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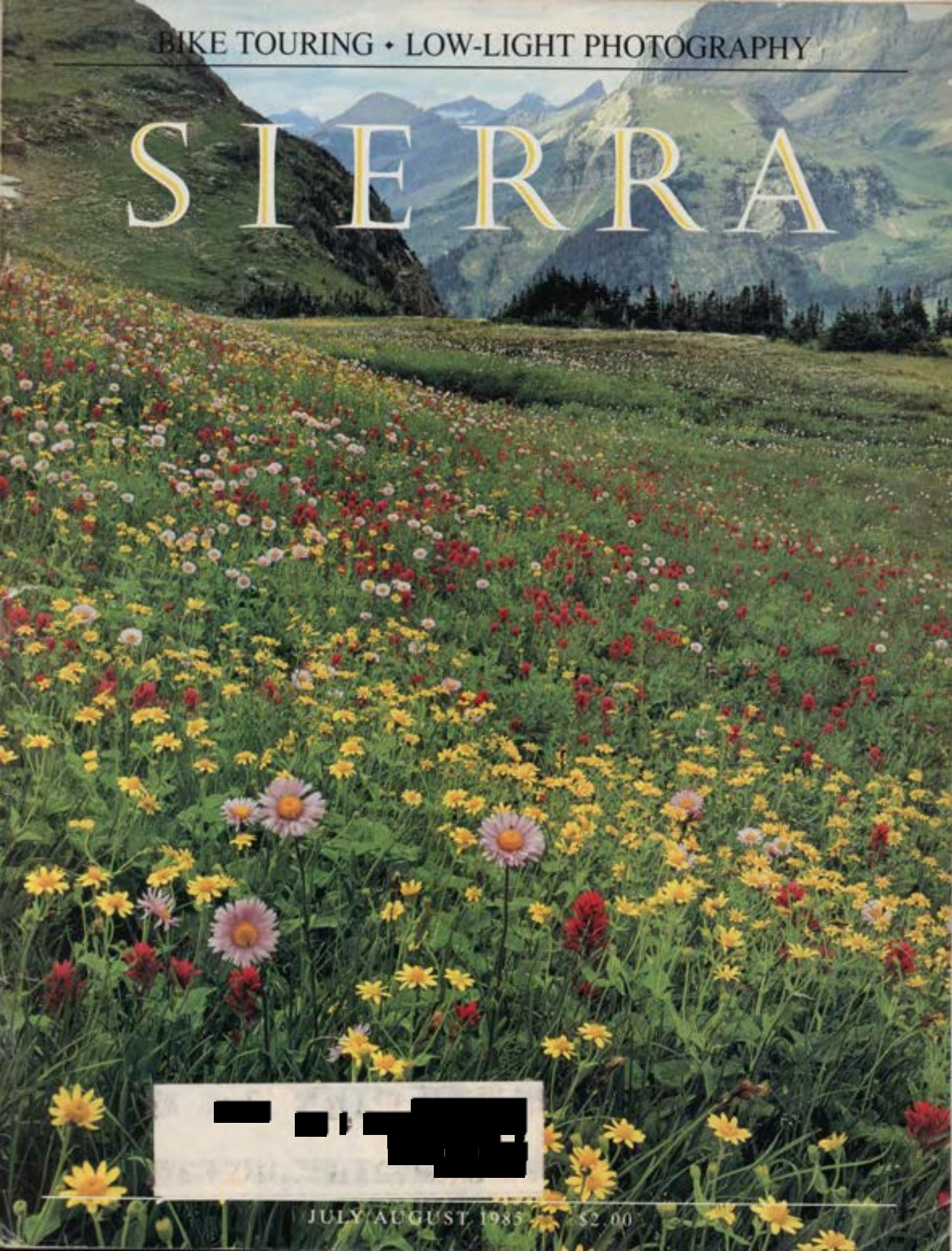

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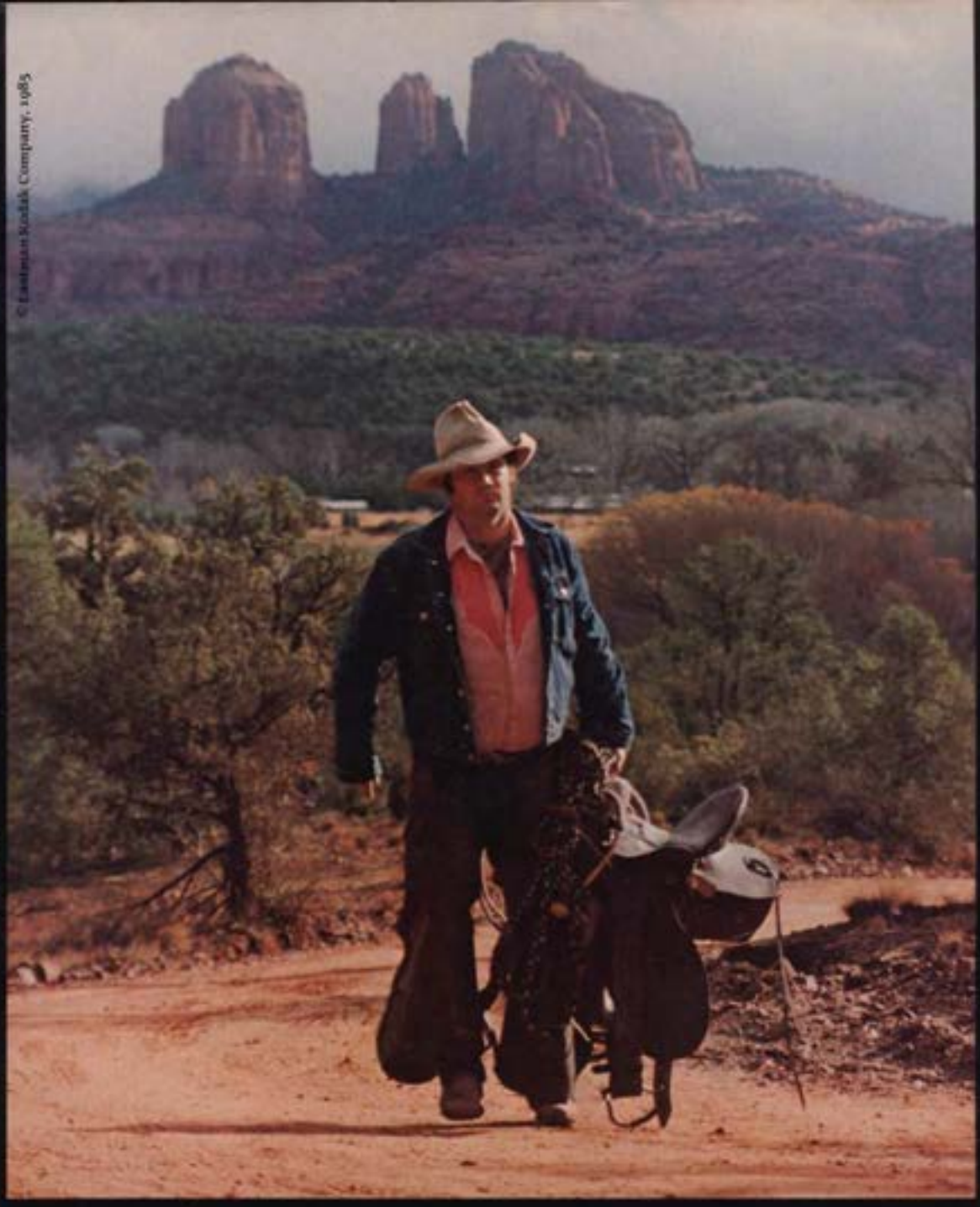

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FEATURES

POLITICS

DEPARTMENTS

COVER: Wildflower display in the Garden Wall Peaks area of Glacier National Park, Montana. For more about the 75-year-old park, turn to page 36. Photo by David Muench.

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BPA

The Price is Right

As a Sierra Club member whose family has grazed cattle on public land for more than a century, I would like to give the other side of the grazing-fee controversy ("A Fair Price for Privilege," March/April 1985).

There are valid reasons for the difference between grazing fees on public lands and the fees usually paid for grazing on private lands. Because grazing is part of multiple use, public land must be shared with hunters, off-road vehicle users, and others. Public-land grazing is also subject to limits and controls by the Forest Service and BLM. These may include rigid "on" and "off" dates, limits on stocking numbers, counting of cattle at inconvenient times, and other impositions on the operator. Finally, improvements on public land are often built and maintained by the permittee, but they become the property of the government and cannot be removed.

Except for a few brief periods in the last 50 years that I have been in the cattle business, farmers and ranchers have not made much of a profit. The government is now considering many schemes to bail agriculture out of its financial difficulties. Raising grazing fees would greatly add to the cost of raising livestock, and would negate other government efforts.

James Sinton
Shandon, Calif.

Infertile Assertions

How sad to read your recent article by Michael Castleman ("Toxics and Male Infertility," March/April 1985). The entire monograph reflects prejudiced reporting, innuendo, inferences, and deletions of significant information that does not agree with Castleman's opinion.

The article rambles on about the role of environmental toxins in carcinogenicity, teratogenicity, mutagenicity, and birth defects. Castleman's speculation on the part played by medicines and radiation in causing birth defects leaves one wondering what this has to do with male infertility. Alternative viewpoints on this greatly disputed topic are completely lacking.

The author uses the word "genotoxic" indiscriminately. The term is not found in most medical dictionaries because of its ambiguity. To include the causes of cancer, birth defects, genetic disorders, and male infertility under one term is too simple and naive to impart good information. It is like using the word "fruit" to describe both pineapples and tomatoes.

Scientific literature from the western world has yet to indict dioxins as a major (or even minor) cause of birth defects and miscarriage. The author commented that dioxin caused an increase in miscarriages in Oregon. He did not mention subsequent studies by the state and an independent research unit that could not find an increase in miscarriages in the area mentioned.

Debate on the role of environmental toxins on male infertility is far from being resolved, and to quote one scientific source without quoting the consensus of opinion from expert scientists is another disservice.

The author's statements about Bendectin refer to a case in which a judge awarded a family $180,000 in the face of significant scientific evidence for a birth defect that had been known to specialists years before the drug was ever invented. The award has since been overturned because of overwhelming evidence exonerating Bendectin. In the meantime, pregnant women in the United States have been deprived of the best antidote to morning sickness known to the field of obstetrics.

Gerald H. Prescott
Associate Director
Medical Genetics and
Birth Defects Center
Emanuel Hospital
Portland, Ore.

Michael Castleman responds:

Mr. Prescott is certainly entitled to his opinions, and as I stated quite clearly in the article, the epidemiology of male (and female) infertility leaves a good deal of room for debate. A clear consensus of scientific opinion, however, agrees that (1) the average male sperm count has declined significantly in recent decades, (2) the incidence of testicular cancer has increased significantly, and

(3) the average age at diagnosis of testicular cancer has plunged during this century from about 60 to the late teens.

These observations suggest either a virulent infectious agent or some set of environmental circumstances. The question remains open, but I stand by the article. I believe that a conservative analysis of the medical literature points to the proliferation of toxic chemicals as a possible explanation for the observed trends in male infertility.

