadequate emergency planning. (Some 250,000 people live within a 10-mile radius of the plant.) Despite recommendations from the NRC technical staff and the licensing board that certain safety steps be taken, four members of the commission voted that the units were safe enough as they were. Although the commission had problems with the evacuation plan, the majority felt that the utility's proposals had improved over time and could be reviewed at a future date.

"That decision was flat-out wrong," Asselstine says. "If you have large numbers of people living near a plant, you do as much as you can possibly do to protect them. The NRC staff had determined that some changes were necessary, appropriate, and fully justified. I don't understand how anyone could reach the conclusion the other commissioners reached in that case."

After deciding that Indian Point posed no undue risk to the public, the commission majority soon adopted the Policy on Severe Reactor Accidents, in which it determined that *all* existing plants were acceptably safe. Asselstine sees the adoption of this policy as the second indication of the NRC's downward spiral.

In announcing the policy, Chairman Palladino wrote, "I believe the Commission is on the right course with this decision," and he went on to state that the policy was logical and consistent with the commission's other actions. Asselstine, once more the lone dissenter, charged: "The commission's action today fails to provide even the most rudimentary explanation of, or justification for, these sweeping conclusions. As a basis for rational decision-making, the commission's severe-accident policy statement is a complete failure."

AP / WIDE WORLD PHOTOS

NRC Commissioner Jim Asselstine, who has visited 60 of the nation's 108 nuclear power plants, tours the control room of the Pilgrim plant in Plymouth, Mass. Pilgrim has been shut down because of operational problems since April 12, 1986.

Asselstine sees the policy as being a favor to the nuclear industry, which wanted a commission statement that would lay to rest the inquiry into reactor safety that began after Three Mile Island. But he does not see the public as so naive.

"The agency gets into trouble when it tries to make broad statements to reassure the public when in fact there is no real support for those pronouncements, and worse, where actual experience directly refutes what the agency is saying," Asselstine says.

While the commission apparently believes it can erase the possibility of an accident by declaration, the analyses done by NRC staff conclude that the

likelihood of a serious nuclear accident over the next 20 years is between 12 and 45 percent. As Asselstine points out, those numbers don't even include such external causes of accidents as earthquakes and floods, human error, equipment failure, or the poor operating performance record of existing plants. "My own conclusion is that we should not be surprised to see at least one serious nuclear accident in this country in the next 10 to 20 years," he says.

Just how serious that accident will be depends on the performance of the reactor containment vessel, the structure that is supposed to keep radioactivity from escaping. Asselstine alleges that, in a third crucial action, the NRC has eroded its power to ensure that containment and other safety issues are adequately addressed.

> "My own conclusion is that we should not be surprised to see at least one serious nuclear accident in this country in the next 10 to 20 years."

At issue is the NRC's "backfit rule," which determines under what conditions a utility must make safety-related changes at operating plants. The rule is "unprecedented in the annals of regulation," according to Asselstine. "I'm not aware of any other agency that has deliberately restricted its own ability to impose safety requirements."

Under the backfit rule, a utility can be required to improve a plant only if the benefits of the change outweigh the costs. While the commission was quite specific about which costs needed to be considered, the only benefit listed in the rule is the prevention of injury to a member of the public. "It's very difficult to calculate that benefit," Asselstine claims. "The industry could challenge—and block—almost any proposed change, including those recommended by the commission itself."

Asselstine feels that the most obvious benefit that should be considered is avoiding a large-scale accident in which contamination spreads beyond the plant site.

"I can't see how anyone can justify not including the benefit of avoiding a Chernobyl," he says. "If you consider the costs of displaced people, ruined crops, and a damaged reactor, you can increase the amount of money that would be justified for safety improvements by ten times. I think the commission intentionally left that out."

The backfit rule also requires that the improvement result in "a substantial increase" in protection of the public. That requirement, he feels, is so unclear that it is useless.

In Asselstine's strong dissent to the rule he stated: "The adoption of this rule is the most compelling evidence to date of the commission majority's open hostility to the regulatory mission of this agency. . . . The commission is reluctant to demand improved safety because that might suggest to the public that the existing reactors are unsafe and might hinder the further development of the nuclear industry." He predicted that the rule would make it almost impossible to insist on safety improvements.

Chairman Palladino disagreed: "The rule that emerged is a good one. Contrary to the claim of Commissioner Asselstine, the rule is not designed to stymie regulation. Commissioner Asselstine simply ignores the words of the rule when he contends that it requires a backfit analysis that is skewed against new safety requirements."

The backfit rule was adopted in September 1985. Early in 1987 the commission was called to a hearing before the House Interior Committee. The commissioners were asked to identify the most important safety improvement that had been adopted over the past year. The request was met with stunning silence: They had none to offer.

By this time Asselstine was becoming all too familiar with defeat. But another disappointment lay ahead. In July the commission announced its nuclear reactor safety goals, a move that Asselstine now sees as the fourth key negative action during his tenure.

The first goal the commission decided upon was that the risk of death to a person near a nuclear power plant should be less than one tenth of one percent of the risk of death from other kinds of accidents. The second goal was that the risk of cancer deaths from nuclear-power-plant operation should be less than one tenth of one percent of the risk of cancer deaths from other causes.

Those goals are fine as far as they go, says Asselstine, but two goals are missing. The likelihood of an accident should be very low, and the performance level of containment vessels should be very high. Despite his urging, the commission did not adopt safety goals that addressed these issues.

Asselstine claims that because they address only public health, the safety goals have no teeth. "The numerical goals adopted by the commission set a test," he says, "that would have been passed by the reactor at Chernobyl."

Asselstine sighs as he rests his case. Yes, he says with more sadness than chagrin, it's been frustrating, difficult, discouraging. During his tenure on the commission he has seen the agency ignore the lessons of Three Mile Island and Chernobyl, grant licenses to unsafe reactors, and, as he wrote after the majority approved the backfit rule, "continue its inexorable march down the path toward nonregulation of the nuclear industry." The result, he warns, could be a nuclear accident far more serious than has yet occurred.

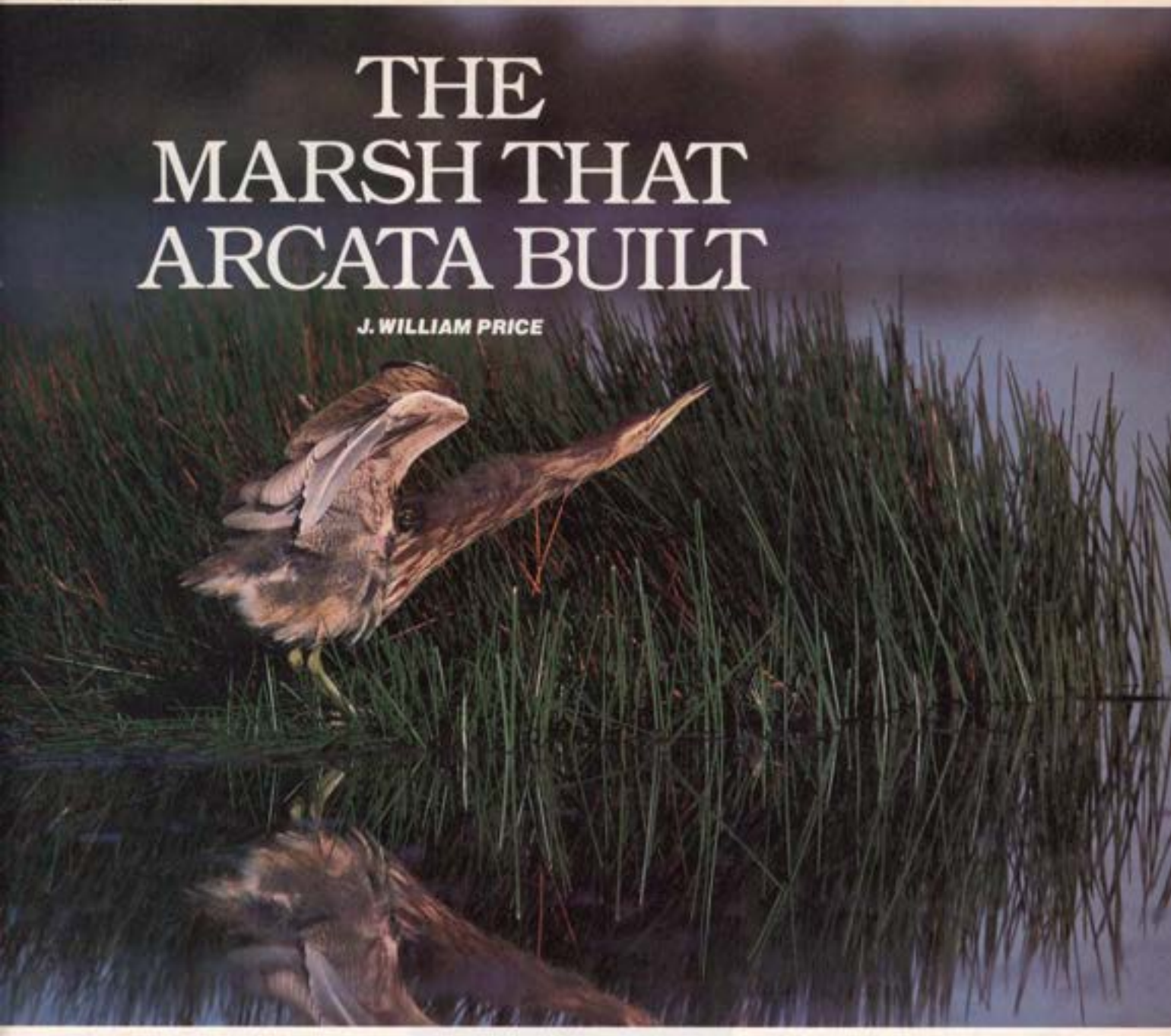
At the thought of such a catastrophe, the eyebrows rise on the owlish face. The judicious mind organizes its dissent. To this commissioner, that probability is simply unacceptable. ■

ANNIE STINE *is an associate editor of* Sierra.

J. MARK HOLEY

THE MARSH THAT ARCATA BUILT

J. WILLIAM PRICE



An American bittern in Arcata. In solving a sewage-treatment problem, this small California town secured a slew of side benefits—abundant bird life, a thriving salmon ranch, a new fuel source, a public park, and a proud populace.

The Arcata Marsh and Wildlife Sanctuary lies in a foggy little university town about 280 miles north of San Francisco. Trails and weathered bird blinds draw numerous human visitors, while 94 acres of saltwater and freshwater marshes support a teeming population of migratory and resident waterfowl. For many of Arcata's 14,800 citizens, the sanctuary is a favorite place to relax.

"But did you know," says a birdwatcher to a visitor, "that the water in these marshes is wastewater? That what you're looking at is part of a sewage-treatment plant?"

It's true. Effluent from Arcata's sewage-treatment plant is routed right through the sanctuary. Organisms that live in the mud and on the plants of the marsh act as a filter for the wastewater, while the effluent's nutrients add to the richness of the ecological system. Arcata's municipal salmon hatchery grows fish in the wastewater. Stickleback, native fish that abound here, take care of mosquito

control. Just offshore from Arcata, where the effluent finally flows into Humboldt Bay, are the state's most productive commercial oyster beds. Eventually, cattails from the marsh may be harvested and used to produce ethanol (to help run police cars) or methane (to generate electricity).

Local experts say the marsh will need careful management to fulfill its promise. But it has already become a focal point for the community. On any given weekday visitors can see Arcata's small public works staff going about its business in state-of-the-art laboratory facilities and rattletrap vehicles, while birdwatchers, picnickers, and schoolchildren enjoy their unusual sanctuary.

This part of Arcata wasn't always so peaceful and productive. Ten years ago the site contained an abandoned county dump, an old railroad trestle, and the remains of a lumber mill. Arcata's city council and local activists were battling with California's powerful State Water Resources Control Board over plans for a regional sewage-treatment facility that residents considered both environmentally and economically unsound.

As soon as the implications of the state's plan became clear—higher costs, a sewage line through surrounding agricultural lands that would encourage rapid development, and possible contamination of the bay—a number of Arcata citizens began working to find an alternative. If Arcata wanted to keep putting its wastewater into the bay, the town would have to meet a new state requirement to "enhance the quality of Humboldt Bay."

One day, during the time when the proposal was first taking shape, Humboldt State University Professor George Allen decided to discuss the town's enhancement dilemma in an undergraduate fisheries class. A nameless hero (whom Allen now recalls as "a C-minus student") suggested passing the local effluent through wetlands. "I grabbed my hat and ran out of that classroom to find [engineering Professor] Bob Gearheart," Allen recalls. "Why didn't I think of it first?"

Together with Stanley Harris, a professor of wildlife management at Humboldt, and Frank Klopp, Arcata's public works director, Gearheart and Allen developed a plan that involved using an upgraded version of Arcata's existing sewage-treatment plant in conjunction with a system of freshwater marshes.

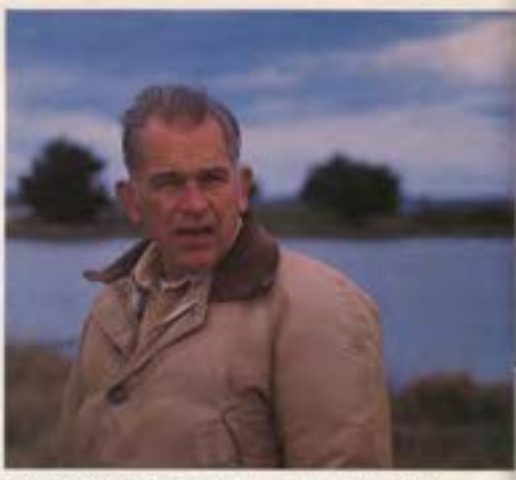
Klopp won the Arcata City Council's endorsement for the plan in February 1977. A few months later, however, the Regional Water Quality Control Board refused to give its nod, arguing that the plan would not enhance the quality of Humboldt Bay.

Arcata would not back down. The town appealed the regional board's decision to the State Water Resources Control Board. In October 1977 the state agreed to consider funding a demonstration project that would use wetlands to treat wastes. After long negotiations, in 1979 Arcata finally got $300,000 for a three-year pilot program.