Anyone who would like a fully referenced manuscript may contact me through Sierra.

Blown Fuse

Being a former resident of the great Northwest, I read Steve Forrester's account of the woes of WPPSS ("After the Fall," May/June 1985) with great interest—until I came to the part about the 600-percent increase in electricity rates to the unheard-of height of 3.6 cents per kilowatt hour. Having just sent San Diego Gas and Electric the cost of running a small, one-room office—at *12.8 cents* per kilowatt hour—I was stunned.

This is more galling considering that SDG&E is not paying for the foibles of WPPSS, only for its own poor management.

Len A. Surles
Borrego Springs, Calif.

Editor's Note: *It was stated of the Washington Public Power Supply System in "After the Fall," March/April 1985, that ". . . none of the plants will ever produce a kilowatt hour of electricity." In fact, one of the WPPSS plants is already producing electricity.* Sierra *regrets this editorial error.*

Smelters Not So Bad

Dan Whipple's article ("King Copper's Acid Reign," March/April 1985) contradicts several studies of the effects of southwestern copper-smelter emissions on the environment.

University of California scientists found that smelter sulfate drifted no more than 600 kilometers from southern Arizona. Long before that distance is reached, the sulfate's acidity is neutralized by dust. A study by the U.S. Department of Agriculture and scientists at the University of Arizona found that the Douglas smelter affected rain pH slightly 50 kilometers away; the effect probably dissipates completely within 100 to 150 kilometers. Northern Arizona University scientists attribute the minimal long-range effects of copper-smelter emissions to direct sulfur absorption by the alkaline soils of the region.

Moreover, Tucson, Ariz., which is ringed by copper smelters, has a low atmospheric sulfate concentration and no acid rain.

The photo accompanying Whipple's arti-

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cle shows how the high mountains and frequent temperature inversions of the region confine much of the smelter emissions to local areas.

The Environmental Defense Fund has a worthy goal in trying to clean up smelter emissions. Unfortunately, the author's reasons for doing so are almost all wrong or irrelevant.

Hinrich Bohn
Tucson, Ariz.

Dan Whipple responds:

Mr. Bohn brings up two essential points. He is correct in saying there is little evidence of acid precipitation damage in the southwestern deserts. This appears to be because airborne dust is highly alkaline, and buffers the acidity of the emissions when it reaches the ground. This buffering capacity does not exist in the high-mountain lakes and streams of the Rocky Mountains.

His second point is that smelter sulfate drifted no more than 600 kilometers from southern Arizona. Recent research conducted by the Environmental Defense Fund and other sources quoted in my article indicate a strong correlation between sulfate emissions from copper smelters and acid deposition in the Rockies, supporting the long-range deposition hypothesis.

SCS All Wet

It's too bad James Risser did not give more attention to the reforms necessary in the Soil Conservation Service ("The Other Farm Crisis," May/June 1985). A substantial portion of the SCS budget is now devoted to activities that support agricultural production. More conservation could be purchased with a program focused on the protection of wetlands and fragile environments. Until such reforms are realized, it is difficult for a conservationist to give wholehearted support to the SCS program.

Vernon W. Ruttan
Department of Agricultural and Applied Economics
University of Minnesota
St. Paul, Minn.

I can't believe you'd run an article extolling the virtues of the SCS without once mentioning their part in the channelization and drainage that have devastated wetland habitats and caused water pollution in the Chesapeake Bay region and elsewhere.

At this very moment, the SCS is promoting more channelization on Maryland's eastern shore. I hope the Sierra Club is entering into this "support SCS" position with its eyes open.

Ruth Mathes
Greenbelt, Md.

A New Hand on the Helm

The Sierra Club has had two Executive Directors in its 93-year history, and it is about to welcome its third. Douglas P. Wheeler will assume that position on July 1, 1985.

Doug knows the environmental movement and shares its commitments. He understands government inside and out, and knows what it takes to be effective. He has also worked with volunteer organizations and knows the power they possess. And he is a proven manager. Everyone who interviewed Doug during the careful executive search process felt an instant rapport with him, and that he was right for the Club.

Mike McCloskey and Doug Wheeler

Philip Adam

In announcing the new appointment, Club President Michele Perrault said, "We have found an individual fully equal to this most challenging job, deeply skilled and experienced, and with the vision to challenge the Sierra Club to continued growth in political accomplishment."

A 43-year-old lawyer, Doug has been president of the American Farmland Trust since 1980. He founded the organization to rally public opinion to protect prime farmland from competing uses and to combat soil erosion. The Sierra Club's agricultural campaign has been working closely with the Trust, and relations of deep mutual respect have developed. Doug and his staff made a presentation at our February Board meeting in Washington, D.C., that impressed all who were there.

From 1977 to 1980, Doug was executive vice-president of the National Trust for Historic Preservation. As chief operating officer he was responsible for a staff comparable in size to the Sierra Club's, and he administered a budget of more than $15 million. The Trust for Historic Preservation prospered under his management.

Many Club leaders first met Doug in the early 1970s, when he served as Deputy Assistant Secretary for Fish, Wildlife and Parks under Nat Reed in the Department of Interior. He was a key figure in making breakthroughs on many issues close to our hearts, including Alaska and the redwoods. His service during that period planted the seeds of an enduring interest in advancing the cause of conservation. Prior to joining the Interior Department in 1969, Doug practiced law in Charlotte, N.C.

When he accepted his new position, Doug Wheeler said, "I am grateful to the Board of Directors for having given me this opportunity to share in the great work that lies ahead, and pledge my earnest commitment to the achievement of our shared directives." I am proud to turn over the reins to one so able and ready for the challenge.

I have served as Executive Director since taking over from David Brower in 1969, more than 16 years ago. During that time the Sierra Club has come of age as a national institution. It is now recognized as the premier organization of grassroots environmental activists; it is a model for effectiveness in a large advocacy group and one of the most sophisticated lobbies working Capitol Hill. The Sierra Club is seen as the pacesetter for the environmental movement. Together we have been instrumental in the passage of more than a hundred pieces of important environmental legislation, which literally form the foundation of the nation's environmental policies. And the Club has thrived as an institution. Since 1969 our membership has increased fivefold, from 70,000 to 356,000. Our budget has increased from around $2 million to nearly $20 million, and our net worth has grown fivefold in constant dollars.

I am proud of our progress during my tenure as Executive Director, but last year I told the Club's Board of Directors that I thought it was time to contemplate a change because, among other reasons, I wanted to move back into doing more public policy work. After exploring the possibilities, the Board offered me a new job as Chairman of the Sierra Club, which I accepted.

After the first of July I will be the Club's senior officer, responsible for providing analysis, guidance, and leadership on matters of conservation policy and strategy. My time will be divided among the tasks of analyzing policy options, high-level lobbying, networking on the international scene, fundraising, public relations, and reaching out to other interests in society. I will also be available to assist the new Executive Director.

Serving the Sierra Club as Executive Director has been the best experience of my life, and I know it will be for Doug, too. I also know that the membership will extend all the cooperation and kindness to him that they have to me these 16 years.

Mike McCloskey

Michael McCloskey
Chairman

When Green Is No Good

As houses, roads, shopping centers, casinos, and tourists continue to invade the Tahoe Basin of California and Nevada, another more subtle transformation has been taking place. Lake Tahoe, for 2 million years the azure sparkle in the eye of the Sierra, is slowly turning green.

The cause of the color change is algae; the cause of the algae, researchers say, is overdevelopment. A building frenzy during the past 30 years has destroyed three quarters of the marsh areas, half the meadows, and more than a third of the stream bank areas in the 500-square-mile basin, according to the University of California Tahoe Research Group. With the loss of these lands, sediment that comes tumbling into the lake is not filtered, and the nutrients that used to feed natural vegetation now spawn algae. As the algae decays in the lake, nutrients are created for a new generation.

The politics of remediation are highly charged. There is currently a moratorium on development in the most sensitive areas, but the situation changes daily as developers, property owners, legislators, and conservationists fight it out. Meanwhile, the greening of Lake Tahoe continues.


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The Texas Chainsaw Massacre

With a nod from the U.S. Forest Service, loggers have been invading Texas wilderness.

The timber-cutting has been labeled "beetlemania" by conservationists, who have sued the Forest Service for damaging more than 285 acres of congressionally designated wilderness. The agency claims the cuts are needed to save surrounding lands from the ravages of the southern pine beetle. Forest Service officials cite a section of the Wilderness Act that gives the Secretary of Agriculture authority to take necessary measures to control fire, insects, and disease in wilderness areas.

The suit, which was filed in April by the Sierra Club, The Wilderness Society, and the Texas Committee on Natural Resources, claims the beetle-control program is ineffective, causing more damage than the


U.S. Forest Service

insects, and that the action violates the Wilderness Act, the Endangered Species Act, and the National Environmental Policy Act.

"Cutting trees in our wilderness areas is like swatting flies in a greenhouse with a sledge hammer," says Ned Fritz, chair of the Texas Committee on Natural Resources.

In an attempt to keep beetles from killing trees in new areas, the Forest Service has been

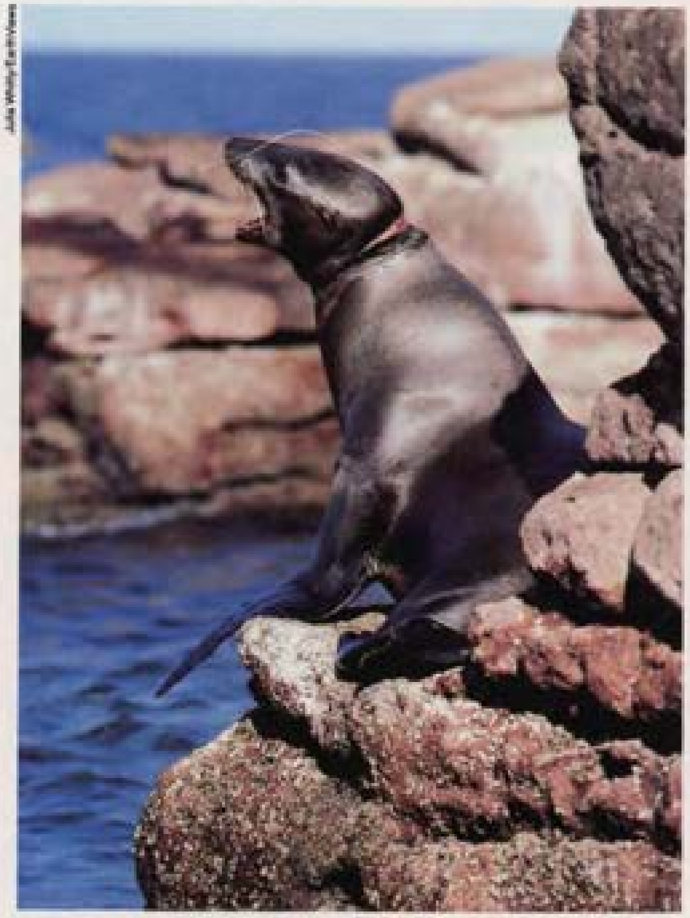
clearing 250-foot-wide buffer strips—sometimes within wilderness areas. Meanwhile, the insects have continued to spread, supporting the theories of experts who say the beetle will fly thousands of feet to invade new trees.

Conservationists argue that a more naturally managed forest—not timbering—is the answer to beetle problems. "The mix of pines with hardwoods historically kept the beetles from building too great a population in our forests," says Howard Saxion, chair of the Sierra Club's Lone Star Chapter. "Over the last few decades, the Forest Service and private timber owners have increasingly created pine monocultures by eliminating many of the hardwoods. The beetles thrive in these artificial forests."

Plastic Wastes Spell Danger for Ocean Wildlife

A new form of pollution is fouling the Earth's seas and oceans, killing as many as 2 million sea birds and more than 100,000 sea mammals every year, including whales, dolphins, and seals. Plastic waste—more than 12,500 tons of it—is dumped or lost in the world's oceans every year. The problem is so vast and so deadly, "it boggles the mind," says Warren King, chair of the U.S. section of the International Council for Bird Preservation.

According to some scientists, the problem has become critical largely because of the rapid development of new plastic products, particularly monofilament fishing nets. These nets are not readily biodegradable, yet they often tear apart, creating floating "ghost nets" that can trap and kill marine life. Sea birds diving for entrapped fish drown after becoming entangled themselves. Death from eating plastics (fish are unable to digest such items as styrofoam, ship garbage, and plastic toys) has also increased at a rapid rate. Edward J. Carpenter, an oceanographer at the Marine Sciences Research Center at Stony Brook, N.Y., says he has found plastic in the stomachs of 30 percent of the fish he studied in the North Atlantic, the Sargasso Sea, and the Mediterranean.



Le Bon Mott

Much to the pleasure of parklovers, William Penn Mott was named director of the National Park System on May 1. The 75-year-old Mott, currently general manager of an Oakland, Calif., zoological society, was director of the California Department of Parks and Recreation during then-governor Ronald Reagan's administration. Earlier he managed city and regional park systems in the San Francisco Bay Area.

Mott has worked diligently to enlarge California's parks, and he is undaunted by the specter of budget cuts that might affect his new turf: "I look at them as an opportunity," he says. "I think we can creatively solve problems whether we have the money or not."

Picking Up "Watt" Had Dropped

A U.S. District Court judge ruled in April that some 1.5 million acres of public land should be reconsidered for federal wilderness status.

Former Interior Secretary James Watt had dropped the lands from the Bureau of Land Management's wilderness inventory, saying they could not be designated as wilderness because they were either too small or had privately held mineral rights. In 1983 the Sierra Club and five other conservation groups filed suit to put the areas back into the inventory.

U.S. District Court Judge Lawrence K. Karlton ruled that Watt had "in large measure failed to follow the law" in dropping the areas.

MX Musings

Arkansas Senator Dale Bumpers says of military weapons systems, simply, ". . . you cannot kill one."

Congress' recent vote to add more missiles to the 21 already built and being deployed this year provides testimony to the truth of those words. After 11 years, some 30 congressional votes, three administrations, and changes in justification and in name, the MX has become one of the more tenacious weapons to climb Capitol Hill.

Once a bold plan to counter the Soviet Union's military advances and first-strike capability, the MX is now championed as a bargaining chip in the Geneva arms talks. Controversy over its deployment has also underscored the Pentagon's power and influence, for Congress has never denied a president a major strategic weapons system.

But the explanation for the longevity of the MX also lies within the workings of the congressional budget process. Today there is almost never a final vote on any federal spending program. Under Congress' current operating procedures, there is always the possibility of another vote on a seemingly dead issue. So despite solemn vows by some legislators that the MX has seen its last federal budget appropriation, the chameleon missile could, like other Pentagon projects, live on indefinitely. □

Domestic Maneuvers

A major military power is staging a subtle invasion of vast tracts of American territory. No, it's not a Soviet assault–it's a noisy, unsettling occupation by our own armed services.

MICHAEL BOWKER

In August 1984, "a couple of hayseeds from Nevada" (as they called themselves) journeyed to Washington, D.C., to testify before a U.S. Senate subcommittee. Ed Robbins, a rancher, and Richard Bargen, a physician, came to voice their opposition to a proposal that had already changed their lives. The region where they lived and worked, once a refuge for bighorn sheep, golden eagles, and people in search of solitude, was quietly being appropriated by the United States military.

Bargen, Robbins, and many of their western neighbors are worried, and not without cause. Citing a need for new territory to test their latest supersonic jet fighter planes and other hardware, the Navy and Air Force have been rapidly expanding their facilities. The withdrawals of land are necessary, the Pentagon says, "to provide the specialized training to achieve and maintain a high degree of readiness for its forces." As a result, the high deserts of Arizona, Idaho, New Mexico, Nevada, and Utah now echo with the thunder of hundreds of sonic booms every week.

Collectively, the military's recent and proposed acquisitions amount to an estimated 10,000 square miles of airspace and an equal amount of public land, much of it formerly managed by the Bureau of Land Management (BLM). At least ten proposed wilderness areas and two wildlife refuges are affected. While some of the land has for years been used as Military Operations Areas (MOAs), where nonsupersonic aircraft are tested, the military is proposing a new classification: Supersonic Operations Areas (SOAs), where the air would be re-

served for supersonic jets. The corresponding land withdrawals are for radar installations, target ranges, and flight-support equipment.

Because the military expansion has taken place on a piecemeal basis, and because the Pentagon's machinations have kept the national debate focused on Star Wars and $630 toilet seats, the western air-and-land grab has received little attention outside the region. Yet those on the inside claim that in some cases, such as the Air Force's appropriation of the 89,000-acre Groom Range in southern Nevada, the military has violated federal law by withdrawing the land without congressional approval. (The Groom Range takeover was eventually approved by Congress . . . after the fact.) Residents add that the expansion will severely curtail civilian aviation, render significant tracts of public land inaccessible, and reduce the possibility that the areas being considered will be eligible for wilderness designation. Indeed, citing the military overflights, the BLM in Utah has already recommended against wilderness designation for several areas.

There could be health problems as well. The military has admitted that it does not know the potential physical or psychological effects of frequent sonic booms on humans and wildlife. Initial studies indicate that while bighorn sheep in the sonic boom areas have not shown signs of stress, some raptors, including a number of golden eagles, have begun to deviate from their normal nesting and flight patterns. Military officials acknowledge that many areas have been subjected to more than a hundred sonic booms per day.

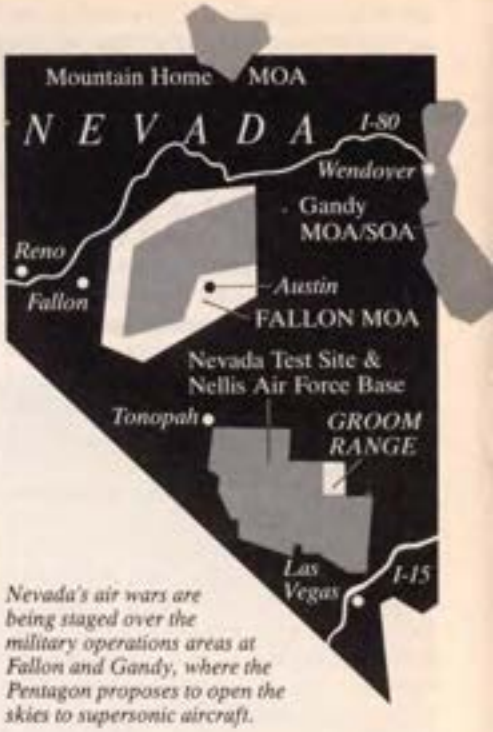
The military is no stranger to Nevada, and it already has made itself more at home there than some residents would like. More than 4 million acres of the state are being used for bombing ranges and testing and storage of nuclear weapons. Now an unlikely coalition of Nevadans—political groups, the Sierra Club's Toiyabe Chapter, local chambers of commerce, ranchers, Indian tribes, miners, and pilots—is waging a bitter and costly battle against the military takeover. Some of the most active opposition has come from those living near the town of Fallon in western Nevada, where the Navy is proposing withdrawal of some 181,000 acres of BLM land to create a 5,600-square-mile SOA.

Fallon has not yet been formally designated an SOA, but "it's like living in the middle of a war zone," says Robbins, an ex-Marine from the tiny community of Dixie Valley, some 30 miles from the Navy MOA. Robbins and the 60 other residents of Dixie Valley have been shaken by more than 230 sonic booms in the last two years. "We aren't anti-Navy or anti-American, but we feel our own military shouldn't do this to us," he says. "These sonic booms are not only nerve-wracking, they crack the walls of our homes and schools. Plus, the bombs they use for testing have stirred up the sediment in our water wells." Robbins has had to sell all his cattle to pay for unsuccessful lawsuits against the Navy, and he now hopes the military will at least buy out those who wish to move away from the sonic boom areas. "We're saying, 'If you fly it, buy it.' The fear we all live with is that we will be driven from our homes and left with nothing."

Lieutenant Martin Smith, project officer at the Naval Facilities Engineering Command at San Bruno, Calif., says the Navy is considering the "fly it, buy it" option, but will not make a decision until after the final environmental impact study (EIS) on the Fallon expansion has been approved. "That could be six months or two years or more, depending on how much the procedure is slowed down," he says, referring to objections raised to the Navy's draft EIS. In a letter to Smith and other Navy officials, Rose Strickland and Dave Hornbeck of the Toiyabe Chapter criticized the draft as "a classic example of a document written to justify decisions already made—and indeed, already partially implemented—in direct violation of National Environmental Policy Act requirements."

Strickland and Hornbeck outlined a number of specific deficiencies in the draft EIS, including several procedural violations, and charged that the draft does not address adequately either the need for the project or its potential effect on wilderness and wildlife. A key allegation made by opponents of the expansion—one that could toss a monkey wrench in the military's plans—is the claim that all military appropriations in Nevada and southern Utah are connected to a larger "master plan." They say the military's piecemeal expansion, when taken as a whole, is strikingly similar to a plan called Continental Operations Range that was proposed by the Pentagon in 1974. This plan, which was set aside in the mid-1970s because of substantial public opposition, called for the appropriation of land and airspace to link southern Nevada's Nellis Air Force Base, the Fallon Naval Air Station, and western Utah's Hill/Wendover Air Force complex in a giant triangle. If the Toiyabe Chapter's allegation sticks, the Navy's EIS for the Fallon facility will have to address the cumulative impacts of all military expansions in Utah and Nevada.

Smith and other military officials have consistently denied any relationship between the Continental Operations Range plan and the current expansion. Yet some



Nevada's air wars are being staged over the military operations areas at Fallon and Gandy, where the Pentagon proposes to open the skies to supersonic aircraft.

similarities do exist. Current Pentagon plans include Air Force appropriation of the BLM's 89,000-acre Groom Range; the proposed creation of a 3,000-square-mile SOA at the Gandy MOA on the Nevada-Utah border; and the creation of an SOA and Strike Warfare Center near Fallon—all of which resemble appropriations called for in the 1974 plan.