By this time Arcata was already at work rebuilding its marshlands. With rented equipment and funds from the State Coastal Conservancy, the city was transforming these lands into the Arcata Marsh and Wildlife Sanctuary. Near the old county dump, now a grassy hill sealed off with clay, workers dug out a five-foot-deep lake. They leveled one mudflat area, creating a few islands with the extra fill. They built dikes around an old pasture and filled it with fresh water. Near the abandoned lumber mill, they dug out old wood chips and let fresh water flow over the cleared ground. No vegetation was introduced in any of these new marshlands. Topsoil was scraped off and re-spread after grading. Then well and surface water was turned into the area. Nature did the rest.

Humboldt State Professor George Allen leads a tour of Arcata's salmon ranch. Fish reared near the sewage plant spawn here along Jolly Giant Creek.

LARRY ULRICH



Frank Klopp, Arcata's down-to-earth public works director, is a staunch advocate of using wetlands to treat wastewater.

The sanctuary was dedicated in 1981, the same year the city received the California Coastal Commission's Award of Distinction for design excellence and successful implementation of the policies of the California Coastal Act. This was the beginning of a continuing collaboration between Arcata and the conservancy. Over the next three years the city restored 17 acres of salt marsh and constructed an estuary on a 26-acre industrial site near the original project. So far, Arcata and the conservancy have added 96 acres of wetlands and 22 acres of adjacent uplands to the town's open-space reserves for a total investment of $675,550.

Finally, in July 1983 the State Water Resources Control Board accepted the results of the waste-treatment pilot study and approved Arcata's wetland process. Three years later, treated effluent entered the marshes of the wildlife sanctuary for the first time.

The result is both a less expensive and more effective solution to the town's sewage-treatment problems than the state had originally planned. "But what we have really saved is water quality," Klopp says. The water going into the

ocean from the regional plant would have met state standards, but it would not have been as clean as the water that Arcata now puts into Humboldt Bay.

The new marsh has also brought Arcata a dramatic increase in bird life. Almost 200 bird species now use the sanctuary—more than twice as many as ornithologist Stanley Harris and his Humboldt State students had seen near the treatment plant before. In October and November about 1,000 ducks spent six weeks resting on a single five-acre pond in the sanctuary. "We didn't have habitat that attracted birds in huge numbers like that before," Harris explains. The marsh is now an important rest stop for birds migrating along the Pacific Flyway.

Thanks to Humboldt State's George Allen, fish also are establishing a stronghold here. Arcata's hatchery ponds, fed with wastewater, are full of thousands of young salmon as well as steelhead and cutthroat trout. The salmon are released in a local stream and swim to the ocean when they are old enough to tolerate seawater. Adults return to the creek, where they are either trapped for their eggs or allowed to spawn.

Allen hopes that the creek can eventually support a small natural run of salmon. Meanwhile, he's working to establish an artificial run to his hatchery ponds near the sewage-treatment plant.

"Because our project is new and innovative, it's an exhilarating place for students to work," Allen says. "It's also a valuable demonstration of how treated wastewater can be used to provide wholesome food."

Then there are the cattails. If the marsh is for filtering, fish, and fowl, its nutrient-rich water is also producing an abundant supply of vegetation—enough to threaten the open water needed for ducks. But Gearhart is determined to make the marsh's fertility a boon rather than a bane.

A pilot project that the engineer began in the early 1980s proved that cattails can be used to produce either a liquid or a gaseous fuel—that is, either ethanol or methane. Cattails could probably supply about 10 percent of the local police force's fuel needs, he says, or double the amount of electricity now being produced in a cogeneration plant fueled by the town's sewage solids. But it will take a 30- to 40-percent rise in fuel costs to make this cattail-power project economically feasible, Gearheart adds.

J. MARK HOLLY

Marbled godwits land at the Arcata Marsh and Wildlife Sanctuary. New freshwater and saltwater habitat attracts more than 200 bird species.

With or without the fuel project, Arcata sees the sanctuary as a tremendous civic asset. About 112,000 people each year use the trails, bird blinds, and picnic facilities. The sanctuary's beauty and utility have united the community in its support. "People who had never looked at birds before are proud of the marsh," Harris says.

And word has spread beyond Arcata. Public Works Director Klopp once met a man at one of the sanctuary gates who had just driven for seven hours from his home in Livermore. "Where's the rare gull?" the visitor demanded.

Klopp, a cigar-chomping civil engineer, was amused by the question. But he doesn't mind the project's increased visibility. The marsh has solved problems for Arcata, and he'd like other communities to know about it.

"Anybody who has an oxidation pond can build a marsh in part of it to improve water quality," Klopp says. "The marsh will work 365 days a year, 24 hours a day. There are not even any valves to turn.

"An engineer might ask, 'What do I have to do?' The answer is nothing—just put some cattails down there." ■

J. William Price *is a San Francisco freelance writer.*

COVER

BLAZING A NEW OREGON TRAIL

The historic Oregon Trail may be buried under asphalt, but one ambitious hiker has charted an unspoiled–and largely unprotected–wilderness route across the state.

WILLIAM L. SULLIVAN

I WAS BEGINNING TO FEAR that the Beaver State had lost its sense of adventure. Most of the Oregon Trail, over which several thousand pioneers traveled to the lush Willamette River valley in the mid-1800s, has been paved into interstate freeway. Rest stops, motels, and hamburger stands dot a route that once led through wild and untamed country.

But in 1984, Congress passed the Oregon Forest Wilderness Bill and upped the number of the state's designated wilderness areas from 14 to 37. I began to reconsider. Grassy Knob? Black Canyon? Suddenly the map was sprinkled with islands of wildness even a native Oregonian like me had never heard of. Even more intriguing, the areas clustered along a scraggly line winding across the state from southwest to northeast.

Surely, I thought, that line would be the wildest hiking route across Oregon. The route would traverse four mountain ranges and 18 designated wilderness areas. It would lead through fog-bound rainforests, windswept glacial cirques, and sun-baked desert canyons. It would stretch more than 1,300 miles, from the Pacific shore at Cape Blanco to Oregon's easternmost point in the depths of Hells Canyon. It was irresistible.

I started backpacking when I was six. As a college student, I thumbed across North America twice. Since then I'd bicycled 5,000 kilometers around Europe and built a log cabin on Oregon's Siletz River entirely with hand tools. But now, at 32, I was buried in the life of a freelance writer, tapping out novels in an unheated Eugene basement. It was time to stare a little wildness in the face again.

I assembled a stack of topographic maps an inch thick to help me estimate what lay ahead. There would be some bushwhacking, but a surprising 57 percent of the route was already trail. I figured that I could cover the 1,360-mile route in two and a half months, at an average of 18 miles a day—as long as all went well on the trailless portions.

Federal ownership along the path was so complete that I could lay out a route entirely on public land and existing public rights-of-way. Why had no one thought of a cross-state footpath before? The state's Recreational Trail Advisory Council wondered too, and asked me to report on the idea's feasibility. A "New Oregon Trail," they agreed, just might be the future centerpiece of the state's trail network.

And so one foggy mid-August morning I lugged my 55-pound backpack off a Greyhound bus in the sleepy seacoast town of Port Orford, the closest stop to Cape Blanco. I had left eight boxes of supplies and food (mostly oatmeal, granola, noodles, and instant rice) for my wife to send me at checkpoints along my route. I had also left instructions to raise no alarm unless I missed a checkpoint by more than 48 hours.

I began to worry about my schedule almost from the start, as I hiked up from Cape Blanco into the little-known Grassy Knob Wilderness. The only trail in Grassy Knob had been destroyed in the waning months of the 1984 wilderness designation battle by a now-barricaded, 30-foot-wide gravel

Moss-covered rocks below Strawberry Falls in the Strawberry Mountain Wilderness. Five of the seven major life zones of the United States are represented in the area. At right, 2,000-foot-deep Joseph Canyon, a smaller version of nearby Hells Canyon, is sacred to the Nez Percé.

WILLARD CLAY

road. At the end of this eerie corridor I set off into the foggy green forest by map and compass. Live oaks, rhododendrons, and a tangle of iron-limbed madrona threw me back. Finally, by wallowing ahead like a bear, I crashed on through. After eight and a half hours of struggling over wooded ridges and down mossy canyons I splashed triumphantly across the Elk River to a forest road. It was seven miles on the map, but my pedometer showed 12. That day's hike proved to be the longest and most difficult trailless scramble of the entire trip.

A huge chunk of southwest Oregon wilderness lay just ahead: the Kalmiopsis. Bordered on the north and east by the rugged canyons of the Rogue and Illinois rivers, this area is under consideration for national park status. Here the crumpled, ancient Siskiyou Mountains are covered by sparse pine forests and traced by meandering gold miners' packtrails. And by my count, bears outnumber humans five to one. Surprised in the midst of their manzanita-berry meals, black bears would hurriedly huff and claw their way up trees until I passed. The only person I met in that vast wilderness seemed no less wary.

LARRY ULRICH

Babyfoot Lake in the Kalmiopsis Wilderness. Rugged country with many canyons and streams, the botanically diverse Kalmiopsis is home to many rare species, including the weeping spruce. Only 42 percent of Oregon's largest roadless area is designated wilderness.

I had already hiked 20 miles (on a 94-degree day, with precious little water) when I found my trail to a long-anticipated creek blocked by a brush shelter straight out of a Vietnamese jungle. Suddenly, a tall, red-bearded man in combat fatigues jumped out, pistol gleaming in his ammunition belt. Assuming I was the law, he quickly declared that he had been fishing there for three months. Oddly, I noticed no fishing gear, only an enormous pile of empty beer cans, three large rifles, and a six-foot blowgun of South American design.

He urged me to stay for lunch. Under the circumstances, I didn't see how I could decline.

DAVID JENSEN

After three hours of talk, the tense hermit eyed me squarely and said: "You know, I don't think you're a cop after all. I'm really growing a little marijuana out here." A financially ruined investment broker from Arizona, he was now camped for six months, carrying water to his 46 healthy plants and hoping to earn $20,000. He would use the money, he said, to buy a one-way ticket to a tropical island in the Indian Ocean.

Since May he had met only six people on this trail, and all but me had proven to be other marijuana growers.

From the remote Kalmiopsis I headed east, following the rising crest of the Siskiyous along the Oregon-California border. As the mountains rose, I encoun-

tered alpine meadows, delightful blue lakes, and craggy snow-covered peaks. There were trails, too, but none that connected to make a long-distance route. What a shame, I thought, that there is no Siskiyou Crest Trail to show off this beautiful, forgotten range to best advantage.

I joined the well-maintained Pacific Crest Trail (PCT) in the new Red Buttes Wilderness southwest of Medford. I hadn't been on the trail two hours before meeting my first PCT hiker. Bronzed, sporting mirror-lensed dark glasses, and wearing a white-tailed Foreign Legion desert hat, 22-year-old Chris Binns surprised me with his stiff Yorkshire accent. "I started the trail from Mexico in May," he said, "about a month later than the chaps planning to reach Canada before winter."

DAVID MUENCH

The 11-mile-long, 700-foot-deep Deschutes River Gorge is an unexpected treasure in Crooked River National Grasslands.

He shifted his enormous backpack and rearranged his various dangling camera bags and water skins. "There's hundreds of PCTers ahead of me," he added. "And they all know each other, leaving notes at trail registers, passing word with slower hikers. A week ahead of me there are two girls packing their stuff on llamas. One chap's already made it to Canada."

I asked him how he could have found that out.

"Oh, he wrote a postcard back to an outfitter near Shasta to let all the under-25-mile-a-day crowd know," Binns said. "Me, I don't think mileage is the main thing. I probably won't make it all the way, what with October coming in the North Cascades."

I too began to think about winter, even though September had barely begun. As I hiked north along the Cascades, summery meadows gave way to damp autumn forests full of mushrooms. Twice I ran into howling snow whiteouts that made it impossible to light a fire without using my butane camp stove. Crater Lake was a void of fog and sleet. Thirty-mile-per-hour winds filled the left-hand pocket of my waterproof coat with ice water. Because I had vowed from the start to continue regardless of the weather, I pushed on, in 30-mile days, searching for Indian summer. I had to leave the High Cascades to find it.

From a blizzard-bound lake at the foot of Mt. Jefferson, I trekked east into central Oregon and a different world. There, in a sunny canyon on the lower reaches of the remote Metolius River, I stretched out in an oasis of ponderosa pine while my soggy backpacking gear dried on yellow-blossomed clumps of rabbitbrush. That night the stars trooped out in armies, and the silent river slid past.

The following day I crossed a desert of sagebrush and rock to a seldom-seen wild stretch of the Deschutes River can-

Anthony Lake and Gunsight Mountain in the Blue Mountains are part of proposed additions to the John Day Wilderness.

WILLIAM L. SULLIVAN

yon. To the south, river runners are stopped by two huge cataracts, Big Falls and Steelhead Falls. To the north, fishermen stop at the end of Lake Billy Chinook in Cove Palisades State Park. In between are 11 miles of federal land, where the wild Deschutes foams through a canyon layered with 700 feet of basalt rimrock. As I scrambled along on rugged deer and coyote trails, I thought that if I could choose only one place to put a hiking trail, this would be it.

LARRY ULRICH

I hiked eastward along the Ochoco Range to the tall, well-forested Strawberry Mountains, south of the town of John Day. It was the dreamiest of Indian summers imaginable, comparable to anything a New England fall can muster. While the lower canyons were aflame with quaking aspen and golden currant, the high glacial valleys were sprinkled with brilliant orange larch—the only conifer that sheds its needles before winter.

It was in the Strawberries that I came across a strange sort of bag at the side of the trail. Actually, it wasn't so much a bag as a big, shapeless nothing. A nothing that blinked at me. Then it shifted position, and its other parts began to make more sense: camouflaged arms, camouflaged gloves, and a blackened

face draped with a baggy, camouflaged balaclava. Finally I recognized the camouflaged bow with its brace of camouflaged, razor-tipped arrows.