But even these are just a slice of the Defense Department's overall land-and-air-grab pie. Other proposed withdrawals include a 600-square-mile SOA near Valentine in west Texas, a 500-square-mile SOA adjacent to the Gila and Aldo Leopold wilderness areas near Reserve, N.M., and a 4,500-square-mile SOA on the Papago Indian Reservation, near Sells in southern Arizona. While many of these lands are already MOAs, the change to SOAs would not be insignificant: 20 to 50 sonic booms could occur each day.

Moreover, the Pentagon's military expansion is not limited to the West. Currently in the works is a proposal to establish an 18-square-mile National Guard training base on the Cumberland Plateau in Tennessee. The plan threatens a state park, a state natural area, and a fragile riparian stretch along the Collins River. The Sierra Club's Tennessee Chapter and a host of other concerned groups are forming a coalition to fight the appropriation.

One of the problems facing the Tennessee coalition and similar groups across the country is lack of political support. The affected lands are mostly isolated and sparsely populated areas that can be safely

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ignored by politicians in favor of population centers, which are often partially supported economically by nearby military bases.

The controversy has opened a chasm between Nevada state officials and most of the state's congressional delegation. Led by Sen. Paul Laxalt (R), one of President Reagan's closest friends and allies, most of Nevada's congressional delegation has backed the military's plans. However, one member of Congress, Rep. Harry Reid (D) of Las Vegas, introduced legislation in March that would slow down the expansion. Reid's bill would require congressional approval for any military takeover of public airspace.

But the most prominent critic of the military's plans has been Nevada Governor Richard Bryan. Bryan has steadfastly resisted the military's efforts, but he admits there is little he or the people of the state can do to stop them. "What can the governor or any Nevadan do to alter the situation?" asks his aide John Walker. "From a moral and ethical standpoint we feel the military is obligated, at the very least, to buy out and relocate any person disrupted by the expansions. But there is no way we can keep the Navy—or any other military branch for that matter—from doing whatever it wants."

That realization has become painfully evident to many westerners whose rural lifestyle is threatened by the military expansions. A case in point is Richard Bargen, Dixie Valley's "flying doctor." Since 1979 he has been the primary medical link for some 4,000 people, most of them living in scattered, isolated areas. Last year a Navy complaint caused the Federal Aviation Administration to ground Bargen for "buzzing" an unmanned military radar base. The grounding came less than a month after Bargen testified before the congressional subcommittee against the Navy's Fallon SOA proposal. Bargen appealed the ruling, but the Navy says the tapes of the control tower exchange, which would have solved the dispute, were inadvertently erased. Bargen has continued his appeal, but he has had to sell his plane to pay for legal fees generated by his lawsuits against the Navy.

"My situation is just an example of how the military has conducted itself during this entire land-grab operation," Bargen says. "It's frightening to see federal agencies operating outside the law. It shatters your conception of how things work. If the military is allowed to snatch away our lands without opposition, maybe all of us, not just Nevadans, have lost something more important than the land itself."

MICHAEL BOWKER *is a freelance writer living in Placerville, Calif. His article "The Hawkers of Heredity" appeared in the January/February 1985* Sierra.

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POLITICS

GALE WARNER

Low-level Lowdown

High-level radioactive waste grabs most of the headlines, but its less-publicized cousin poses many of the same problems–not the least of which is where to put it.

THIRTY-FIVE MILES north of New York City, Union Carbide Corporation operates a chemical reprocessing plant and a small nuclear reactor. The facility produces some materials used for medical purposes and others used in making nuclear weapons. It also produces a liquid that is considered high-level radioactive waste under one section of the Nuclear Regulatory Commission's regulations. But when the waste is put into 55-gallon barrels with only slightly contaminated paper and metal, the average concentration of radioactivity drops, and the resultant mixture fits within the commission's definition of low-level radioactive waste. The barrels then make the 500-mile journey to the low-level waste dump near Barnwell, S.C., where they are placed in one of 32 trenches and covered with dirt.

While the Barnwell dump is considered a shining star in the waste-management business, significant levels of tritium, a suspected carcinogen, have been detected 200 feet southwest of its trenches.

This story is played out hundreds of times a year. The names and places change, but the problems of low-level radioactive waste stay the same. No one knows how to define it, who should be responsible for it, or how and where it should be discarded.

Currently defined by exclusion, low-level waste is that which does not fall into the high-level category, which includes spent nuclear fuel, reprocessing wastes, and mill tailings from uranium mining. What remains is a bodgepodge of trash from nuclear power plants, factories, research institutions, and hospitals—everything from laboratory animal carcasses and irradiated reactor components to emergency exit signs and residues from the manufacture of luminous watches. Much of this waste is relatively harmless. But some, particularly wastes from radiopharmaceutical companies and contaminated filters from nuclear reactor cooling systems, remain extremely potent for a long time.

Until the 1960s, disposal of low-level waste posed little difficulty. It was simply put into 55-gallon drums, loaded onto Navy ships, hauled out to sea, and unceremoniously dumped overboard. At 6,000 feet below sea level, experts believed, it would

never be heard from again. (But it was, of course; the EPA has since found elevated levels of radioactivity in the seabed and marine life near California's Farallon Islands, where 47,000 barrels of low-level waste were jettisoned.)

With the increase in waste caused by the arrival of commercial nuclear power, it became more viable economically to replace ocean dumping with landfills, and to go from federal to private control. Commercial landfills were patterned after those at a dozen defense installations. Wastes were packaged in steel drums or wooden boxes and dumped into trenches that, when full, were covered with earth.

Apart from their design, low-level waste dumps went corporate with virtually no comprehensive planning or federal oversight. The first commercial dump opened near Beatty, Nev., in 1962. Maxey Flats, Ky., and West Valley, N.Y., opened in 1963; Richland, Wash., in 1965; Sheffield, Ill., in 1967; and Barnwell, S.C., in 1971.

Three of the dumps were short-lived. West Valley closed in 1975, Maxey Flats in 1977, and Sheffield in 1978. Each facility stopped operating because radioactive materials had migrated off the sites. "There isn't a radioactive landfill in any area with 30 to 40 inches of rainfall a year that hasn't leaked," says Marvin Resnikoff, co-director of the Sierra Club Radioactive Waste Campaign. "Landfills act a lot like teabags: The water goes in, the flavor goes out."

But closure has not meant the end of problems at the dumpsites. At Maxey Flats, the largest of the closed dumps, plutonium has been detected more than a mile from the site. Groundwater contaminated with tritium continues to move out of the Sheffield site at the rate of a half mile per year. At West Valley, trenches have been infiltrated with water, creating a "bathtub effect" that has spilled tritium and strontium into nearby streams.

The three remaining commercial dumpsites in Richland, Barnwell, and Beatty have handled all the nation's low-level waste for the last seven years. Residents and state officials are now getting tired of the situation. In October 1979 the governors of Washington and Nevada temporarily shut down the Richland and Beatty sites—the former because waste kept arriving "improperly packaged," in some cases with liquid oozing from the barrels, and the latter because of safety violations.

The governor of South Carolina, fearing that his state would become the low-level dumpsite for the entire country, immediately announced restrictions on the amount of waste the state would accept. Utilities and other producers of low-level waste protested that soon they would have nowhere

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to send their radioactive trash. All three states' actions were later rescinded, but they had created a crisis atmosphere that prompted Congress to pass the Low-Level Radioactive Waste Policy Act in December 1980.

Although several studies had recommended that low-level burial sites be returned to federal jurisdiction, the act dumped the problem into the laps of the states. It called on them to form interstate compacts and construct regional burial sites to handle each region's waste. Once negotiated, compacts were to be submitted to Congress for ratification.

The carrot—and the stick—of the bill was a clause allowing regions with ratified compacts to refuse to accept low-level waste from outside the region after January 1, 1986. The theory was that this would motivate states to reach agreement swiftly and begin constructing new dumpsites. Members of Congress patted themselves on the back for having permanently solved the problem of low-level waste while promoting interstate cooperation.

Putting the law into practice, however, has not been quite that easy. Some states have formed compacts, particularly those that now have dumpsites and are anxious to take advantage of the 1986 deadline. But others have delayed, hoping to leave the issue to political successors. In some areas negotiations have broken down or are in limbo as individual states flirt with several different regions, looking for the best deal. And even in regions that have formed compacts, new sites will not be ready until well past the 1986 deadline.

The Northeast, which generates 37 percent of the volume and 57 percent of the radioactivity of the nation's low-level waste, is in the worst shape. Negotiations for a Northeast compact fell apart when the three largest waste-generating states, New York, Pennsylvania, and Massachusetts, refused to join, leaving four smaller states that had already ratified the compact—Connecticut, Delaware, Maryland, and New Jersey—in the lurch. "They thought some big state would join and take the site, and now they don't know what to do," says Priscilla Chapman of the Sierra Club's New England Chapter. The comparatively tiny waste-generating states of Maine, New Hampshire, Vermont, and Rhode Island are adopting a wait-and-see attitude.

Massachusetts is in a unique position. In 1982 voters passed by a two-to-one margin a referendum requiring that any low-level waste facility not exclusively set aside for medical and institutional wastes be approved by the voters.

Meanwhile, the 24 states that do belong to regional compacts are waiting for congressional approval. It may be a long wait. Few members of Congress are likely to vote for anything that might cut off their state's access to the three current dumpsites.

In an attempt to bring order out of chaos, Rep. Morris Udall (D-Ariz.) has introduced a bill amending the 1980 act. The Udall bill recognizes that the 1986 deadline is unrealistic. At the same time it attempts to appease the states that have formed compacts and prod other states into action. The bill would postpone until 1993 the date that regions can refuse nonregional waste, but in the meantime it specifies reduced volume allocations for these sites.

"The Udall bill is on the right track," says Sierra Club Washington lobbyist Brooks Yeager, "but we don't think it goes far enough in addressing some of the key problems." Among these is the present definition of low-level waste, which lumps together wastes that are hazardous for a few years with those that must be isolated for hundreds or thousands of years. The Sierra Club believes the latter should be taken out of the low-level waste category and considered high-level, or perhaps put into a new category of intermediate waste. "Of course, just creating a new category and a new label isn't going to solve the problem," says Chapman. "You still have to figure out

what to do with the wastes. But at least it recognizes that we can't just throw them all into one trench."

Still another question is whether shallow landfills are the most appropriate method for disposing of low-level waste. While the Nuclear Regulatory Commission remains committed to using trenches, others are not so sure. The states of Illinois and Kentucky, for example, will not make the same mistake twice; their two-state compact calls for "above-ground facilities and other disposal technologies providing greater and safer confinement."

Segregating wastes at the source and storing them in above-ground facilities significantly lessens the amount of low-level waste to be dealt with, since wastes that decay to harmless levels of radioactivity in just a few years could then be disposed of as regular trash. Wastes with hazardous lives longer than the expected lifespan of a facility could be removed and sent to a high-level waste repository when one becomes available.

While the initial costs of above-ground storage facilities are higher than the cost of simply digging a ditch, they have several advantages: Waste can be easily monitored and leaking packages identified; the costs of pumping out leaky landfills are eliminated; and storage can be located in any part of the country because siting is less dependent on climate and geology. Logical places to put above-ground facilities might be the sites of defunct nuclear reactors, which "are going to be de facto waste sites for some time to come," says Resnikoff.

The utilities, however, have been reluctant to take any role in either temporary or long-term storage of low-level waste, says Yeager. "They get upset any time someone asks them to take responsibility for the waste they produce."

"Waste disposal is already very expensive, and our concern is that utilities will have to increase rates, hospitals will have to increase fees, and universities will have to cut back on their research," says Mary Paris of the New York State Low-Level Waste Group, a coalition of utilities, hospitals, universities, and manufacturers. "We could do above-ground storage, but it's a question of how much that would cost over the long term," she says.

According to Resnikoff, this kind of argument simply "runs interference" for the utilities, whose current expenses for low-level waste disposal are "so low that you couldn't measure it on your electricity bill." Medical wastes account for 7 percent of the volume and less than 1 percent of the radioactivity of the nation's low-level waste stream; in contrast, utilities produce 54 percent of its volume and 24 percent of its radioactivity. Medical wastes contain mainly short-lived isotopes that can be safely stored in a warehouse for several years and then disposed of as regular trash.

Meanwhile, South Carolina is threatening to close its dump if Congress doesn't stop dragging its feet on ratification of the Southeast compact. Should the Barnwell site actually close, "it would create quite a problem," says Yeager. "The utilities really hold the key to the short-term capacity crisis. It would cost them money, but they can afford to store it and they have the room."

Overall, Resnikoff is encouraged by what he sees as a movement away from landfills, and the opportunity presented by the Udall bill to redefine low-level waste. However, it is crucial that the public be informed if the problems are to be resolved safely. "If we weren't around looking over industry's and regulators' shoulders, my guess is that all this stuff would just be tossed into the backyard," says Resnikoff. "Only with a tremendous amount of citizen activity on this issue can we continue to make headway."

GALE WARNER, *an environmental writer based in Massachusetts, has written for* New Age *and the* Christian Science Monitor. *Her article "Staking Claims on the Last Frontier" appeared in the July/August 1984* Sierra.

EDGAR WAYBURN

Alaska Parks in Peril

In a race to meet a December deadline, the Park Service has issued a flood of ill-conceived management plans. Citizens must act fast to voice their concern.

SINCE 1967 the Sierra Club has worked to keep remnants of the magnificent Alaskan wilderness undisturbed by civilization. Partly as a result of these steadfast efforts, Congress in 1980 passed the Alaska National Interest Lands Conservation Act (ANILCA), which established 54.5 million of Alaska's 375 million acres as national parks and preserves. The act was not all that conservationists desired, but it was a prodigious achievement.

ANILCA mandated that the National Park Service present to Congress general management plans for the parks and preserves by December 1985. Now, just six months before the final deadline, the public is suddenly presented with a flood of draft management plans, environmental impact statements, and wilderness suitability reviews for nine national parks and preserves. The Park Service is offering only 60 to 120 days for public comment. It is difficult to believe that such a hasty, concentrated planning effort will result in the long-term wisdom essential to quality management of Alaska's national parks.

Despite a dearth of reliable research and baseline data, irreversible management decisions are being made now. The plans address questions vital to the future of the parks, such as how visitors should be regulated; where motorized vehicles should be allowed; what should be done about inholders—those who own private land within the parks; how much development is appropriate; and where subsistence hunting and gathering should be allowed.

At stake are places such as the Gates of the Arctic National Park and Preserve in the Central Brooks Range and the neighboring Noatak National Preserve, the largest mountain-ringed river basin in the United States virtually unaffected by human activities.

"Nothing I had ever seen . . . had given me such a sense of immensity," wrote wilderness explorer Robert Marshall of a trip to the Brooks Range some 50 years ago. "No sight or sound or smell or feeling even remotely hinted of men or their creations. It seemed as if time had dropped away a million years and we were back in a primordial world. It was like discovering an unpeopled universe where only the laws of nature held sway."

Travelers still return from these two parks with similar reports of splendid isolation and pristine natural wonders, but the

Jeff Gnass

A storm moves into the Teklanika Valley from Sable Pass in Alaska's Denali National Park. A bureaucratic cloud also looms over Denali—and eight other national parks in the 50th state.

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situation could be changing. In both of these areas, off-road vehicles and park development have become central issues. At Gates of the Arctic, the Park Service wants to prohibit the use of off-road vehicles by the public, but fails to mention in its draft management plan whether such vehicles are allowed for subsistence users. While they keep most park facilities outside of these parks, the plans suggest placing ranger cabins inside the parks' boundaries.

All park facilities and other developments are inappropriate in these last remnants of primeval American wilderness. Motorized vehicles must be kept out as well —except where they are strictly necessary for subsistence.

At Denali Park, Mt. McKinley abruptly rises 18,000 feet above the Alaska plain and more than 20,000 feet above sea level. The park is a refuge for grizzlies, moose, wolves, and Dall sheep, but the Park Service plan does not adequately protect wildlife habitat. For instance, park planners are calling for recreational development and increased access in the lowlands on the south side of Denali Park. Yet adjoining state lands provide ample access; almost all of Denali should be designated wilderness.

Given the substantial development already in place near Denali's boundaries, remaining lands should be protected, according to a 1985 report by the Alaska Wildlife Alliance. "Further compromise is impossible, unless we are willing to risk the park's survival as a freely functioning large-mammal ecosystem and trade away some of its best views," the report says.

Wrangell-St. Elias National Park and Preserve on the Canadian border is a land of mountains, glaciers, and icefields. The nation's largest national park, it has been designated a World Heritage site by the United Nations. Hunting here has become a concern to some, who say that residents from surrounding areas are permitted to hunt inside the park whether or not they legally qualify as subsistence users. Legitimate

To comment on Alaska's nine national park management plans, send a letter to: Director, Alaska Regional Office, National Park Service, 2525 Gambell St., Room 107, Anchorage, AK 99503-2892. Be sure to forward a copy to your representatives in Congress, along with a letter reminding them that these plans will be presented to them in December.

Write to Campaign Desk, Sierra Club, 530 Bush St., San Francisco, CA 94108 for more information and a copy of the Alaska Report.

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subsistence use of the area is fine, but residents from distant cities such as Valdez—at least a hundred miles from the park by road—should not be allowed to hunt within the park boundary.

THE LIST OF concerns about the management plans for the nine parks could go on. Several policy issues, however, are common to all nine. On these key points, what advice should we give to the Park Service?

- Although the agency has found nearly all nonwilderness areas in the parks suitable for wilderness designation, it has not made recommendations to this effect. These recommendations should be made to Congress now.
- The Park Service should also attempt to acquire inholdings within the parks, to expand wilderness boundaries, and to establish visitor facilities outside the wilderness areas. Any development inside the parks should be postponed until more is known about the areas' resources and ecological relationships.
- Park lands should not be traded to allow resource extraction and sport hunting. Moreover, only qualified subsistence users should be allowed to hunt in the parks.
- The Park Service needs to enforce ANILCA's fish and wildlife policies, not the corresponding state regulations, which are generally weaker. Each management plan should include a clear statement of federal jurisdiction where there is conflict between state regulations and ANILCA's purposes.
- The parks' interim regulations must be revised to bring them into accord with the principles of ANILCA. For example, trespass cabins that exist now because of loopholes in current regulations should be phased out.

CONGRESS ALSO has an important role to play. In addition to requiring plans that protect the wildness of Alaska, it must appropriate the funds to implement them. The Park Service needs more money to buy the inholdings. It also needs more funding for staff. Currently, Alaskan national parks are staffed by skeleton crews. The management documents are mere paper plans until such funding becomes available.

Conservationists' voices have made a difference to Alaska in the past: They helped pass ANILCA, which some have called "the greatest conservation act of the century." Now it is vital that those voices be heard again.

EDGAR WAYBURN, *the Sierra Club's Vice-President for Parks and Protected Areas, heads the Club's Alaska Task Force.*

Yellowcake National Park

The Grand Canyon is neighbor to tens of thousands of mining claims that are said to contain some of the richest uranium deposits ever discovered in the United States.

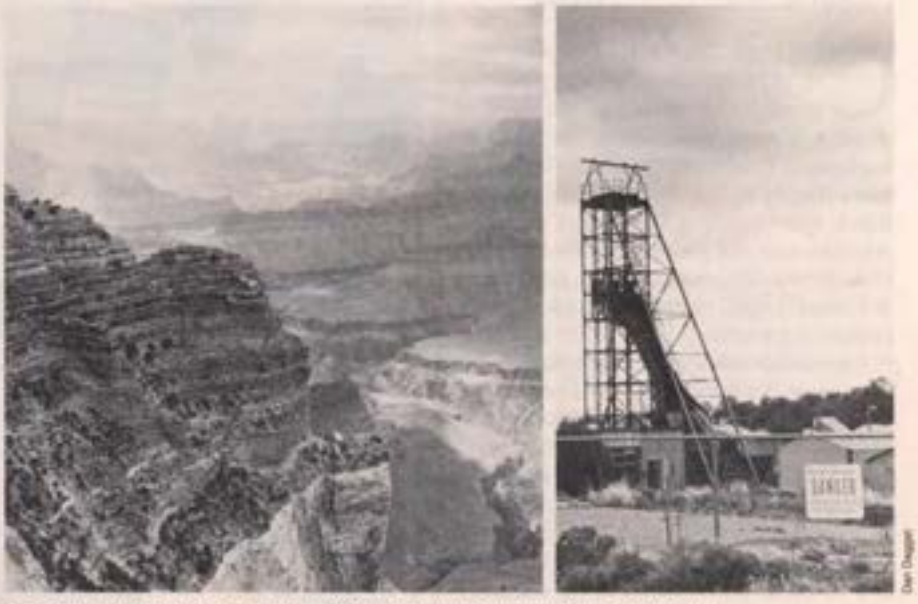
From the El Tovar Hotel on the South Rim of the Grand Canyon, visitors can see a stark silhouette on the horizon. A rusting piece of rigid geometry, the abandoned tower of an old uranium dig stands above the magnificent panoramas of the canyon. Since the Orphan Mine was shut down in 1969, the tower has stood as an unofficial monument to a chapter in the park's history that many assumed was, like the Orphan, closed forever. Recent events indicate that this assumption was painfully premature.

A new wave of uranium prospecting that began in 1980 now promises to give the Orphan a growing family of brothers and sisters just outside Grand Canyon National Park. Although no new mines are allowed in the park itself, conservationists are concerned that nearby mining activity could have a profound impact on the park and important public lands just outside its protective boundary.

In the center of the controversy is the 1872 Mining Law, a relic of the days when mining was considered the highest (and sometimes the only) use of remote lands in the sparsely populated and underappreciated 19th-century American West. Under the law's provisions, any tract of land not specifically withdrawn from mining (such as a national park, a monument, and, since 1984, a wilderness area) can be claimed for mining if it can be proved that the site has a marketable deposit of hardrock minerals. For a nominal fee any valid claim can be "patented," turning ownership of the land over to the claimholder.