The well-disguised figure was Del Stevens, Portland Fire Department captain, in the Canyon Creek archery area for a limited elk-hunting season. Had I been an elk, my chances of recognizing him might have been even lower, for he had bathed in baking soda before scenting himself with the vile musk of a cow elk in rut. What's more, by using a small diaphragm in his mouth he could imitate the whistling bugle of a rival bull elk or the pathetic whimper of a lost calf.

"Elk are wary," Stevens told me. "I have to lure them in. And I won't settle for less than a standing flank shot at under 40 yards." He said he intended to go to an elk wallow the following morning and wait there, 30 feet up a tree on a carpeted triangular platform he had backpacked in. Since he was going to be there for ten hours, he planned to belt himself to the tree to prevent injury in case he should fall asleep at his stand.

"How many years have you been bow hunting like this?" I asked.

"Seven years."

"And have you shot many elk?"

"I've been sharpening my skills. Last year I got my first," he answered.

From the Strawberries I headed north into the Blue Mountains, following the 312-mile route of the proposed Blue Mountain Trail. Although local conservationists have worked for nearly two decades to create the trail, it still suffers from a dozen trailless gaps. According to the trail's chief promoter, Loren Hughes of La Grande, I was the first to attempt to hike it from end to end. Eyeing the skies warily, I knew that Indian summer could not last forever.

By early October I was on the beautiful but remote river trail of the recently designated North Fork John Day Wilderness. Storm clouds rolled in,

Black Canyon Wilderness in the seldom-visited Ochoco Mountains. The proposed long-distance trail would connect the Cascades, Ochocos, and Blue Mountains.

South Sister in the Cascade Range's popular Three Sisters Wilderness.

and the temperature plummeted. As the snow began to fall, I glumly looked for a flat spot where I could shiver through the blizzard in my tent. Instead, beside a rushing creek I found a gold miners' cabin built of lodgepole pine logs. A scrawled note on the ancient door read: "Welcome to the BigFoot Hilton. Our services include: 1) a little food; 2) all the water you can drink; 3) unlimited bathroom facilities; 4) broom furnished with each suite; 5) finest mattresses. Signed—BigFoot."

The door was propped closed by a rail. Inside, the dim light revealed a rickety table, a rusty cot, and an enormous homemade box stove that looked like it could consume anything and produce heat. I thanked my unseen Sasquatch host and settled down to enjoy a *New York Times* crossword puzzle that my wife had somehow smuggled into my map pocket. After I spent a cozy day watching icicles grow, blue sky reappeared. It would accompany me the rest of the way to Hells Canyon.

LARRY ULRICH

Oregon's premier hiking route, the Pacific Crest Trail, passes through the Mt. Jefferson Wilderness. The trail concentrates backcountry users in a single, fragile zone—the subalpine Cascades. The New Oregon Trail would relieve pressure on the Cascades by providing long-distance routes through a greater number and variety of the state's wilderness areas.

Mid-October and the end of the Blue Mountain Trail left me in the remote town of Troy, where the only public telephone is in a tavern. "Hello!" I hollered over the crackling line to my contact in civilization. "This is Bill Sullivan! Are you still planning to meet me at Hat Point on the Hells Canyon next week?"

Only 140 miles remained for me to reach Oregon's easternmost point in the depths of Hells Canyon and to climb out at Hat Point. The closer I got to that goal, the faster civilization was disappearing. This phone might be the last I'd find for the rest of the hike.

"Didn't I already tell you?" a weak voice finally broke through the static. "I was out cutting firewood and felled a tree on my head. . . ." Crackling interrupted the words, although I did hear ". . . some trouble with amnesia. *Who* did you say you were?"

I fought down a surge of panic. Hat Point is a very rough hour's drive from the end of pavement on an Oregon backroad. It is no place to end a hike without a dependable connection. After

UNPROTECTED WILDERNESS ALONG THE ROUTE OF THE NEW OREGON TRAIL

PUBLICITY surrounding the proposed New Oregon Trail provides a shot in the arm for the efforts of the Oregon Natural Resources Council to preserve at least 16 relatively unknown, unprotected wilderness areas along the trail's route. These wilderness areas can provide much-needed alternative destinations to the overused Cascades. Under the auspices of the State Parks Division's Recreational Trail Council, public meetings on the New Oregon Trail are scheduled for later this year.

This map highlights 11 of the underprotected and unprotected wildlands along the New Oregon Trail. Acreage figures represent the total of undesignated wilderness (and designated wilderness, where applicable).

1/The Kalmiopsis (168,900 acres of designated and 235,000 acres of undesignated wilderness). The largest forested wilderness in Oregon, this remote corner of the Klamath Mountains lies within sight of the Pacific Ocean on the California border. The wild waters of the Rogue and Illinois rivers carve through the Kalmiopsis' rugged canyons of madrona, pine, and chaparral. Planned Forest Service roads and helicopter logging threaten the National Park Service's proposed park designation for the area.

2/Soda Mountain (32,000 acres). Straddling the Pacific Crest Trail near the California border, Soda Mountain encompasses three geographic zones: the metamorphic Klamath Mountains, the volcanic Cascade Range, and the block-faulted high desert steppe. Flora varies dramatically from subalpine fir forest to scrub-oak chaparral to sagebrush. The Bureau of Land Management, which manages the area, is studying only 5,640 acres for wilderness designation.

3/Metolius Breaks roadless area (12,500 acres). The Metolius River Trail follows a swift, spring-fed river through the only roadless portion of this popular trout-stream canyon in central Oregon. Tall basalt cliffs on one side of the river are part of the Warm Springs Indian Reservation.

4/Deschutes Canyon (21,000 acres). A half mile wide and 700 feet deep, this wilderness portion of the Deschutes' gorge winds 11 miles through the sagebrush plateaus of central Oregon's Lower Desert. Despite precipitous cliffs, roads and summer homes crowd small parcels of private land near massive Steelhead Falls at the southern edge of the wilderness area.

5/Rock Creek (22,000 acres). The sagebrush and juniper of the Ochoco Mountains' uplands surround this deep, heavily forested valley. A level trail leads to the rushing creek.

6/Aldrich Mountain (32,000 acres). Although a road climbs to a Forest Service lookout atop this fault-

block mountain in dry eastern Oregon, the peak's broad, forested flanks are the roadless habitat of bighorn sheep and mule deer. **McClellan Mountain** (25,000 acres). Twenty miles east of Aldrich Mountain, this collection of broad, juniper-dotted summits invites cross-country hiking. Views from its peaks take in most of eastern Oregon.

7/Glacier Mountain (25,000 acres). Ice Age glaciers scalloped this piney mountain ridge in eastern Oregon. In a last minute House-Senate compromise, the area was dropped from the 1984 Oregon Wilderness Bill.

8/North Fork John Day (218,000 acres of designated and 165,000 acres of undesignated wilderness). More than one third of the heavily forested roadless region is undesignated and is being whittled away by roads and logging.

9/Blue Mountains roadless areas (20,200 acres of designated and 129,000 acres of undesignated wilderness). After the Rockies, the Blue Mountains posed the highest hurdles for the covered wagons on the old Oregon Trail. Here steep, forested canyons cut into cold, windswept tablelands. Hiking paths and deer hunters' trails abound. The New Oregon Trail passes through the protected North Fork Umatilla River area and the unprotected Mt. Emily, Hellhole, and Looking Glass Creek areas.

10/Joseph Canyon (25,000 acres). Sacred to the Nez Percé and named for their Chief Joseph, this rugged, 2,000-foot-deep counterpart to nearby Hells Canyon contains 16 documented archeological sites as well as habitat for elk, fish, and eagles.

11/Hells Canyon National Recreation Area (194,000 acres of designated and 300,000 acres of undesignated wilderness). A bill by Sen. Bob Packwood (R-Ore.) that would designate all remaining roadless areas in the Hells Canyon NRA as wilderness died in the last session of Congress. An opportunity to protect these areas from logging and road-building is not likely until Sen. Mark Hatfield (R-Ore.) leaves office in 1988.

a flurry of phone calls, I persuaded Loren Hughes—the Blue Mountain Trail activist—to make the three-hour trip from La Grande up to Hat Point, but he would only be available on the upcoming weekend. That left me just four days to backpack 140 miles through the deepest canyon on Earth.

I hung up with an unsteady hand. I had never seen Hells Canyon before. What *was* down there, anyway?

I set out an hour before dawn on a thin layer of snow remaining from the previous week's storm. After a grueling 40-mile day, mostly on Forest Service roads, I arrived by starlight at the northwest edge of the Hells Canyon rim. I set up my little backpacking tent at the edge of a mysterious black void.

When the sun rose the next morning I found I had camped at what looked like the ragged edge of a broken planet. I had hiked two months through Oregon's forests, but below me all was treeless. Fourteen layers of basalt rimrock retreated downward in jagged terraces. A vertical mile below, the mighty Snake River looked like a tiny black curve. Beyond, crumpled badlands on the Idaho side spread into the distance in sharp black shadows.

What a sight to see after a thousand miles on foot. Within 40 minutes I had packed up from breakfast and was whistling a tune down the trail to the Snake.

Before long, I'd hiked into a whole new climate. I could still see the snowline high above on the canyon rim. But down by the rushing, growling Snake the air was so summery I stripped to a T-shirt. Prickly pear dotted the canyon slopes. Monarch butterflies fluttered past, unaware that the rest of their tribe had long since gone south to California for the winter.

Two long, delightful days along the Snake River Trail took me to Oregon's easternmost point. It was a scene worth the journey. The perilous-looking river trail was blasted like an open-sided tunnel into the face of sheer granite cliffs. Below, the Snake roared through a chasm so narrow I could throw a stone over the whitewater and hit Idaho. Above the cliffs, the wild badlands and rimrock tiers of the world's deepest canyon stacked up to the sky.

JOHN MARSHALL

Hells Canyon, North America's deepest, reaches down as much as 8,000 feet. Proposed wilderness additions would increase protected lands from 194,000 to 494,000 acres.

I had crossed Oregon on foot by the wildest route possible, and I let out a shout of celebration. What's more, the 1,300-mile route I had scouted looked remarkably promising as the groundwork for a long-distance recreation trail. It traverses four stunning mountain ranges in addition to the popular Cascades. Nowhere does it cross private land or require a major bridge. And the majority of the missing trail sections would offer impressive walks even if they weren't part of a cross-state system. What a hike it had been.

But it was not over yet. The closest road was still at Hat Point, and I had just 24 hours to reach it. I marched through the dusk to a rough campsite, built a fire of driftwood, and looked at the map. Hat Point was still 28 miles away and 6,000 feet up! Backpacking there in a single day would be the equivalent of carrying half a sack of cement on a marathon, then up the stairs in the Empire State Building five times.

I ate breakfast in the predawn and waited for enough light to see the trail. Like an eerie signal, a coyote's lonely howl echoed off huge, shadowy cliffs. I shivered and set off.

Two thousand feet up I sent a herd of 75 elk running across the treeless slopes. Behind me the Snake had again shrunk to a tiny curve at the bottom of Hells Canyon's immense inner gorge. But I was only a third of the way up. After 4,000 feet of climb, the snowcapped peaks of the Seven Devils rose into view above the distant blue of the Idaho rim, like clouds in a sky I had yet to reach.

Puffing steam at each step, my leg muscles burning, I reached the lookout tower at Hat Point summit four minutes ahead of the rendezvous hour. I had just left my walking stick by the trailhead when a pickup bounced up the slushy road. Hughes leaned his head out the window. "You made it, eh? Say, hope I didn't rush you, getting here on a Sunday." He held up a hamburger and a cold beer, as if in apology.

"That's all right," I said, smiling. And I meant it, too. The challenge of Hells Canyon had been a fitting finale to my trek.

As I rattled back to civilization in the truck, two months and three days after having set out from the beach at Cape Blanco, I thought: Perhaps most of the wildness has been paved out of the original Oregon Trail. But Oregon hasn't run out of wilderness, or of wilderness adventure. ■

WILLIAM L. SULLIVAN *is a Eugene, Ore., writer whose book* Oregon's Wilderness: A Guide *is forthcoming from The Mountaineers. He is currently working on a book about the New Oregon Trail. This article originally appeared in* Oregon Magazine.

For the Rivers, Come Hell or High Water

Kathy Crist

To many Californians, Mark Dubois is "that guy who chained himself to a rock" in 1979 to save the Stanislaus River. But Dubois' determination to help preserve free-flowing streams everywhere goes far beyond that single act of civil disobedience—and usually keeps him chained to the telephone instead.

Dubois coordinates the efforts of Friends of the River (FOR), a national river-saving organization, from his home and office in Sacramento, Calif. As FOR's president and executive director, Dubois has attended conferences in Great Britain and around the United States, has traveled to Siberia on an environmental/peace mission, frequently speaks at hearings and colleges, and meets with activists all over the world. He serves on the boards of several environmental organizations, from Friends of the River to Friends of the Ganges. As if that weren't enough, Dubois has brought together a coalition of volunteer researchers, hydrologists, activists, and publicists—the International Dams Network—to study the social effects of the world's large dams.

What began for Dubois as a local battle to save a beloved river has escalated into a crusade: He wants to expose this country's wasteful water practices and prevent those practices from being foisted on developing countries in the Third World. "Every continent is copying the United States," he says, "both our advances and our mistakes."

Under the heading of mistakes Dubois would include most large-scale water projects, including New Melones Dam, which drowned the Stanislaus River in 1982.

Dubois first entered the fight to save the Stanislaus in 1973, while running a nonprofit rafting outfit called Environmental Traveling Companions. He specialized in taking delinquent and inner-city children and disabled adults down the Stanislaus. But whitewater trips on the river would end with the completion of New Melones, then in its seventh year of construction. Dubois hated the idea, but doubted that there was anything anyone could do about it.

Then he met Gerald Meral at a 1973 hearing of the California Water Commission, an advisory agency to the state's Department of Water Resources. Meral, who often led Sierra Club river trips down the Stanislaus, first heard of the dam project in 1967. Obsessed with the idea of saving the river, he thoroughly researched the dam proposal. Meral's digging convinced him that the irrigation and hydroelectric potential of New Melones—the Army Corps of Engineers' primary justification for building it—was minimal. He also felt a much smaller dam would provide flood control for California's Central Valley farmlands, another justification, without inundating the nine-mile boating stretch on the upper Stanislaus.