It is this old law, this blank check given to the mining industry more than a century ago, that holds the ominous threat of uncontrolled uranium development over the plateau surrounding the Grand Canyon. It is this law that prevents public-land managers from saying, "No, not here. This is too beautiful, too vital to wildlife, too close to the park."

The current Grand Canyon uranium rush started in 1980, when Denver-based Energy Fuels Nuclear took over a claim in Hack Canyon, less than nine miles from the park boundary on the North Rim. Exploration of the site uncovered a very rich deposit of uranium ore, some of the richest ever discovered in the United States, according to the company's chief engineer, Bob Steele. The ore was found in a breccia pipe, a geologic structure that forms when a sec-



The Orphan Mine (at right) is closed, but the canyon's mining days are not over.

tion of earth collapses downward and is later filled with mineralized deposits.

The success at Hack Canyon started Energy Fuels Nuclear on a treasure hunt for more breccia pipes, initiating a prospecting fever that sent rumors flying all over northern Arizona. The resulting claims now number in the tens of thousands on public lands near the Grand Canyon managed by the Bureau of Land Management (BLM) or the U.S. Forest Service.

Claims were filed on lands where mineral entry is restricted as well as on those open to mining. Pathfinder Mines, a company 80-percent owned by a French firm, filed some 1,300 claims within the Grand Canyon National Game Preserve, an area north of the canyon that was set aside by Teddy Roosevelt in 1906. When the Forest Service refused to allow access to those claims, Pathfinder took the agency to court. The case is still pending.

To the north of the park, uranium activity has marred publicly owned roadless areas on the Arizona Strip, the land between the Grand Canyon and the Utah state line. All three mines that Energy Fuels Nuclear had opened or planned to open as of 1983 were in designated wilderness study areas, public lands that are supposed to be managed to preserve their wild characteristics until Congress decides whether they should be designated as wilderness.

Conservationists' concern over development on the Strip was focused mostly on these and other sensitive and irreplaceable wilderness study areas. Energy Fuels Nuclear President John Adams moved to defuse the situation by entering into negotiations with The Wilderness Society, the Sierra Club, and the National Parks and Conservation Association. This resulted in provisions that stopped any further prospecting on 397,000 acres of roadless land on the Strip by adding them to the Arizona Wilderness Act of 1984. But the law simultaneously released more than 673,000 acres of roadless land for development.

The main reason Energy Fuels Nuclear, Pathfinder Mines, and Rocky Mountain Nuclear (the other major claimholder in the area) are holding back on mining is the current low price of uranium on the world market. That and some stiff competition from richer Canadian, Australian, and South African ores has confined mining activity on the million-odd acres claimed by these companies to only the richest sites. The three mines opened by Energy Fuels Nuclear north of the park are all within 16 miles of the park, and the company has proposed one mine to the south that would be 13 miles from the park boundary. Pathfinder maintains an office in the area, but its activities and those of Rocky Mountain Nu-

clear have been limited to exploration.

Uranium prices are expected to remain at or near present levels through the rest of the decade, according to metals analysts. If that prediction turns out to be accurate, Steele says Energy Fuels Nuclear will try to open one new mine a year. If prices go up, however, he admits that more mining and construction of a mill might occur.

Conservationists are concerned that a rise in uranium prices would trigger an explosion of mining activity that could harm the park as well as the rugged and beautiful land surrounding it. A preview of just what sorts of problems this could cause was provided by a flash flood that breached the diversion ditches at Energy Fuels Nuclear's Hack Canyon site in August 1984. The flood washed ten tons of high-grade radioactive ore down the canyon. The EPA cited Energy Fuels Nuclear for being in violation of the Clean Water Act, but the company has since cleaned up the spill to the agency's satisfaction by removing 1,500 tons of contaminated soil from Hack Canyon.

A more serious spill occurred at the Churchrock uranium mill in New Mexico in 1979 when contaminated water poured down the Rio Puerco into the Little Colorado River. Since that spill, according to Flagstaff, Ariz., environmental consultant Bill Towler, high levels of radiation have been detected at various locations along the Little Colorado's course, including its confluence with the Colorado, within the boundaries of Grand Canyon Park.

Concerns about uranium mining have been voiced frequently at forums held by Energy Fuels Nuclear in various communities in northern Arizona. The state has had a long history of problems with radiation, caused mostly by unstable tailings piles and unsafe mining conditions. (See "Uranium Plagues the Navajos," November/December 1983.) Company officials are quick to point out that controls over all phases of the mining process are more stringent now. But the fact that the ditches at Hack Canyon met current regulations didn't protect them from destruction by floodwater.

One change that mining will bring to the plateau, even at its current growth rate, is traffic and roads in an area where access has never been very extensive. Ace Peterson, president of the Arizona Wildlife Federation, considers this to be the greatest potential danger of the mining revival. The proposed Canyon Mine, the first in the current mining rush to be located on the South Rim, would send ten trucks loaded with 20 tons of uranium ore every day over the back roads of the Kaibab National Forest to the

Energy Fuels Nuclear mill at Blanding, Utah. There would also be supply trucks to service the mine, and traffic from daily crew shifts. Add to this the incidental traffic that would inevitably stray down a wide, flat road leading off into the sagebrush, and you have what Peterson describes as a major impact on wildlife.

One of mining's impacts on people would probably be visible at the overlooks. Conservationists fear that increased traffic could cloud park vistas, as the dust stirred up along the mining access roads impairs visibility. A rash of mining activity could also discourage backpacking, hunting, and camping on lands surrounding the park.

Because this is the first of the recent mining proposals on the South Rim, it is seen by activists as an escalation in the current round of development. Since the mine was proposed in November 1984, sentiment against it—and the larger threat it represents—has been growing. Conservation groups, including the Sierra Club's Plateau Group, Earth First!, the Arizona Wildlife Federation, Friends of the River, and the Southwest Resource Council, have voiced their opposition to the uranium project.

The U.S. Forest Service, which manages the surface of the Canyon Mine claim, must either approve or modify the company's plan of operation. Conservationists have already convinced the agency to produce an environmental impact statement (EIS) before acting on the plan. They are also pushing for a regional EIS on uranium mining. Energy Fuels Nuclear opposes this broader study because all potential mine sites are not yet known.

But neither the Forest Service nor the BLM has proposed more than what Rob Smith, Assistant Southwest Representative of the Sierra Club, calls band-aid remedies to mitigate the impacts of mining on the lands they manage. Smith points out that neither agency can stop the development of a patented claim in any area, no matter how sensitive, because "under the 1872 Mining Law that would be a violation of private property rights."

As activists continue to look for a way to protect the unique resources of the Grand Canyon and surrounding lands, the 1872 Mining Law keeps cropping up as a major obstacle. Dawson Henderson, chair of the Sierra Club's Plateau Group, says Congress should protect the lands surrounding this famous national park in spite of the law, just as it has protected wilderness areas and other lands withdrawn from mining.

But environmentalists agree that a better solution would be to scrap the old giveaway law and place hardrock minerals under a system similar to that used for leasable minerals such as coal, oil shale, oil and gas, potash, and phosphate. This type of system would give land-management agencies the right to refuse mining operations. Where leases were granted, they would bring money into the federal treasury through royalty and rent payments.

"The 1872 Mining Law not only lets miners control the development of our public lands, it also mandates continual disturbance of the land even where development is not imminent," Smith says. To keep a mining claim valid, the law requires that the claimant do at least $100 worth of "assessment work" each year, which can include digging, road-building, and other environmentally damaging activities. "A leasing system would spare the land this unnecessary destruction," he says.

Where prospecting fever has spread to leasable lands in the Lake Mead National Recreation Area along the park's western boundary, environmentalists have put a stop to it—at least temporarily. The Sierra Club sued the National Park Service, which manages the Lake Mead area, arguing that the agency was routinely approving leases without environmental assessment, according to Sierra Club Legal Defense Fund attorney Lori Potter. In direct response to the suit, the agency revamped its management plans, withdrawing the lands adjacent to the park from mining. Industry may challenge that decision, however.

Scrapping the 1872 Mining Law and replacing it with a leasing system has been tried before, but the effort has always failed in the face of powerful mining-industry lobbying. Congress appears no more receptive to the idea this session than it has been in the past. Nevertheless, Grand Canyon activists believe they must begin reminding Congress that a change in the law is necessary. They hope the immense prestige of the Grand Canyon can somehow induce Congress to wean mining companies away from an archaic corporate welfare system, thus dragging federal minerals policy reluctantly but finally into the 20th century.

Dieter Krewedl of Pathfinder Mines points out that the huge number of claims filed on both rims of the canyon does not necessarily indicate that anywhere near that many mines will ever be opened there. But every new mine that does open increases the level of alarm felt by those to whom the region is a very special place. Just how well that alarm translates into action will play a big role in how the Grand Canyon weathers this latest storm.

Dan Dagget, *conservation chair of the Sierra Club's Plateau Group, is a knifemaker and freelance writer living in Flagstaff, Ariz.*

POLITICS

AL BUCHANAN

Costa Rica's Wild West

The country's much-admired park system faces the most serious threat of its 16-year existence as gold miners wreak havoc in Corcovado National Park.

A tiny Central American country roughly the size of West Virginia has earned worldwide admiration and acclaim for the accomplishments of its national park system. Since its inception in 1969, the Costa Rican National Parks Service has come to administer 24 units that comprise 8 percent of the country's territory—double the percentage devoted to parks in the United States. Nearly 85 percent of the parklands are government-owned. Most of the park service's 350 employees work in the field, and many of them have benefited from state-sponsored training in forestry and management.

Unlike most park systems, this one places greater emphasis on scientific research than on tourism. The majority of Costa Rica's parks are primarily preserves for tropical ecosystems: Visitor services are minimal, and viewing the flora and fauna—in fact, just getting to the parks—requires some logistical and physical effort. The persistent are rewarded by spectacular scenery and an unparalleled diversity of wildlife.

Nowhere is this diversity more evident than in Corcovado National Park. A naturalist's wonderland, Corcovado's 161 square miles contain 285 bird species (among them the scarlet macaw, chestnut-mandibled toucan, laughing falcon, Central American curassow, and the rare harpy eagle); 500 species of trees; 139 species of mammals (including tapir, ocelot, peccary, jaguar, and coatimundi, as well as squirrel, howler, spider, and capuchin monkeys), between 5,000 and 10,000 insect species; and green, leatherback, hawksbill, and olive ridley turtles. But a nonnative interloper, the *orero*, is fast becoming the center of attention and controversy as it threatens to alter the ecosystem of the Osa Peninsula.

Oreros, or gold miners, are reaching epidemic numbers within Corcovado's boundaries. The exact number is not known, but there are at least 1,500 to 2,000 of them—with some estimates running as high as 3,000. They are responsible for increasing habitat degradation, erosion, deforestation, and poaching.