An earlier letter-writing and signature campaign failed to stop the project, so Meral decided to try to qualify an initiative for the November 1974 California ballot that would include the Stanislaus in the state's Wild and Scenic Rivers System. If the measure passed, it would prevent New Melones Dam from ever being filled to capacity.

Meral was traveling about the state, talking up the values of the river. He liked to quote a Bureau of Land Man-

"I thought of our speedy lives and how much we miss all this magic that goes on in every corner of the Earth every day."

DON BRIGGS PHOTOS

The Stanislaus, before and after its disappearance under New Melones' flatwater. Inset: Mark Dubois.

agement (BLM) study showing that the Stanislaus was the West's premier rafting river, drawing some 90,000 adventurers each year. High in the Sierra north of Yosemite National Park, the Stanislaus offered easy access and thrilling but navigable rafting sections. Meral felt that California's voters—not resource-hungry developers—should decide whether to flood the popular stream.

Dubois was impressed with Meral's research. So when Meral asked Dubois if he would consider coordinating the Sacramento-area effort to help collect the 300,000 signatures necessary to qualify the measure for the ballot, Dubois said he would give it a try. "It was supposed to take a couple of hours a day," he recalls with a laugh, "but it turned into a 24-hour-a-day job."

Politics wasn't really Dubois' forte. He was more at home on the river, where he could wear cutoffs and greet friends with a bear hug that left their feet dangling. At six feet eight, Dubois towers over almost everyone, a fact that made him something of a legend on the Stanislaus (along with his habit of lifting boats all by himself). But by early 1974, Dubois was in the thick of the battle to launch what became Proposition 17.

With donations that Stanislaus rafting outfitters collected from their clients, Meral formed Friends of the River as a campaign organization. Dubois' apartment became FOR's Northern California headquarters.

From the beginning, some people thought the effort to keep the upper Stanislaus free-flowing was hopeless. The Central Valley, nourished by Sierra streams, produces 25 percent of the nation's food. Southern California, which lacks water of its own, needs Northern California's water to sustain its huge population and industry. To the masterminds of California's water projects, the swirling green and white ribbons of the Stanislaus represented dollar signs and progress. Dams, diversions, and hydroelectric plants could pour water and power into vital agricultural and cosmopolitan basins. Impoundment of the Stanislaus could also help protect valuable farmlands downstream from periodic flooding.

During the next 10 months, Meral, Dubois, and 30,000 volunteers worked feverishly, first to place Proposition 17 on the ballot, then to get it passed. They bused up and down the state, gathering signatures and garnering votes. They stapled posters to telephone poles and hung homemade banners along freeways. Several FOR volunteers moved in with Dubois at the apartment/headquarters to work the phones.

Friends of the River's efforts paid off by June 1974. The group had gathered 348,000 valid signatures, enough to place the initiative on the ballot, and more than $238,000 in campaign contributions from rafting companies and individuals. This support made them feel that winning the election in November was within their grasp.

In the end, however, events would crush their hopes. Californians Against Proposition 17, with more than $400,000 in campaign contributions, launched a TV blitz just prior to the election; Friends of the River could counter only with radio spots. Perhaps inevitably, the measure lost—by 300,000 votes.

But Dubois, who emerged from the Stanislaus fight as FOR's president, couldn't stay away from the river. As long as the Stanislaus was alive, he thought, he would fight the filling of the reservoir. A few other FOR volunteers felt the same way, and they commis-

DON BROSS

David Brower (holding branch) rafted the Stan with Dubois and other activists.

sioned a poll to find out why people had voted the way they did on Proposition 17. The poll showed that the initiative's wording was so confusing that some who thought they were voting against the dam really had voted for it. It also became clear that Friends of the River had committed an error in strategy: Instead of following Meral's early example of talking up the values of the river, they had been on the defensive, fighting the Corps and the farmers.

With the wisdom of hindsight, FOR began again with a new approach. The election had brought Jerry Brown to the Governor's Mansion and a new political atmosphere to Sacramento. Both Brown and his resources secretary, Huey Johnson, were known to be fans of the river. Perhaps Brown could be persuaded to withdraw support for construction of New Melones—thus preventing the Corps from proceeding with the project—as Georgia Gov. Jimmy Carter had done for the Sprewell Bluff Dam on the Flint River. But for reasons that remain unclear, Brown didn't withdraw his support for the dam, dashing FOR's hopes again.

When the New Melones Dam was completed in 1978, FOR frantically searched for ways to prevent it from being filled to capacity. Sixty people trekked from Camp Nine on the Stanislaus to Sacramento, carrying a toyon tree from the doomed canyon to plant outside Gov. Brown's office. Twice a week, FOR outfitters took VIPs and members of the media down the river. Other volunteers did studies of the rare harvestman spider, which lived in a cave that would be flooded, and asked Congress to review the New Melones project under the terms of the National Environmental Policy Act. (No environmental impact report had ever been done on the project.)

The volunteers presented evidence to the Carter administration that more than 600 archaeological and historical sites between Camp Nine and Melones would be flooded by the new dam. At the same time, they persuaded Brown to push for national monument status for the canyon.

Friends of the River was also fighting to save other California streams, from the Smith in the north to the Kern in the south. They were questioning California's agricultural practices as well as the state's obsolete, heavily subsidized water policy.

Despite FOR's efforts, the fight for the Stanislaus was nearing its conclusion. By April 1979 the reservoir had crept up the river's banks almost to Parrots Ferry, the take-out point for the rafting companies.

"At the time, we were working with the Interior Department, trying to get protection for the river at the federal level," says Dubois. "It was just another year, another effort at trying to slow the process down. We tried anything we could get a handle on."

Friends of the River managed to delay the filling somewhat under the terms of the federal Historical Preservation Act. Though this legislation couldn't protect the canyon itself, it did force the Corps to do whatever it could to mitigate destruction of the historical sites. Before the process was completed, however, a friend alerted Dubois that the Corps had ordered its archaeologist to "do a hatchet job on the Indian sites" rather than take the time necessary to preserve the delicate artifacts. "The Corps was going to fill the dam above Parrots Ferry, but they'd made no public announcement," Dubois says. "What they were doing was against the law."

Desperate and despairing, Dubois devised a plan to chain himself inside the canyon to protest the illegal filling of the dam by the Army Corps. He asked an old friend to help him make some shackles, but was refused. "He realized he would be helping me to die," Dubois says, "but I had such a strong personal feeling about what I planned to do. After all we'd done, I thought, if they're going to flood and kill something that's been around nine million years, one small life like mine won't make a difference. Nothing else had worked. It was the only way I knew of to speak out on the life of this place."

Dubois wrote a letter to Colonel Donald O'Shei of the Corps, stressing that his action had nothing to do with Friends of the River. "I went to deliver the letter," he remembers, "and passed Gov. Brown's office on the way. I was amazed by how large the toyon tree we'd planted had grown in such a short

time. When I saw it, all my fear turned to strength."

Next, Dubois met with outfitter Marty McDonnell, whom he'd nicknamed "Deep Paddle."

"I knew I could trust him," Dubois says. "We planned for him to check on me while I was chained. I told him that once the water level reached my knees, I didn't want to see him again."

His location disclosed only to McDonnell, Dubois hiked into the canyon on a Sunday night late in May, barefoot and alone. The next morning he kayaked down the upper river for what he thought would be the last time. "I saw it flooding the petroglyphs, the meadow where David Brower once spoke on behalf of the river," Dubois remembers. "And across from the meadow was a perfect alcove where no one could see me."

It was two days before Dubois slipped out of his city pace and recognized the sound he kept hearing over his shoulder as a shrew. Blisters stippled his legs from the poison oak that laced the boulder where he had driven an eyebolt into a crack and placed the chain around his ankle. Because of a false step in the dark while hiking in, a toe on his right leg was broken; his leg was swollen to the knee. Dubois put a thick sock over the injury to hide it from McDonnell.

Out on the river a motorboat sped by. Each day a 20-man search party made up of Army Corps personnel, BLM rangers, and local lawmen scoured the canyon looking for him. Two helicopters searched the canyon from above. Dubois felt like a criminal every time the searchers swept by him, even though he believed what he was doing was right. The rising flatwater behind New Melones Dam lapped at the boulder two feet away, and could rise above his head overnight. But Dubois was determined not to be found.

"The time went quickly," Dubois recalls. "Every night the beavers and otters came out. I'd never seen a beaver on the Stanislaus before, but now their homes were flooded. One day I felt something behind me—it was a four-foot snake just sliding right past. I thought of our speedy lives and how much we miss all this magic that goes on in every corner of the earth every day." It

New Melones Dam, the focus of an epic river-protection battle. The fight continues against unnecessary dams elsewhere.

was as if the river had finally accepted Dubois, not as an intruder but merely as part of it.

On the fourth day, Dubois agreed to allow reporters from the *Los Angeles Times* and the *San Jose Mercury News* to interview him. The attention the stories drew paid off. Huey Johnson alerted Gov. Brown to Dubois' action, and Brown ordered the Corps to shut down the reservoir. Parrots Ferry was saved—for now.

"My last day in the canyon I heard from McDonnell that Brown had ordered the Corps not to fill the reservoir that year," Dubois says. "After I came out someone told me that the Corps had looked through all the law books for some way to arrest me, but couldn't find anything."

Dubois' action was surrounded by controversy. Some people in FOR had supported his act of civil disobedience, but others had not. His friend David Brower came down on Dubois' side. "What Mark did wasn't civil disobedience," Brower says. "There was no law that said he couldn't be there."

The river's reprieve would be short-lived, however. Though Friends of the River continued to fight it, the reservoir was filled in 1982. A flood in 1980 turned public sentiment against the river, and after that Gov. Brown either would not or could not stop the filling. New Melones' final cost in monetary terms was

$341 million—nearly $335 million more than what its planners had thought it would cost in 1944. But more to the point, the dam had cost Californians a beautiful canyon. "In the canyon I saw people smile more deeply, more intensely, and more frequently than I ever have in the city," Dubois sadly recalls.

Dubois married his girlfriend Sharon Negri amongst the willows on the South Fork of the American River in 1983, and the two set off for a trek through Asia and Africa. He spent that year and the next recovering from the loss of his river and trying to find ways of paying off the enormous debt FOR had amassed during the Stanislaus campaign. He returned from his journey more convinced than ever that large-scale technology is often inappropriate for developing nations. Dubois had seen firsthand that massive clearcutting and erosion, waterborne disease, and pollution often result from some of the dam projects sponsored by the World Bank and other multilateral aid agencies.

The International Dams Network arose out of Dubois' determination to thwart what he considers an ill-advised impetus toward river development worldwide. The coalition's primary goal is to share its knowledge of watershed issues, its successes and its mistakes, through the *International Dams Newsletter*, which Dubois produces. The organization is pushing the World Bank and other aid agencies to display greater sensitivity to environmental concerns and the rights of indigenous peoples. Its opposition through the international press to one project, the Three Gorges Dam on China's Yangtze River (in an area considered to be that country's Grand Canyon), prompted the Chinese government to withdraw the project from its five-year plan.

Dubois has also spent some time reflecting on the lessons learned during the fight for the Stanislaus. "We made them the enemy," he says of the Corps and the farmers who wanted New Melones filled. He preaches a different message now: ridding the environmental movement of an "us against them" attitude.

"I should have gone to the farmers directly and let them know what I was speaking out about," Dubois says. That approach, he's convinced, might have been a more creative way than the chaining to get the compromise he wanted—though he insists that "if the circumstances were right, I'd definitely do the same thing again."

Growing up in California's Central Valley, Dubois learned the cycles of nature at an early age—how the Trinity and American rivers rise and fall with the seasons. Later, after studying anthropology, he explored Mexico and Guatemala with an archaeologist friend. Their exploration of the Chixoy tributary of the Usumacinta River in 1969 is still the only one made of that fork. "We saw aborigines on the banks," he remembers, "and when we waved to them they ran away. They'd never seen white men before."

That must have been the way it was on the Stanislaus, with the Miwok Indians running away when the first miners came. It's too late now to save the Stanislaus, but if Dubois has his way, the Usumacinta and other free-flowing rivers will remain pristine. ■

KATHY CRIST, *a freelance writer, has contributed articles to* River Runner *and* Canoe.

ROBERT LOCKER

A sparkling stream that begins at the crest of the Sierra, the South Yuba is threatened by hydroelectric development here in the Gold Rush foothills near Nevada City.

A Nonrenewable River

NEVADA CITY, CALIFORNIA

AT FIRST GLANCE, Northwest Power Company's chances of winning approval to build two hydroelectric facilities on the South Yuba River appear slim.

For one thing, the only two landowners involved oppose the projects. For another, the Nevada County supervisors have asked that the river be studied by the state for inclusion in the California Wild and Scenic Rivers System. The western Sierra stream, which originates in the Donner Summit area, also has a large and devoted constituency: Hikers, picnickers, fishermen, and gold panners like it just the way it is.

Undaunted by this opposition, Northwest Power says it is moving ahead with plans for both dam projects anyway. The firm's ace in the hole—for one of the facilities at least—is a license issued in 1985 by the Federal Energy Regulatory Commission (FERC). The license gives the company federal approval, complete with condemnation powers, to build a dam and a 2.5 megawatt power plant at the Miner's Tunnel site, five miles northwest of Nevada City. Northwest Power has also applied for a license to build another dam and a 14 MW power plant a mile upstream. Both sites are on the same 20-mile stretch that others hope to protect.

Both landowners—the California Department of Parks and Recreation at Miner's Tunnel, and Roger Hodgson, founder of the rock group Supertramp, who holds the land upstream—oppose the dams. But because of the condemnation powers included in the FERC license, the landowners may not be able to stop the projects.

"This has statewide and national implications," says Roger Hicks of the South Yuba River Citizens League. The state is in the process of establishing a river-corridor park and recreation area at the Miner's Tunnel site. "If developers can take land from a public park in one place, they can do it elsewhere."