"We are seeing ominous signals throughout the park," says Fernando Cortes, head of the National Parks Service's research section. Poaching and habitat degradation are the most pressing worries. Fish and freshwater shrimp, once abundant in the Madrigal River, are now gone. One no longer sees peccary herds of 200 or more; most sight-

A. Buchanan

A Costa Rican couple pan for gold at the mouth of the Madrigal River, Corcovado National Park, during low tide. A sluice box for separating the gold from river sediment sits behind them.

ings number 50 or less. "For the first time we have had park service horses—seven in the past year—killed by jaguars," says Cortes, "which is some indication of disruption in the cats' normal habitats."

Meanwhile, erosion and deforestation are upsetting the fragile balance of the region's flora. Surface mining is extremely destructive, causing whole riverbanks to erode. The miners cut trees and clear vegetation to plant crops and build sleep and work quarters; once this protective vegetation is removed, high temperatures and heavy rainfalls leach nutrients from the soil.

"The miners represent the biggest challenge to our parks system today," says Parks Director Alvaro Ugalde. "The Osa Peninsula and Corcovado National Park are the last frontier, Costa Rica's Wild West. We must conquer this problem before it gets out of control."

Failure to find a way to control the illegal mining could be perceived as an overall lack of control by the National Parks System, and thus have a devastating effect on the important foreign donations—such as the MacArthur Foundation's $1 million matching grant—that are responsible for much land acquisition and improvement within the park system. "This is a crucial moment in Ugalde's plan to consolidate and improve the parks," says Charles Schnell of the Organization for Tropical Studies.

Placer gold mining—which involves locating alluvial deposits, building diversion channels to increase water flow, and panning or using sluice boxes to catch and separate gold from sediment—is not a recent phenomenon in Corcovado, having been part of the region's history for more than 50 years. But when the park was created in 1975, only 60 miners—mostly old-timers—were working in the area. "These men were not seen as a problem, so we allowed them to stay," says Ugalde. In 1979, however, sundry events altered this scenario.

After several years of heavy crop losses, the Osa Peninsula was declared a poor rice producer by the National Insurance Institute, an agency that provides farmers with a hedge against occasional calamities. The institute subsequently suspended its crop-insurance program, and the government cut off agricultural credits for rice. The peninsula's economy stagnated. At the same time the administration of President Rodrigo Carazo enlarged Corcovado by executive decrees; the annexed zone included prime placer-mining sites already being exploited.

Quickly following these developments, the world market for bananas dropped drastically, forcing many plantations to switch to the more profitable and less labor-intensive production of palm oil. By 1981 banana production had been virtually eliminated on the Osa, many plantation workers were unemployed, and inflation was spiraling. The Costa Rican gold rush began in earnest.

More than half the miners are concentrated along the Madrigal, Tigre, and Rincon rivers in Corcovado's southern and eastern reaches. While most are residents of the Osa and surrounding areas, some have come here from Nicaragua and Panama. "Being a remote area, the Osa also has its share of fugitives—outlaws and drug dealers," says German Haug, a former director of Corcovado.

The miners and their families endure a harsh existence, packing in supplies from Port Jimenez, the Osa's commercial center and home to the chief gold buyer, Central Bank. There are no schools for the children, and only one physician, one nurse, and four assistants to serve the entire peninsula. According to Dr. Rodolfo Leal Vega, health problems among the miners include skin disorders caused by the acid river water in which they work, gastrointestinal illnesses caused by contaminated drinking water, kidney infections, and venereal disease. Social problems include alcoholism, prostitution, robbery, and petty crime.

But if life in Corcovado is so difficult, why do the miners stay? Ramon Salazar, who supports his wife and six children by mining, says, "We have nowhere else to go and no other way to make our living here. Besides, why work in the fields for 200 colones a day [about $4] when I can make two, three, sometimes ten times that much by working the streams?" Salazar knows he is breaking the law—but he also knows he has little to fear from the authorities, save the infrequent and understaffed patrols of the park service. "As soon as they leave the area, we return to our mining sites," he says.

With only 20 rangers divided among five stations in Corcovado, the park service is unable to do much more than watch the mining activities. Park headquarters are on the Pacific coast at Sirena, quite a distance from the mining areas and accessible only by air, horse, or foot (although several placer camps were recently discovered on the Rio Claro, only two miles away). "Lack of staff and money are the biggest worries I face," says Sergio Leon, director of Corcovado. "I need at least 50 rangers to patrol effectively, and my current budget is inadequate to implement any plan of action."

The budget for Corcovado—excluding salaries—comes to about 50,000 colones ($1,000) per year in petty cash. New or emergency equipment and supplies are usually purchased, if approved, with money from either the government's general fund

(the most expeditious method) or from the $1 million annual budget of the park service, which allocates more than 90 percent of its funds to salaries.

Efforts to remove the miners from Corcovado have hardly been successful. In March 1984 a government-sponsored operation costing 100,000 colones ($2,000) pitted 20 Rural Guardsmen and six park rangers against several hundred miners from the Madrigal River area. During one of several altercations, a miner was severely injured. The miners were taken to the jail at Golfito and promptly released because of overcrowding. Most returned to their mining sites in less than three days.

"That incident caused such trauma in the park service that we pulled back for a while," recalls Ugalde. "Guns are not the answer; peaceful education is."

Animosity still festers among miners in the wake of the raid. Edgar Quintero, leader of a group of 60 Madrigal River miners, is adamant in his refusal to be moved again. "The government must understand that we need to make a living and feed our families. We are all armed. If they try to move us again, we will fight, shooting anyone who tries."

Quintero represents a minority faction. The majority of miners have formed a union, the Syndicate of Miners, to seek peaceful solutions. The group's demands include better prices for gold nuggets, the allocation of income from the tax on gold to the Port Jimenez Community Development Association, and permission to mine either within the portion of the park annexed in 1979 or in the most productive region of all, just outside Corcovado's eastern boundary.

This last suggestion might seem to be a logical solution, encouraging protection of the parklands while providing Osa residents with a tenable way of life, but the land in question is already divided into 3,500 mineral concessions currently being mined by companies from Costa Rica, the United States, Canada, France, and Japan. (Other concessions have been granted in the ocean 500 meters from Corcovado's beaches.) These companies have shown little interest in training the unskilled miners to operate the heavy machinery used in their operations. Individual miners may apply for permits to mine around the park, but most lack the time, money, or information to make such an application.

According to an official at the Ministry of Energy and Mining (who requested anonymity), "Most people within the ministry are more concerned with gold production and the potential presence of silver, uranium, nickel, and other precious metals than they are with the environment or with the welfare of the miners. In reality, if the

1982 Costa Rica Mining Code [modeled after Oregon's] were adhered to, there would be no placer mining in the country; but Costa Rica suffers from a scarcity of resources, offering little capacity for expansion. Consequently, we feel the potential benefits from ore production are necessary for economic stability and far outweigh the negative aspects."

Atiliano Garbanzo, farmer and community leader from Rio Nuevo (a few hours by horseback from Port Jimenez), downplays any benefits from ore production: "It is a detriment to Costa Rica to mine gold. The waters dry up when you mine with machinery; cattle and agriculture suffer, and the mining companies destroy the forest. In the end, the people of the Osa will be the losers."

Just how much benefit Costa Rica gains from surface mining is a matter of debate. "It is known that prior to 1982 several large companies were paying only 2,000 colones [$40] per year for their concessions while mining out an average of 12 pounds of gold per week," says Cortes. "Of course, this was in one of the best ore areas. Actually, Corcovado Park possesses some of the poorer gold sites on the Osa."

Corcovado may possess the poorest placer sites, but unless alternatives are offered the miners will stay, and their numbers and attendant problems will multiply. "What we have is a social problem, not a parks problem," says Leon. "The park service cannot go it alone anymore. It needs the assistance and cooperation of other government departments and agencies and of international organizations." Until that assistance materializes (if it does), Parks Director Ugalde is faced with finding his own solutions to the illegal mining.

During the May-to-September rainy season, when mining is at a low ebb, Ugalde plans to add 25 park rangers to Corcovado. The main ranger station may be moved to Cerro de Oro, in the midst of the mining areas and accessible by jeep. An information center to be opened in Port Jimenez will offer education regarding the benefits of Corcovado to the country and its people, while at the same time dispelling rumors that the park, which is used mainly for scientific and natural-history studies, is a haven for the rich. Ugalde also wants the government to help by providing additional funds and issuing an official proclamation against the mining. There is always the possibility—however remote—that the miners will be permitted to work under the supervision of park service personnel within the annexed zone, along the Tigre and Agujas rivers and in the Piedras Blancas area.

"The park service has been on the defensive for the past two years," says Ugalde, "but we see the park slipping out of our hands. We must now go on the offensive and conquer the area, for if we lose Corcovado, it is the beginning of the end for us and the conservation movement in Costa Rica. It would set a terrible precedent for the park service."

The Costa Rican park service stands at the most crucial point in its short history. Its accomplishments to date have been effected by the political savvy, dedication, and hard work of Ugalde and Mario Boza, the first director of national parks and head of the environmental education program at Costa Rica's Open University. To save Corcovado will be their greatest challenge. □

AL BUCHANAN, *an editorial intern with* Sierra, *visited Costa Rica twice to research this article.*

A LAST FIERCE PARADISE

GARY FERGUSON

This year marks the 75th anniversary of that grand slice of Montana mountainscape known as Glacier National Park. It would be hard to think of another place where nature has scoured the high country into a more fascinating collage of peaks and palisades, yawning snowfields, and deep hidden basins filled with cobalt water. This is what remains of America's wildest mountain country, a final harbor for the grizzly bear and Rocky Mountain wolf. "For sheer God-given glory," Michael Frome wrote, "this is the place."

As is the case with so many of the West's glory spots, much of Glacier's magnificence can be attributed to a grand swell of ancient sea bottoms followed by the grind of glacial ice millions of years later. But what is unique about Glacier is that in many places its earth history is almost perfectly preserved. Geologists have come to recognize that certain sections of the park's 300,000 acres lying above timberline are the finest spots in North America to study sedimentary deposition. Here also can be found the continent's best collection of stromatolites (primitive, fossilized cones produced by blue-green algae and bacteria). Appropriately, nowhere else

George Bird Grinnell explored "the crown of the continent" in the 1880s. As editor of Forest and Stream *magazine, he led a determined crusade to make the area a national park. Congress finally consented in 1910. Below, St. Mary Lake lies in a valley sculpted by glaciers.*

David Muench

Glacier National Park

An avalanche destroyed these chalets at Gunsight Lake shortly after they were built in 1914. Today a trail from the lake leads to Sperry Glacier, one of the park's largest ice masses.

in the Lower 48 will you find a finer set of remnant lowland glaciers.

Beyond titanic form, however, much of the fascination to be found in Glacier's wild nooks and crannies stems from the park's staggering biological complexity. This is the only natural reserve in North America that contains five distinct biomes, ranging from the grand cedar-hemlock groves of the Pacific slope forest to the west to the rippling High Plains grasslands to the east. Over millions of years a unique interplay of flora and fauna has evolved within these overlapping ecosystems, and scientists are just beginning to recognize the area as an ecological gold mine.