The Sierra Club's Sierra Nevada Group and the South Yuba River Cit-

izens League are now lobbying to win approval in the state legislature for a river study. Hicks admits this will not solve the problem of Northwest Power's existing FERC license. Only court action or a licensing "rehearing," which FERC has granted but not scheduled, can do that. The study might not even stop a dam on the Hodgson property, where Northwest Power has already filed a FERC license application.

On the other hand, the study would make it more difficult for the developer to succeed, Hicks contends, "because state agencies would refuse to cooperate with the projects—and might even contest them in court." It would also prohibit all other hydroelectric development while the river is being studied. Later, if lawmakers decide to put the river in the state system, the new dam ban would be permanent.

Northwest Power confronts its opposition with arguments about hydroelectric power being a "clean and renewable" source of energy that California will need in the future. Hicks contests these projections, quoting state reports that forecast an excess of electrical power through the end of the century. He also talks about the river's higher values. "They say that water is a renewable resource," Hicks says. "But they just aren't making many free-flowing rivers these days."—*Dave Carter*

Wilderness and Worship—or Wells?

LEWIS AND CLARK N.F., MONT.

For the Blackfeet Indians, the Badger–Two Medicine roadless area just southeast of Montana's Glacier National Park is holy ground. "This is our church," says George Kipp, a Blackfoot traditionalist.

Not everyone sees it that way, however. The Forest Service has given the Chevron and American Petrofina corporations preliminary approval to drill two exploratory oil and gas wells and to build 17 miles of roads in the heart of the region this summer. The development threatens to fragment the largest remaining roadless area on Montana's wildlife-rich eastern slope. In human terms, it would "cut out the heart" of Blackfoot religion and culture. "We would lose our identity as a people," says Kipp.

Chevron officials concede that they are unlikely to strike oil or gas here. But should they find it, they would need as many as 22 wells, a network of access roads, and a refinery on the border of Glacier Park, according to U.S. Forest Service projections.

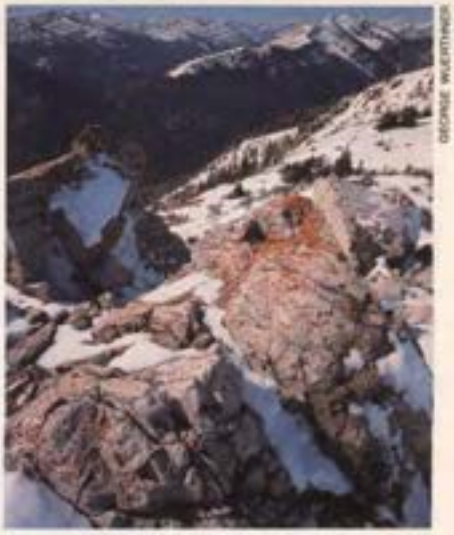
Fearing the possibility of such full-scale development, conservationists

formed the Glacier–Two Medicine Alliance in 1985 to advocate federal wilderness designation for the area. While wilderness status might not stop the two exploratory wells now under consideration, it would likely halt future oil and gas development in the area.

Some Blackfeet are uneasy about the idea, fearing that wilderness designation might interfere with their treaty rights to these lands. But the many tribal traditionalists are interested in some kind of special protection that would help keep the land in a pristine state. "We've been at the losing end of white proposals for centuries," explains Kipp. "But when we began running into work crews and helicopters at every turn, we had to do something."

So last summer, tribal traditionalists and the alliance each appealed the Lewis and Clark National Forest Plan. The traditionalists argued that by committing the forest to oil and gas development the plan violates religious rights protected by the First Amendment. The Missoula chapter of the alliance challenged the plan on environmental grounds. A third appeal has been filed by a coalition of 15 environmental groups, including the Montana Wilderness Association and the Montana Chapter of the Sierra Club.

The opponents of oil and gas development face an uphill battle. The first appeal has already been denied by the regional forester. The other two are still pending. But preservation sentiment remains strong in Montana. At a March 2 rally sponsored by environmental groups from around the state, more than 200 people walked through Missoula's streets to protest the Montana congressional delegation's neglect of its unprotected wilderness lands.



GEORGE WUERTHNER

Badger-Two Medicine: unprotected wildlands south of Glacier National Park.

"If we are going to save the Badger and areas like it, people will have to be visible and loud," says Mike Bader, president of the Missoula chapter of the alliance. "It would be terrible to tell our grandchildren we just didn't get around to it."—***Michael Kantor***

A Grassroots Rebuff for Du Pont

LUKANG, TAIWAN

Local protesters have forced the Du Pont Company to abandon plans to build a $168-million chemical facility near this densely populated agricultural community.

After months of trying to convince Lukang citizens that the plant would be safe, Du Pont bowed to local opposition on March 12, saying that it would look elsewhere in Taiwan for a site.

Du Pont spokesman Craig Skaggs describes the town as a pocket of "anti-industrial feeling" in a country that generally supports development. Conservationists, on the other hand, see the Lukang story as a sign of an environmental awakening in Taiwan.

At first the government welcomed the Du Pont plant, which would have been one of the island's largest foreign-investment projects. That was before Lukang citizens let their anti-Du Pont feelings be known. In June hundreds of protestors broke through a police cordon and marched through the town. A month later more than a score of them picketed government offices in Taipei.

Another protest occurred in August, during which 270 Lukang residents were detained by riot police for six hours. Most of them were wearing T-

Lukang protestors visited Taipei in December. Their message was "Endure."

shirts printed in Chinese characters that read "I love Taiwan but want no part of Du Pont." In December, 400 residents demonstrated again in Taipei.

The plant would have produced 60,000 tons a year of titanium dioxide, a compound used in paints and in plastics, paper, and other substances. While titanium dioxide itself is harmless, the manufacturing process uses chlorine, a poisonous gas, and produces large quantities of acidic wastewater.

Shortly after the first three Lukang protests, the government announced that it intended to quadruple its spending for environmental protection. A Reuters news service story published in Taipei's *China Post* linked the announcement to events at Lukang. "The protests are seen as a warning that people are no longer prepared to put up with pollution, which spewed freely into rivers and the air during the island's rapid industrialization in the 1960s and 1970s," the July 1986 story stated. "The government is now coming under pressure to improve the quality of life on the island."—***Joan Hamilton***

Suburbs Close in on a Seabird Colony

KAUAI, HAWAII

A volcanic explosion millions of years ago created a graceful dome near the northernmost tip of the island of Kauai. Today the land that explosion formed, a spectacular coastal complex that includes Crater Hill, Kilauea Point, and Mokolea Point, provides nesting sites for the largest seabird colony in the inhabited Hawaiian Islands.

"In a state under heavy development pressure, it's one of the few places left where you can go and see substantial numbers of native Hawaiian seabirds," says Lawrence Hamilton of the Hawaii Chapter of the Sierra Club.

Crater Hill, like Diamond Head on Oahu, is a significant local landmark. To the northwest, the 31-acre Kilauea National Wildlife Refuge is one of Kauai's most popular attractions. Each day more than 1,500 visitors come to see the refuge's lighthouse, its breathtaking scenery, and its birds.

The birds are well protected when

The spectacular coastal lands near the Kilauea Point lighthouse are more than a popular tourist attraction. They also provide prime habitat for native Hawaiian seabirds.

they choose to nest within the refuge. But most of their key habitat, which extends eastward along the coast for more than a mile to Mokolea Point, is privately owned. That was not a problem for most of this century because the land was used for grazing. In the 1970s, however, large-scale subdividing began. Now, according to the U.S. Fish and Wildlife Service, domestic dogs and cats are killing up to 75 percent of the baby birds hatched on these coastal lands.

The Kilauea Neighborhood Association and the Sierra Club are asking Congress to help solve the problem. They say the wildlife refuge should be expanded to include 138 acres of key coastal lands now privately owned.

In an era when federal land purchases are rare, this plan might appear to face worse odds than an albatross egg in a subdivision. It has nonetheless attracted support from a number of important political players, including Kauai's mayor and county council, two state legislators, and U.S. Sen. Spark Matsunaga (D). Daniel Inouye (D), Hawaii's other senator, supports acquisition of about one fourth the acreage at issue.

Almost all the land in the conservationists' proposal has already been reserved "for conservation purposes" by the county, meaning that it must be left as open space. Federal purchase would allow the lands to be fenced and managed to protect the birds. It would also prevent the local government from yielding to the intense development pressure that is expected in the future.

The Kilauea Neighborhood Association has gathered 2,400 signatures from people who support federal acquisition of the key habitat. Its members and those of the Club's Hawaii Chapter are now at work on a letter-writing campaign to convince the Hawaii congressional delegation to put the issue on its 1987 legislative agenda. A sense of urgency has developed recently: One major landowner has agreed to make lands available for preservation on the condition that Congress appropriates federal funds this spring.

"Federal acquisition won't happen overnight," says Gary Smith of the association. "But it will happen. It makes a lot of sense."—*JoAnn Yoshimoto and Carolyn Proczka*

Three new campaign tools pertaining to the California desert bill are now available from Sierra Club headquarters. "The California Desert Protection Act," a 12-minute video (VHS format) produced by the California Desert Protection League, may be rented for two weeks for $5. Also on hand is "The California Desert: Our Western Heritage," a two-color poster illustrating the desert's natural, cultural, and recreational resources and outlining the boundaries of the proposed Mojave, Joshua Tree, and Death Valley national parks (25" × 36"; $3 folded, $5 flat).

Reprints of "Protecting the Desert" (*Sierra*, September/October 1986), an article by Sen. Alan Cranston (D-Calif.), are available to members for 15 cents each, to nonmembers for 30 cents each. There is a 10-percent discount on orders of 10 to 49 copies, and a 25-percent discount on orders of 50 copies or more. These materials may be obtained through the Public Affairs Department of the Sierra Club, 730 Polk Street, San Francisco, CA 94109.

The Sierra Club 1987-88 National Conservation Campaigns, adopted by the Board of Directors at its meeting in Washington, D.C., early this year, are now in full swing. Two priorities in particular are drawing on the full resources of volunteers and staff. The first, *Reauthorization of the Clean Air Act*, is an effort to keep alive this vital legislation designed to control acid rain and toxic air pollutants, reduce urban smog, preserve clean-air areas, and protect the atmospheric ozone layer. The second, *Arctic National Wildlife Refuge Protection*, continues the struggle to preserve an area of pristine wilderness and prevent oil and gas exploration there.

The Club will also focus its attention on four other conservation priorities: *Bureau of Land Management Wilderness/Desert National Parks* is a campaign to enact California desert and other BLM wilderness legislation and protect de facto wilderness; *National Forests/National Parks Protection* seeks to curb forest road-building, improve forest planning and management, and protect national parks and national forest wildernesses; *Implementation of Toxics Control Laws* would ensure fulfillment of all the provisions of the Superfund, Clean Water Act, Resource Conservation Recovery Act, and other relevant laws; and *Oil & Gas Leasing/High Level Nuclear Waste* would enact reforms of on-shore oil and gas leasing and assure environmentally sound planning for disposal of high-level nuclear wastes.

A resolution placed on the 1987 Sierra Club National Election ballot could become a priority if a majority of members approve it. *Preventing Nuclear War/Ending the Arms Race* was placed on the ballot by a membership petition. The Board of Directors recommended a "no" vote on the question, saying the petition departed from the Club's established procedure for selecting priorities and allocating funds. Tabulation of ballots was expected to be completed on April 13, with results to be made known soon thereafter.

Photo submissions for the 1989 Sierra Club Calendars will be accepted May 15 through July 31, 1987. Send a postcard only to request guidelines from Calendar Editor, Sierra Club Books, 730 Polk Street, San Francisco, CA 94109.

Sierra Club Books will publish another in its popular series of adventure travel guides in May. *Adventuring in the San Francisco Bay Area* ($10.95, paper) covers all nine counties touching the Bay and offers concise information on geology, landscape, flora, fauna, and climate. It is the fourth Sierra Club Book by San Franciscan and longtime Club activist Peggy Wayburn.

May is also the month for release of *Animals in Their Places: Tales From the Natural World* ($18.95, cloth), a sampler of animal stories and observations made over the past 40 years by Roger Caras, noted environmentalist, television correspondent, and award-winning author of more than 50 books.

These books may be ordered by mail

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

Sue the Sonofaguns! is the basic premise behind the Environmental Action Foundation's new workbook, *Making Polluters Pay: A Citizen's Guide to Legal Action and Organizing* by Andrew Owens Moore. Parties injured by improperly handled toxic wastes can take the polluters directly to court by means of tort lawsuits rather than wait for the EPA or some other government agency to implement and enforce regulations—a strategy that often involves a tangle of bureaucratic procedure. The net result of injured parties bringing such lawsuits, according to Moore, will be to put economic pressure on the polluters to clean up their act permanently.

The comprehensive workbook is available on a sliding price scale: $15 for individual activists; $20 for nonprofit public-interest groups; $40 for libraries, law firms, and state offices; $100 for businesses and corporations. A 10-percent postage and handling charge should be added to orders. Write to: Environmental Action Foundation, 1525 New Hampshire Ave., N.W., Washington, DC 20036. Attorneys Dan Becker and Carol Dansereau are available to answer questions about such legal actions at (207) 745-4879.

Environmental job-seekers may find helpful information in either of two publications. *Environmental Job Opportunities* is a newsletter listing job openings ranging from summer internships for college students to research positions at universities. A one-year subscription (10 issues) is available from Institute for Environmental Studies, 550 N. Park St., 15 Science Hall, Madison, WI 53706. *Becoming an Environmental Professional: Strategies for Career Planning* is a 111-page publication of highlights from a conference of more than 30 professionals in the field. Copies are $10.95 from The CEIP Fund, 332 The Arcade, Cleveland, OH 44114. ■

SIERRA CLUB OUTINGS OPEN-TRIP LIST 1987

It's not too late to sign up for a 1987 Outing. There is still space available on a large number of 1987 Sierra Club Outings. If you act promptly, you can probably find spaces on any of the trips listed below. If a trip is not listed below, check with the Outing Department—vacancies may have occurred. Please see the January/February issue of *Sierra* for reservation and cancellation information and an application form. Make sure you read the reservation and cancellation policy carefully before applying. To order supplemental information on any of our 1987 Outings, send in the coupon on page 75. A listing of 1988 Foreign Trips will be published in the July/August issue.

Trip Number	* = Leader approval required. Backpack Rating Key: L = Leisure Trip, M = Moderate Trip, S = Strenuous Trip	Date	Rating	Trip Fee (including Deposit)	Per Person Deposit	Leader
ALASKA TRIPS	*(Prices do not include airfare to Alaska or charter air costs on most trips.)*					
87052	*Kenai Highlight, AK	June 23-July 2		1020	70	Jerry Lobel
87059	*Atlin Lake Backpack, British Columbia	Aug. 4-14		990	70	Sigrid Miles
BACKPACK TRIPS	*(See Alaska and Foreign Trips for other backpack outings.)*					
87071	*Alferd Packer Special, La Garita Wilderness, CO	July 8-17	M-S	265	35	Bob Berges
87074	*Garfield Grove Big Trees, Sequoia Park, Sierra	July 12-19	M	205	35	Ellen Howard
87080	*Rubicon River Loop, El Dorado Forest, CA	July 19-28	M	275	35	Modesto Piazza
87082	*Silver Lake, Sequoia Park, Sierra	July 20-28	M	210	35	Andy Johnson
87084	*Five Acre Lake Leisure, Emigrant Basin, Sierra	July 25-Aug. 2	L	230	35	H. & E. Bodington
87089	*Rosy Finch Lake, John Muir Wilderness, Sierra	July 26-Aug. 2	M	215	35	Jim Gilbreath
87094	*Rogue River Canyon, OR	Aug. 1-8	L-M	435	35	Carolyn Downey
87097	*North Palisade Circuit, Inyo Forest, Sierra	Aug. 3-10	M-S	225	35	Chuck Schmidt
87099	*Sequoia Redwoods and Lakes, Sequoia Park, Sierra	Aug. 7-15	M	210	35	Don Lackowski
87102	*Matterhorn Canyon Loop, Toiyabe Forest, Sierra	Aug. 8-18	M	290	35	Sy Gelman
87106	*Absaroka-Beartooth Wilderness, MT	Aug. 11-21	M-S	395	35	Chuck Shinn
87112	*Circumambulating the White Clouds, Sawtooth Recreation Area, ID	Aug. 17-28	L-M	430	35	Sheri Serna
87113	*French Canyon/Bear Lakes, John Muir Wilderness, Sierra	Aug. 19-26	M-S	220	35	Bill Engs
87116	*Clark Range, Ansel Adams Wilderness/Yosemite Park, Sierra	Aug. 21-30	M-S	255	35	David Reneau
87118	*Kaweah Basin, Sequoia and Kings Canyon Parks, Sierra	Aug. 23-Sept. 1	M-S	250	35	Bob Madsen
87120	*Mt. Goddard, Kings Canyon Park, Sierra	Aug. 24-Sept. 2	M	235	35	M. & D. Smith
87124	*Kings-Kern Divide, Kings Canyon and Sequoia Parks, Sierra	Aug. 29-Sept. 7	M-S	235	35	Joe Uzarski
87127	*Upper Basin, Kings Canyon Park, Sierra	Sept. 9-19	L-M	300	35	Mac Downing
88350	*Adirondack Park—Long Lake to Algonquin, NY	Sept. 26-Oct. 4	L-M	300	35	Sally Daly
88351	*Tanner-Hance Trails, Grand Canyon, AZ	Sept. 27-Oct. 2	M-S	230	35	Bob Madsen
88356	*Pine Barrens Environmental Issue Excursion, Wharton State Forest, NJ	Oct. 11-17	L	275	35	E. Allan Blair & Joan Goldstein
88357	*Appalachian Trail, Nantahala Forest, NC	Oct. 18-24	M	260	35	M. Richman & R. Brinko
88358	*Ozark Highlands Trail, Ozark Forest, AR	Oct. 18-24	M	285	35	Larry Ten Pas
Junior Backpack Trip						
87130	*Sawtooth Ridge, Yosemite Park, Sierra	July 26-Aug. 2	L-M	220	35	Rick McEwan
BASE CAMP TRIPS	*(See Foreign, Hawaii, and Canoe Trips for other base camp outings.)*					
87132	Scenic Golden Gate, Golden Gate National Recreation Area, CA	June 21-27		375	35	Betty Watters
87134	Joe Crane Lake, Ansel Adams Wilderness, Sierra	July 18-30		460	35	Bill Davies
87139	Historical Meadow Lake, Tahoe Forest, Sierra	Aug. 23-29		240	35	Bob Ruff
87140	Fall Alpine Camp, Clark Range, Sierra	Sept. 7-18		445	35	M. &. T. Look

Trip Number	* = Leader approval required	Backpack Rating Key: L = Leisure Trip M = Moderate Trip S = Strenuous Trip	Date	Rating	Trip Fee (including Deposit)	Per Person Deposit	Leader
87142	Monument Valley Photography, Navajo Tribal Park, UT		Sept. 20-27		415	35	Tom Roy
88359	Everglades Park, FL		Dec. 26-31		305	35	V. & O. Spielbichler
BICYCLE TRIPS	*(See Foreign Trips for other bicycle outings.)*						
87145	*Wisconsin Hills and Valleys		June 7-14		295	35	J. Arthur & D. Zelman
87149	*The Golden Triangle Bicycle Tour, Canada		Aug. 2-9		325	35	J. & P. Von Normann
87150	*Finger Lakes "Grand Tour," NY		Aug. 16-22		280	35	Frank Traficante
87152	*Yosemite Sampler—Bike and Hike, Sierra		Sept. 13-20		340	35	Bill Lande
BURRO TRIPS							
87156	*Across Northern Yosemite, Sierra		Aug. 15-22		395	35	L. Coffin & D. Bain
FOREIGN TRIPS	*(Prices do not include airfare.)*						
87935	Adventure in Eastern Turkey		June 15-July 8		3070	100	Ray Des Camp
87940	*Highlands and Islands of Scotland		June 10-July 6		2805	100	M. & T. Look
87945	*The South of France—Biking Provence		June 16-28		2005	100	L. Simpson & R. Weiss
87947	*The Unknown Pyrénées, Spain		June 20-July 3		1590	100	Joe Lee Braun
87972	*2nd Annual British Service Trip, England/Wales		July 18-Aug. 8		825	100	David Brown
87975	*Hut-Hopping in the Dolomites, Italy		July 19-Aug. 1		1495	100	Fred Gooding
87980	*Appenzell and the Lötschental, Switzerland		July 20-31		1690	100	Ray Simpson
87985	*Hiking in the Rondane Mountains, Norway		Aug. 4-14		1035	100	Bert Gibbs
87987	*Scottish Service Trip, II		Aug. 25-Sept. 4		495	100	Don Coppock
87990	Victoria Falls and the National Parks of Zimbabwe, Africa		Sept. 6-18		2970	100	Pete Nelson
88995	*Exploring Israel		Sept. 12-Oct. 1		TBA	100	Ray Des Camp
87997	*Montafon Valley and the Stubai Alps, Austria		Sept. 17-29		1845	100	Walt Goggin
88500	*Touring the Mosel Valley, West Germany		Sept. 27-Oct. 10		2125	100	L. McClellan-Loots
88501	*Autumn in the Alps of Japan		Sept. 27-Oct. 14		3280	100	Emily, Gus, & Alan Benner
88505	*Ganesh Sanctuary, Nepal		Oct. 24-Nov. 16		1390	100	Bob Madsen
88510	*Lamjung Himal Trek, Nepal		Nov. 21-Dec. 7		1175	100	John DeCock
88512	*Summertime Trek in the National Parks of Australia and Tasmania		Dec. 15, 1987-Jan. 2, 1988		2170	100	Pete Nelson
88517	*Cross-Country Skiing in the Austrian & Swiss Alps		Dec. 20, 1987-Jan.3, 1988		2300	100	Wayne Woodruff
88525	*Patagonia Overland Expedition, Argentina/Chile		Jan. 31-Feb. 23, 1988		TBA	100	Bill Evans
88530	*Cross-Country Skiing in the Austrian Tyrol		Jan. 23-Feb. 2, 1988		2310	100	Carolyn Steinmetz
88535	Wander Down Under, New Zealand		Feb. 24-March 18, 1988		TBA	100	Vicky Hoover
88540	*Arlberg Ski Adventure, Austria		March 19-26, 1988		1610	100	Ann Hildebrand
HAWAII TRIPS	*(Prices do not include airfare.)*						
87165	*Bicycle Tour of Kauai		June 21-July 5	Price Per Adult	755 Price Per Child	70	John Ruzek
87166	Volcanoes and Beaches, Big Island of Hawaii		Aug. 1-9	460	305	35	K. & S. Johnsen
HIGHLIGHT TRIPS	*(See Alaska and Base Camp Trips for other highlight-type outings.)*						
87169	Birds of the Arizona Borderlands		July 18-26		850	70	Richard Taylor
87170	Llama Trek/Photography Seminar, Three Sisters Wilderness, Cascade Range, OR		Aug. 3-12		1020	70	To Be Announced
87171	Sawtooth Wilderness, Sawtooth Forest, ID		Aug. 9-17		775	70	Jerry Clegg
87173	Eagle Cap Wilderness Llama Trek, Wallowa-Whitman Forest, OR		Aug. 27-Sept. 5		1020	70	Bill Gifford
87176	Three Sisters Wilderness Llama Trek, Willamette Forest, OR		Sept. 13-18		590	70	Marilyn Gifford
88362	Anza-Borrego Park, CA		Dec. 27, 1987-Jan. 1, 1988		295	35	B. LeCheminant
SERVICE TRIPS	*(Also see Foreign Trip #s 87972 and 97987.)*						
87180	*Blue Range Primitive Area, Apache Forest, AZ		June 6-13		80	35	Rod Ricker
87183	*Spruce Knob, Monongahela Forest, WV		June 15-26		160	35	Dick Williams

Trip Number	* = Leader approval required	Date	Price Per Adult	Price Per Child	Trip Fee (including Deposit)	Deposit	Leader
87185	*Sierra Club's Own Trail Maintenance Project, Sierra Forest, Sierra	June 26-July 6			120	35	Flint Ellsworth
87189	*Meteor Lake, Marble Mountain Wilderness, Klamath Forest, CA	July 7-17			120	35	Tom Gefell
87191	*Targhee Teton Trail Maintenance, Targhee Forest, WY	July 17-27			120	35	Eric Scott-Bowman
87192	*Clair Tappaan Lodge Family Trip, Sierra	July 18-26	190		130	35	V. White-Petteruti
87195	*Snowmass Lake Trail Construction, White River Forest, CO	July 21-31			120	35	Bill Weinberg
87196	*Grand Canyon Trail Maintenance, Kaibab Forest, AZ	July 23-Aug. 1			125	35	Peter Curia
87198	*Fifth Annual Beginning Campers' Trail Maintenance and Restoration, Washakie Wilderness, WY	July 28-Aug. 7			120	35	Ed Thomas
87200	*Upper Pine Creek, John Muir Wilderness, Sierra	July 30-Aug. 9			120	35	D. Northcutt & A. Stork
87201	*Trout Lake Trail Maintenance, Selkirk Mountains, Panhandle Forest, ID	Aug. 1-11			120	35	Bob Wolf
87202	*Joulious Creek Trail Maintenance, Wasatch Forest, UT	Aug. 3-13			120	35	John Fischer
87203	*Lost Man Trail Construction, White River Forest, CO	Aug. 3-13			120	35	John Stansfield
87205	*Teen's Trail Work Trip, Sierra Forest, Sierra	Aug. 14-24			120	35	B. Ilfeld & J. Laguardia
87207	*Lost Creek Trail Construction, Pike Forest, CO	Aug. 15-25			120	35	Laura Shaw
87208	*Fishhawk Creek Trail Construction, Washakie Wilderness, WY	Aug. 16-26			120	35	Jack Brautigam
87210	*Minarets Avalanche Cleanup, Ansel Adams Wilderness, Sierra	Aug. 20-30			120	35	Gwen Jarrel
87212	*Mt. Hood Timberline Trail Maintenance, Cascade Range, OR	Aug. 23-Sept. 2			150	35	Rick Zenn
87213	*Sierra Club's Own Trail Construction Project, Sierra Forest, Sierra	Aug. 27-Sept 6			120	35	Dale Hekhuis
87218	*Ice Age Trail/Grandfather Falls Trail Construction Project, Lincoln County, WI	Sept. 15-25			120	35	Ann Diamond
88363	*Ozark Trail, AR	Oct. 25-31			90	35	Rick Rice

WATER TRIPS

Sailing Trips

87225	Totems, Sails, and Orca Whales, A Northwest Sailing Odyssey, British Columbia	July 16-22			1150	70	Bill Bricca
87227	Northwest Sailing and Natural History Adventure, British Columbia/Washington State	Sept. 7-12			850	70	Karen Short
87228	Northwest Sailing and Natural History Adventure, British Columbia/Washington State	Sept. 13-18			850	70	Grace Hansen

Canoe Trips

87234	*Upper Ottawa River, Parc de la Verendrye, Quebec, Canada	Aug. 30-Sept. 6			380	35	George Neffinger
88364	*Scenic Suwannee, FL	Oct. 18-24			425	35	Peter Bengtson

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.

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FOR YOUNGER READERS

Tale of the Tallgrass

Most of the living matter of a grass plant lies beneath the soil. Grasses have enormous root systems that spread out and sink deep into the soil to soak up any available water. A single big bluestem may have a root system two feet across and five feet deep. If you take a close look at lawn grass, you will see that grasses spread along runners (horizontal vines) that creep along the top of the soil as stolons *or underground as* rhizomes. *The runners interlace with the grass' fibrous root system to form a dense material called sod. Sod binds the dirt together, retains moisture, and prevents erosion. Because sod slows the draining (leaching) of nutrients through the soil, the decayed matter of dead plants continually builds up the prairie dirt. This process helped produce the rich, dark soil so valuable to farmers. Sod also prevents the forest from taking over the prairie. There is simply no place in the sod for tree seedlings to set their roots.*

BOBBIE F. LIVELY (DEBOLDT ILLUSTRATION. Commissioned by David Knapp for The Prairie Annual. First published by Landscape Architecture Magazine, 1975.

PATRICIA D. DUNCAN PHOTO

Eileen Docekal

THE HUGE FIELDS of corn and wheat that cover much of America's Great Plains live dangerously. Although beautiful and bountiful, these crops survive because of the constant attention of their caretakers—farmers—who add water, fertilizer, and pesticides to keep them healthy.

The vast plains that stretch from Indiana to Nebraska and from North Dakota to Oklahoma used to be covered with native grasses that could survive searing hot summers, bitter cold winters, rainless skies, and whipping winds. But the deep, dark prairie soil was perfect for crops, and the country was growing. Just 150 years after the first white explorers discovered the Plains, the prairie has been changed from an immense natural landscape to an endangered ecosystem. Today, just one percent of the original prairie remains. The rest of it has been plowed for crops, fenced for grazing, or paved with cities.

Although few people think we should plow under every acre of corn and wheat field and plant prairie grasses to return the Plains to their natural state, there are good reasons for saving what's left of the prairie. It is a valuable example of a balanced ecosystem that has evolved over centuries to support numerous varieties of plants and animals. Biologists who study these natural areas can learn how the hardy prairie grasses have adapted to their environment over time. By combining the genes of prairie grasses with those of important food grasses such as wheat, biologists hope to come up with a new plant that produces just as much grain but that grows with very little human assistance. If we let the prairie grasses disappear, we will lose an important part of America's natural heritage, as important a reminder of our country's history as any building or battlefield.

There are three types of prairie—tallgrass, shortgrass, and mixed—found in the United States. Tallgrass, the most dramatic, grows

The tallgrass prairie is the easternmost and lushest of the three types of North American grasslands. It gets more rainfall than the mixed-grass and shortgrass prairies of the dry western plains.

☐ *Shortgrass* ☐ *Mixed grass* ☐ *Tallgrass*

PATRICIA D. DUNCAN PHOTOS

Wildfires, as frightening as they may be, help the prairie. Each fall the tops of grasses die and become tinder dry. Set by lightning or by humans, and fanned by the wind, wildfires sweep across the land. Although devastating for trees and shrubs, fires do not kill the grasses, whose growing parts lie dormant underground, shielded by the sod. In fact, grasses grow better after a fire, in part because they feast on the nutrients released from the ash of the burned plants, and because fire exposes the seedbeds to sunlight.

in a 250-million-acre area in the easternmost, wettest part of the Great Plains. It can grow 12 feet high, and its fields once stretched to the horizon. The most common tallgrasses are big bluestem, Indian grass, prairie cord grass, and switch grass. Wildflowers grow among the tallgrasses, but in most prairies the grasses make up more than 90 percent of all plant life.

The Plains are a harsh environment. When cold Arctic winds barrel through in winter, temperatures often plunge below zero. Blizzards are common. In summer, warm air traveling north from the Gulf of Mexico brings scorching temperatures. Rainfall can be substantial, but it is irregular and droughts are frequent. Violent thunderstorms and tornadoes are common in summer, and wildfires often rage in spring and fall.

Grasses, not trees, are best suited to these extremes. Trees can survive the harsh prairie environment only in the wettest and most sheltered areas. While high winds easily snap off the tender tips of tree seedlings and grasses alike, a tree suffers the most. Because a tree's new growth occurs at the tips of its branches, wind damage stunts its progress. Grasses, however, grow from their bases, so they will thrive even if their tips are broken. This ground-hugging growing method also helps grasses survive wildfires and grazing.

Tangled among the blades of grass, sparkling like jewels, are at least 20 kinds of wildflowers. Most are perennials (permanent species) that will reappear even after a fire, and many have long, vertical roots called taproots that search deep in the soil for water. A great variety of birds, reptiles, mammals, insects, spiders, and microscopic organisms live in

and amongst the tallgrass. Bison, elk, and white-tailed deer once grazed freely on the succulent grasses.

If you casually look out over a tallgrass prairie, you probably won't see many animals. Most prairie mammals are burrowers, well hidden in the vegetation and under the soil. Rodents, such as the Franklin ground squirrel and the Plains pocket gopher, are the dominant diggers. They have sharp, constantly growing incisor teeth that help them gnaw through tough roots and stems. By burrowing, they escape predators, such as coyotes, foxes, and red-tailed hawks, and find protection from fires, winter snows, and summer heat. Sharing the soil with them are worms, fungi, and bacteria. They help break down organic matter, provide oxygen to the soil, and recycle nutrients.

Of the approximately 300 bird species found on the tallgrass prairie, most are fall and spring migrants rather than permanent residents. For them the Plains provide a convenient flyway, without ocean or mountain barriers, between Canada and warm southern climates. But both the permanent and seasonal birds had to adapt to harsh prairie conditions. They must fly in strong winds and endure the prairie's heat and lack of water. Because trees and perches are rare, most prairie birds nest on or near the ground and sing while flying. Countless prairie insects, however, provide plentiful food.

Although numerous small tallgrass parcels have been saved, National Park Service proposals to create a 50,000- to 100,000-acre Tallgrass Prairie National Preserve (complete with native buffalo and elk) in Oklahoma have not yet been approved by Congress. The park would be the largest prairie reserve in the United States. Its size would give visitors the feel of the original prairie's expansiveness and would ensure the long-term stability of the prairie's diverse genetic pool. Like the tallgrass itself, however, the Tallgrass Preserve proposal will survive only if people work hard to save it. ■

EILEEN DOCEKAL *is a naturalist and environmental educator in Tulsa, Okla. She contributed "There's More Life in a Fallen Tree Than You Think" to the March/April 1986 issue of* Sierra.

The Paradox of Progress

New Lands, New Men: America and the Second Great Age of Discovery
by William H. Goetzmann
Viking, 1986; $24.95, cloth.

Victor A. Walsh

In his latest book, Pulitzer Prize-winning historian William H. Goetzmann identifies the 17th through the 19th centuries as a period when a newly emerging "culture of science" became the driving force behind extensive exploration. This was wholly different from the exploration of earlier centuries that arose out of trade and religious rivalries, the search for gold, and grandiose imperial schemes. The great intellectual movements of the age, Goetzmann argues, dramatically changed the way western peoples looked at the universe and inspired what he calls the Second Great Age of Discovery. The hallmarks of this new age—mathematical precision, empirical observation and classification—gave rise to new areas of science (including geography and botany) and expanded others (cartography). Armed with new techniques, instruments, and forms of organization, explorers charted new continents and new oceans to discover the mysteries of nature itself.

New Lands, New Men is organized into three sections: "The Book of the Continent," "The Book of the Oceans," and "The Book of Time." Book One focuses on the 18th- and early 19th-century explorations of North and South America. Although the English, French, and Russians paved the way, Americans became increasingly involved in the exploration experience. "North America became a vast, pristine collecting ground for men of scientific curiosity," writes Goetzmann. This was especially true of the West beyond the Mississippi River, which President Jefferson purchased from the French in 1803. This acquisition more than doubled the size of the young republic and prompted the U.S. government to launch a number of scientific expeditions into this untrammeled wilderness during the early 19th century. Beginning with the epic trek of Lewis and Clark (1804–1806) and ending with the Topographical Corps' federal railroad surveys of the 1850s, these expeditions (together with the explorations of American fur trappers) provided a wealth of information about the geography, flora, fauna, and Indian tribes of the Far West. They also set the stage for American westward expansion and settlement.

Artists, Goetzmann tells us, often accompanied these explorers, and their paintings had a lasting impact not only on their contemporaries but on future generations. Their renditions of spectacular terrains and exotic tribes inspired the birth of Romanticism (what Goetzmann calls "the West of the Imagination"). Karl Bodmer's and George Catlin's paintings of Mandan war chiefs and ceremonial life, Alfred J. Miller's scenes of free-roaming trappers in the Rockies, and John Mix Stanley's landscapes of prairies teeming with bison and geese portray forever a vanished America—a wild, wondrous, and fertile land full of strange animals and peoples.

In Book Two the geographic focus shifts to the South Pacific seas and Antarctica. Goetzmann's treatment of the new nation's maritime tradition, a neglected topic, is especially rich in detail and insight. The first American seafarers—New England whalers and seal hunters—left in their wake a carnage similar to that of the buffalo hunters on the Great Plains. By the second decade of the 19th century they had slaughtered more than 3 million seals in the South Pacific islands alone; by the early 20th century 58,000 whales had been killed in the world's oceans. Like the Rocky Mountain fur trappers, these seafarers were more concerned with quick profit than scientific inquiry. That role fell to private- and government-sponsored expeditions, the most important of which was the Great United States Exploring

Expedition of the South Seas (1838-1842) under the command of Lieutenant Charles Wilkes. So much data was collected by the Wilkes expedition that a museum—the Smithsonian Institution—had to be constructed to house it, helping to establish Washington, D.C., as a center of scientific endeavor.

In Book Three, Goetzmann argues that the notion of time—the discovery of the past—became the central focus of scientific investigation during the late 19th century. With the discovery of exotic new lands around the globe, explorers were exposed to strange new cultures and peoples. And the geologist, armed with a knowledge of paleontology and geomorphology, became the principal explorer of the period. In 1879, Congress created the U.S. Geological Survey, which until well into this century dominated the fledgling earth sciences. The USGS conducted the last explorations and surveys of the shrinking wilderness areas in the Far West and in the 1890s initiated the first major explorations and surveys of that vast frozen wilderness to the north: Alaska.

Written in absorbing and compelling detail, *New Lands, New Men* chronicles the remarkable adventures of the explorers: their hardships, frustrations, and rivalries, and their enduring legacy. The book documents an important historical theme. America was truly an "exploration's nation"—a nation of pioneers who believed in rugged individualism and Manifest Destiny, who moved across new lands and new oceans. Out of this ferment, a distinct American culture championing science and progress emerged.

Not all Americans, as Goetzmann readily acknowledges, championed exploration. Painter-explorer Catlin felt the rush across the continent would spell the demise of the Plains Indians' noble way of life. There were other explorers whom the author does not mention—the hunter-naturalist John Audubon, the Santa Fe Trail master Josiah Gregg, the trappers George Ruxton, Warren Ferris, and Osborne Russell—who expressed ambivalence and even regret over the toll exacted by "progress," especially the early slaughter of the great buffalo and antelope herds. The paradox of progress

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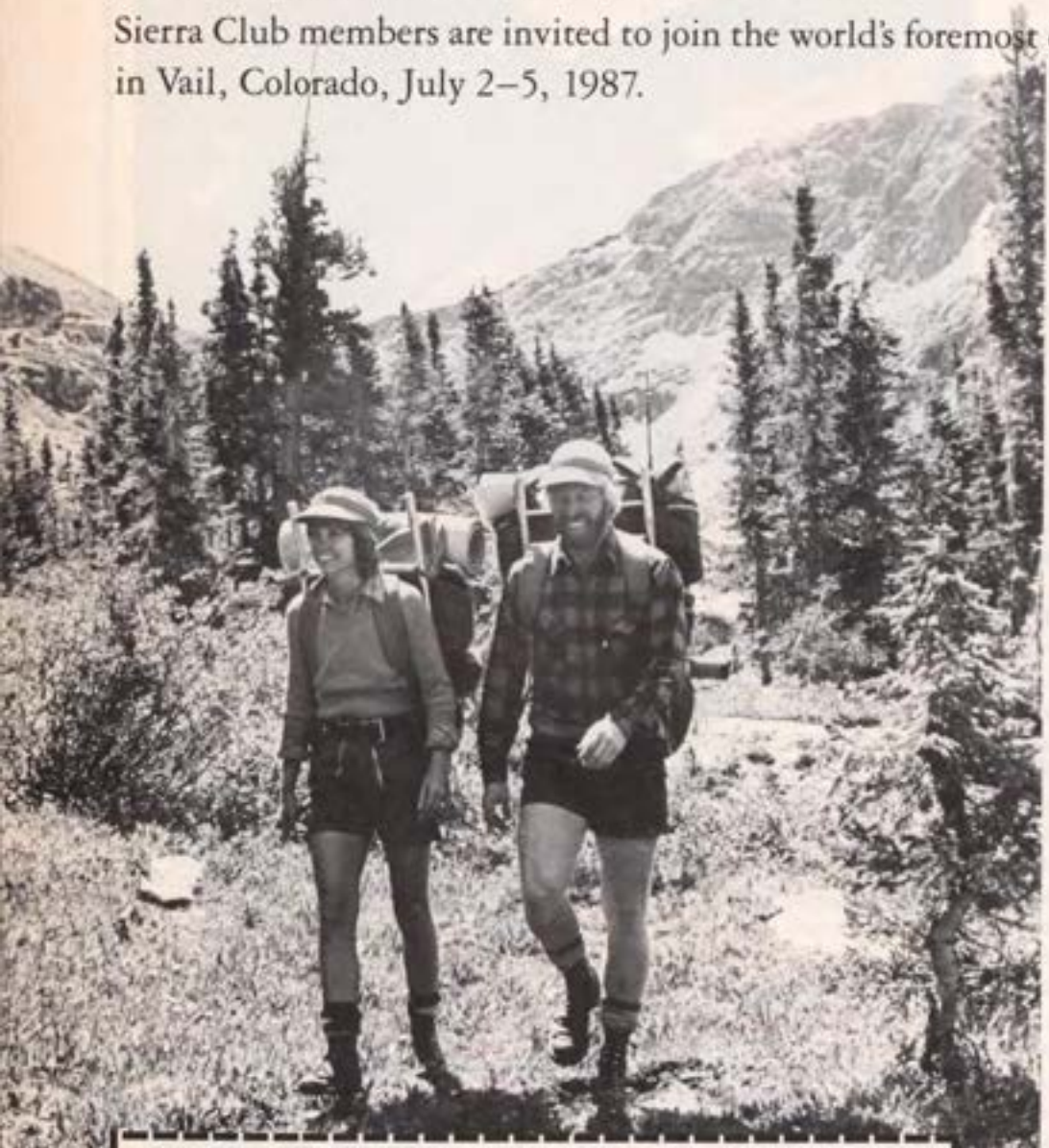

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is a neglected historical theme deserving more attention. It shows that, like us, our forebears struggled with the inevitable tension between the quest for progress and the call of the wild.

VICTOR A. WALSH *is assistant professor of history at St. Mary's College in Moraga, Calif.*

The Wildness Not There

Wintergreen: Rambles in a Ravaged Land
by Robert Michael Pyle
Scribners, 1986. $19.95, cloth.

Christopher Camuto

IN 16 ESSAYS, naturalist Robert Pyle turns his keen, informed attention to the logged-over Willapa Hills region of western Washington, where he makes his home. "These are understated hills," he writes, "not very high, made of lavas and mud, and nothing more. The fact that they once supported one of the greatest forests on earth is beside the point, since that forest isn't there any more. . . . These are devastated hills, doing their best to recover, to grow green things in time for the next devastation. A ravaged land, awaiting the next ravages. It is no wilderness, and yet it is wild and elusive."

Bounded by the Olympics to the north, the Cascades to the east, and the Columbia River and the Oregon Coast Range to the south, the Willapa Hills compare poorly with the more spectacular and better-protected natural attractions of the Pacific Northwest. Pyle's purpose is to explore the region's vestigial wildness and elusive beauty while coming to grips with the shortsightedness that undervalued and misused the old-growth forest of Douglas fir, Sitka spruce, and western hemlock that once covered the Willapa Hills. Without losing sight of what has been lost and why, Pyle reads between the lines of the clearcuts and probes through the slash to understand what is left to learn from, value, and protect.

At the heart of *Wintergreen*, and providing a subtext throughout, are four essays collectively entitled "Hands

on the Land." Pyle minces no words about the timber industry's poor stewardship of the land and the economic deception perpetrated upon loggers, their families, and their communities. He knows who is left to deal with the economic and human consequences of the boom-and-bust approach to resource management. Pyle lives with the "managed forest" and has seen what "multiple use" and "sustained-yield logging" have amounted to in practice. A product of two forestry schools, he sees the potential sophistry in concepts like the "overmature forest" and understands the danger of creating biological monocultures. Pyle has traversed the ugly gaps between timber-industry propaganda and practice, and he has watched the D-9 Caterpillars work their way through the loopholes in the Timber Practices Act. He sees clearly the wildness and the beauty that is not there in the Willapa, knows what has driven off bears and owls and who has put the dioxin in the watersheds and the silt in the rivers.

No victim of pastoral naiveté, Pyle nonetheless fully appreciates what the Weyerhaeusers and Crown Zellerbachs have inadvertently left behind. *Wintergreen* is, for the most part, a positive book—a discursive field guide, a celebration of the Willapa, its dogged flora, fauna, and people. Like the epiphytes he writes about, Pyle as an essayist is a "mutualist," a gracious link between the visiting reader and the Willapa Hills. With an eye always on the value of biological diversity and the purposeful curiosities of adaptation, Pyle assays the biogeography of the rain forest's sword ferns and chanterelles, lichens and mosses, its salamanders and slugs, butterflies and bears. He surveys the Willapa's topography and history, defends his preoccupation with tree stumps, his love of snails and fear of spiders. Pyle's entomology and biology—he's the author of *The Audubon Society Handbook for Butterfly Watchers*—is as precise as it is interesting. He keeps a good-humored eye on the foibles of the naturalist's search for knowledge of nature and the irony of trying to be a countryman in a world of urban values. Ultimately, *Wintergreen* constitutes a biogeography of the naturalist himself, the story of how and why he came to be one of the denizens of the rainy, green Willapa.

Pyle is a fine essayist. The clear, complex topography of his language pays homage at every turn to the land he describes. Whether cataloging a

AT A GLANCE

Hawaii: Magnificent Wilderness
Photography and text by Jeff Gnass.
Westcliffe Publishers, 1987.
$22.50, cloth.

Jeff Gnass knows the Islands' secret spots like few others. Here, on the upper slopes of Kilauea, he's captured the sinewy grace of an ohia forest, with its understory of hapuu tree ferns.

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microhabitat in dense ecological detail or clarifying his thoughts about the region's politics and people, Pyle uses words with wit and care, as if they too were a resource not to be devalued by misuse.

Rambling through the undeniable impoverishment of his bioregion, Pyle proves himself a rich man. "The essential beauty of Willapa," he concludes, "has been marred, but not erased."

CHRISTOPHER CAMUTO *has written for* Trout *and* Fly Fisherman. *He teaches English at the University of Virginia.*

BRIEFLY NOTED

After a very mild winter, it looks like an early start to the hiking season for West Coast walkers. For those who like to hit the books before hitting the trails, Gary Ferguson's ***Walks of California*** (Prentice Hall; $10.95) sketches a variety of dayhikes up and down the state, from the mountains to the sea. . . . Hikers in Southern California will be happy to see an expanded edition of ***Day Walks in the Santa Monica Mountains***, produced by the Sierra Club Angeles Chapter's Santa Monica Mountains Task Force, whose "Sundays in the Santa Monicas" series is one of the most ambitious local outing programs of any Club chapter. The guide is available for $3.50 (plus $1 postage and handling), payable to SMMTF, from 4961 Edgerton Ave., Encino, CA 91436. Special attention is paid to rating trails for handicapped access. . . . Ron Felzer's popular "High Sierra Hiking Guide" to areas within the USGS ***Devils Postpile*** 15-minute quadrangle (including the Ritter Range and Mammoth Lakes area), published by Wilderness Press ($6.95), features a meticulously revised plastic-paper topo map ($2.75 for the map alone). . . . The season gets rolling a little later in the Washington Cascades, which means that readers who start today will have just enough time to digest the wealth of information mountaineering legend Fred Beckey has poured into the second edition of his stupendously detailed ***Cascade Alpine Guide: Climbing and High Routes*** (The Mountaineers; $16.95). Volume 1, now available, covers the region between the Columbia River and Stevens Pass and is packed with photos, detailed route descriptions, geo-

logical info, and more. Absolutely essential for all Cascade visitors, not just climbers. . . . You say you can't find a photomap of Ica, Peru? Don't know where to turn for a street guide to Marianske Lazne, Czechoslovakia, or geologic maps of the moon? The "10,000 Maps to Anywhere" catalog published by Travel Centers of the World (P.O. Box 1788, Hollywood, CA 90078; $12.95 + $3.50 postage and handling) lists maps of all kinds, for all corners of the Earth. Historical maps, globes, atlases, and travel guidebooks are also listed. The currently available seventh edition was published in 1983, but we're assured that maps cataloged here remain "very much available." . . . Two books for birders: ***Grand Canyon Birds***, by Bryan T. Brown, Steven W. Carothers, and R. Roy Johnson, new from University of Arizona Press ($19.95), features checklists and entries but no species illustrations, while ***Birds of South Florida*** ($9.50 from River Road Press, P.O. Box 1130, Conway, AR 72032) reviews the region's best birding areas in addition to providing species descriptions. . . . At nearly 1,000 pages in length, David Arora's ***Mushrooms Demystified*** (Ten Speed Press) may not be everyone's first choice as a daypack stuffer. But it's probably the most comprehensive mycological field guide extant, and in this much-expanded second edition is useful for mushroomers across the continent. Sharp color photos, detailed keys, and more than 2,000 species entries make this sturdy paperback more than worth its $24.95 price tag. Highly recommended, for its rigorous detail and engaging humor alike. . . . And now for something completely different: ***Save the World*** is a "cooperative environmental board game" developed by longtime eco-activist Don Strachan. The package includes dice and markers, a four-color gameboard, 121 illustrated cards, and a 48-page instruction booklet. Strachan says that the game, which he recommends for older children and adults, "forces players to confront all of the world's major ecological disasters and presents concrete actions to end them all." A 20-percent environmentalist discount is offered; for information, write to Bongers, P.O. Box 84366, Los Angeles, CA 90073. ■

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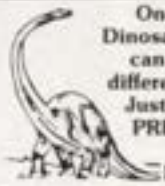

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During the summer, I enjoy feeding hummingbirds a mixture of one part sugar to four parts water. Is this healthy for the birds? How can I make it more nutritious? (Tim Maret, Ft. Wingate, N.M.)

All hummingbirds eat a pretty even combination of nectar and insects, although some species eat more nectar, and some are more insectivorous. Assuming that the birds have access to enough insects to satisfy their need for protein, they need only large amounts of nectar—or a nutritional equivalent—to make their diets complete.

Nectar is essentially just glucose and fructose in high concentration. Since the sucrose you feed to hummingbirds is also a glucose-fructose compound and can be broken down by water, nutritionally it's very similar to nectar.

The National Audubon Society and other ornithological experts recommend boiling the one-part-sugar/four-parts-water mixture to dissolve the sugar fully. As long as you keep an adequate supply of the stuff accessible to the hummers (making sure to change it regularly), you'll do them no greater harm than encouraging dependence on an artificial food source.

I never thought I'd eat raw fish, but I tried sushi on a dare, and loved it! Are there any health risks I should know about? (Susan Steinman, Ventura, Calif.)

Most of the tuna, crab, shrimp, octopus, mackerel, and other types of seafood commonly served as sushi in this country are no more dangerous eaten raw than they are when prepared any other way. The only time you're likely to run the risk of illness is when your sushi comes from an anadromous fish (any saltwater species that spends part of its life cycle in fresh water).

Anadromous fish often pick up parasitic larvae during the freshwater portion of their life cycles, then carry the larvae in their flesh when they move out to sea. When the fish is eaten, the parasites may attach themselves to the consumer's intestinal wall, causing acute abdominal pain and nausea (though no reliable accounts of deaths have been reported).

The only anadromous fish in U.S. waters regularly used as sushi is the Pacific salmon. While smoking or cooking the fish kills any parasites it may be carrying, most scientists believe that salmon can be safely eaten raw only if it has been frozen at zero degrees for at least three days. This doesn't mean that all sushi restaurants freeze their salmon, however. Many rely on their well-trained chefs to inspect the fish carefully for the easily visible larvae.

What's the best season for high-elevation climbing or hiking? (Betty Ann Cowlitz, Ely, Nev.)

It's a good idea to avoid casual climbing in winter, and to be alert to such dangers as avalanches well into springtime. June, July, and August are considered the best months to contest the higher elevations in the Northern Hemisphere, although in many areas summer snowstorms (albeit usually of short duration) are not uncommon. Outdoor-safety experts urge all hikers and climbers to pack warm clothing as a precaution, even for those optimistic summer starts under blue skies and a warm sun.

I've been reading more and more about noise pollution lately. How dangerous is this problem? (Althea Ridder, Flint, Mich.)

Unlike many other sensory inputs, noise can cause physical damage at levels below the threshold of discomfort or pain. For example, nearly a quarter of the people exposed for eight hours a day to noise in the 90-decibel range—about what one experiences on city streets with heavy traffic—will suffer hearing loss. For this reason the federal government requires the establishment of hearing conservation programs for workers whose jobs regularly expose them to noise levels above 85 dB. The EPA estimates that as many as 10 percent of American workers are at risk in this way—and many experts consider that figure to be on the conservative side.

In addition to temporary or even permanent loss of hearing acuity, excessive noise levels are frequently associated with such medical problems as high blood pressure, ulcers, and cardiovascular ailments. Psychological difficulties have also been linked to noise, particularly stress-related problems such as fatigue, irritability, and learning difficulties. As studies of children living under airport flight paths have shown, these types of problems do not always disappear with the noise that provoked them.

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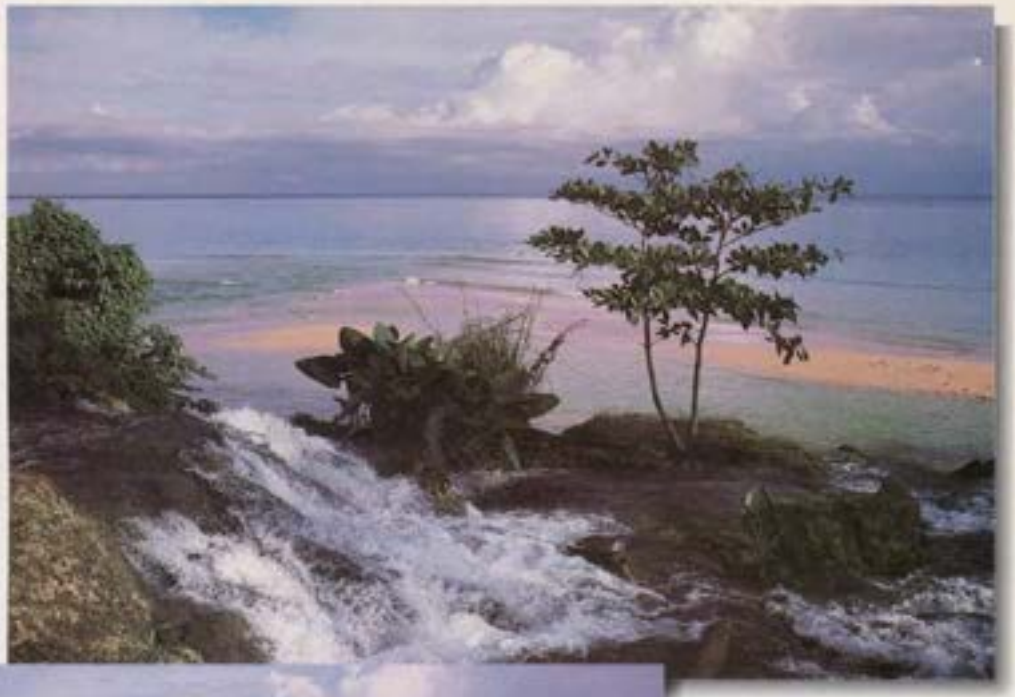

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