These million acres comprise the only national park below the 49th parallel that contains both bighorn sheep and Rocky Mountain goats. It has been estimated that more than 90 percent of the world's genetically pure westslope cutthroat trout can still be found here. In the park's Zoo and Algal caves, researchers recently uncovered two hitherto unknown amphipod species, and they suspect that several undescribed species of plankton remain to be found elsewhere in the park. Bald eagles and peregrine falcons still soar above the snow-capped peaks, along with healthy populations of several bird species targeted by the Audubon Blue List as approaching endangered status elsewhere.

But if these mountains were blessed with a gene pool wider and deeper than most, the area that is now Glacier National Park remains intact mainly because it was sidestepped by the Europeans as they swept westward across the continent. Though Hudson Bay trappers (and later David Thompson of the North West Company) routinely sought furs on the fringes of Glacier's "shining mountains," the Blackfeet Indians kept any regular trade routes from being established across the region.

Ironically, it was to investigate the wretched conditions of the Blackfeet, who by 1885 were starving because of their refusal to become farmers, that George Bird Grinnell headed west for Glacier. Almost from his very first visit, the founder of the Audubon Society and "father force" behind the park considered this remote pocket of Montana "the crown of the continent" and a perfect wild place to preserve for future generations.

To this end, Glacier was rather fortunate. Its scant reserves of precious metals, mostly copper, played out fast. The region was also (as one observer noted) "entirely valueless for agricultural purposes." Senator Baily from Texas reluctantly concluded that creating a national park was "as good a use as can be made of that land." Yet even with all this going for it, Glacier was not accepted into the park system until 1910—nearly two decades after Grinnell first began massing support for its protection.

After several bills to create the park died (primarily because they did not make adequate concessions to logging and railroad interests), the House finally passed what it considered an acceptable version in 1909. The Senate, however, continued to drag its feet. One of the reasons was a sharp division of opinion between advocates of multiple-use reserves and those who believed in setting aside land primarily for preservation. Furthermore, it was incomprehensible to many politicians of the day that a parcel of land so far in the middle of nowhere could need federal protection at all.

"Why," wondered one senator, "with the federal government already devoting very large sums of money to national parks in that section or in other sections, this should be added, I am at a loss to see." From another: "It seems to be protected by nature, without our setting it aside, because it is practically inaccessible." But one of the most effective pro-Glacier arguments was the suggestion that the park would help wrestle vacationing Americans (and their money) away from the Swiss Alps.

For a remarkably long time after its designation as a national park, being "practically inaccessible" did seem to ensure that Glacier's wild character would remain intact. Access to much of the region was limited to railroads until the 1930s. During the park's early years the country was wrapped up in a genuine car craze, and motorists were not about to cross Glacier's Continental Divide with their four-wheelers strapped to a train ferry. They would go south instead. Also a plus during those first years was the fact that, unlike Yellowstone and Yosemite, Glacier remained relatively free of exploitive concessionaires.

Even today Glacier boasts nature thick enough to support Canadian lynx, fishers, and mountain lions, as well as the species that has always been considered absolute lord of the North American wilderness: the grizzly bear. (It is fear of the grizzly, many park officials will tell you, that has been the major factor in keeping Glacier's backcountry untrammeled.) Yet the long-range outlook for the grizzly is not bright. And in many ways, a look at the condition of the grizzly is a look at the condition of Glacier National Park.

In 1931, Vernon Bailey of the U.S. Biological Survey wrote: "The destruction of the grizzly is absolutely necessary before the stock business can be maintained on a profitable basis." And so it was done. By 1970 the great bear was gone from all but a few isolated tracts in the Northwest. In 1975 it was declared a threatened species.

A computer-simulation study done in 1981 found that, depending on habitat productivity, it is necessary to maintain between 30 and 70 grizzlies within an ecosystem if the species is to sustain itself. But of the six systems identified as grizzly bear habitat, only two meet that requirement: Yellowstone, with about 200 animals, and the Northern Continental Divide, with somewhere between 440 and 680. (Exact figures do not exist.) Thanks in part to wise "people management" by park officials, the grizzly population has remained fairly stable in Glacier for the last five years while the number of bear-related injuries to the growing visitor population has declined.

This alone would seem to be cause for some optimism about the park's grizzlies. Unfortunately, you will find very little of that coming from the researchers who know the bears best. Grizzly bears may cover a thousand square miles in a lifetime, and while they recognize ecological boundaries, they know nothing of the political ones used to determine the parameters of a national park. Only one third of the area identified as grizzly habitat in the Northern Continental Divide ecosystem lies within the bound-

The peregrine falcon is occasionally seen in the park on its fall migration.

Grizzly bears still reign as the lords and protectors of Glacier's backcountry.

Because they prefer the high country, mountain goats are among the most secure of the park's wild creatures. At right, a sample of Glacier's diverse vegetation.

David Muench

St. Mary Lake along the Going-to-the-Sun Road attracts many park visitors. It also nurtures the westslope cutthroat trout (at right).

George Wuerthner

Glacier National Park

A band of Blackfeet Indians visits Cracker Lake, date unknown. Today the tribe lives on a reservation just east of the park.

aries of Glacier National Park. The surrounding lands are currently faced with plans for extensive logging on the North Fork of the Flathead River, as well as a plethora of oil and gas development schemes elsewhere in the area. Such exploitation would likely reduce the region's grizzly bears to a small island population within the boundaries of the park. And Glacier Resource Specialist Gary Gregory notes that "nearly every island population of grizzlies in the country has disappeared. The smaller the island, the quicker that decline accelerates."

Three years ago premier grizzly researcher John Craighead warned that "critical nonwilderness habitat adjacent to wilderness must be type mapped [surveyed] and, where feasible, reclassified as wilderness. Monitoring large wilderness areas inviolate to energy exploration is essential to the future of grizzly bears throughout their North American range." With that statement Craighead had put his finger on what threatens finally to bring down not only Glacier's grizzlies but its whole wild house of cards: Ninety percent of the threats to grizzly bear habitat are related to energy exploration.

A comprehensive survey of threats to units of the national park system, "The State of the Parks," was completed in 1980. To the complete surprise of many, Glacier topped the list as America's most beleaguered national park, with 56 identified threats to its integrity. Included were confirmed risks from chemicals, thermal discharge, mineral extraction, habitat destruction, and industrial noise. Of the 56 items listed, only 11 were internally based. Many park people thought that if Glacier was to be saved, protective corridors would have to be established around the park, as Craighead had prescribed.

Yet no such protection ever came. "It should have happened 75 years ago," notes Clyde Lockwood, Glacier's chief of interpretation. "To establish such protective corridors today would be very, very difficult." One needn't look far to see why this is so. Five new tracts of land were recently leased to the Chevron Oil Company for natural-gas exploration. "That just about takes the rest of the park boundary that wasn't already leased," says Glacier Resource Specialist Gregory. "The only protection we have in these areas is that the company's tract permits say they won't drill within a quarter mile of our boundary. But a quarter mile isn't very far."

Of even greater consequence, the second stage of approval has recently been secured for the controversial Cabin Creek Coal Mine in British Columbia. The mine will consist of two giant open pits on a tributary of the North Fork of the Flathead River, just eight miles north of the Glacier boundary. Environmental researchers say warm-water discharge may adversely affect the North Fork of the Flathead (a Wild and Scenic river), that airborne pollutants could degrade Glacier's Class 1 air quality, and that wildlife habitat will be disturbed by increased human activity and development.

NOT LONG AGO the United States and Canada called for an international joint commission charged with upholding the Boundary Waters Treaty of 1909 to arbitrate the mine's pollution issues. The treaty deals primarily with water issues, however; no such agreement has been signed with regard to transboundary air pollution. The process will undoubtedly prove to be extremely slow. Not only is this the first time the treaty's arbitration provision has been used, but air-pollution threshold standards have yet to be established.

It is hoped that UNESCO will approve Glacier's recent application for World Heritage status. This worldwide natural and cultural reserve program is based on a treaty establishing environmental-quality standards by which Canada, as a member state, would be obliged to abide. (World Heritage status differs from designation as a Biosphere Reserve, which both Glacier and Canada's connecting Waterton Lakes Park attained during the 1970s. The Biosphere Reserve system is based on an informal agreement to preserve and enhance significant genetic reservoirs.)

Yet another threat on the North Fork of the Flathead is an approved plan to drill for gas on state land adjacent to the park. An environmental review for the project states that noise from the drilling operation will be audible from two Glacier campgrounds. If gas is found, the company plans to flare it (residues from gas drilling are often burned), which, in an area that receives as much precipitation annually as Seattle, could bring acid rain to the park.

More than 92 percent of Glacier National Park is managed as de facto wilderness, and there is probably no place in continental America where the average tourist can better sense threads of wildness running through the landscape. Devoted users of the backcountry still view the park as a last, fierce paradise. Yet somehow, even from deep within Glacier's heartland, you can almost hear the outside walls grinding in. Perhaps some of the living pieces of the park's biological puzzle will always find its innermost sanctuaries protection enough from external threats. But it is the restless ones—the wolf, the grizzly, and others who cannot easily adapt to life on a tiny wilderness island—who will see their species dwindle. And even though most of us have only felt their presence in Glacier, we can never hope to come here and find the same sense of wonder without them.

Almost a hundred years ago negotiations were held with the Blackfeet Indians to purchase the mountainous western section of their reservation so that it could be opened up for mineral exploration. This land would later become the eastern half of Glacier National Park. At one point in the talks, Indian Agent William Pollock told the Blackfeet:

"These mountains never furnished you houses, never fed cattle, nor fed and clothed you. Can you send your wives and children to these mountains to ask for food, clothing, wagons, and cattle? You may keep these mountains forever and never realize anything from them. Our money offers you these things; the mountains offer you nothing but snow and ice and rock."

Sometimes, it seems, we have learned nothing at all. □

GARY FERGUSON *worked as an interpretive naturalist for the U.S. Forest Service in Idaho. He has written for many publications, including* Outside, American Legion, *and* Travel-Holiday.

Gary Moon

Sunsets in Yosemite Valley present dramatic photo opportunities, but only if you have a tripod—or know how to hand-hold shots at shutter speeds under 1/30 of a second.

I'M A LAZY PHOTOGRAPHER. I rarely carry a tripod in the backcountry, even though it seems that the farther I am from my tripod, the more I need it. But I really hate to pass up a good shot, so I've learned to get along without the heavy artillery.

Mastery of a few simple techniques now allows me to shoot at very slow shutter speeds without a tripod. This is good news for every backcountry hiker, backpacker, canoe tripper, bicyclist, or climber with an interest in photography. Regardless of what you may have heard, you *can* shoot at speeds as slow as 1/8 or even 1/4 of a second without a tripod. That way, you can travel with a pack as light as your spirits, confident that you can still get the pictures you want.

Shooting at relatively slow speeds without a tripod is strongly discouraged by experts, and this is good advice—as far as it goes. Predictably, photographs taken at speeds slower than 1/30 of a second are blurred by camera motion while the shutter is open. Hand-held cameras are just not steady enough.

But few of us who own cameras also own tripods. Those who do are professionals or serious amateurs to whom fine photography is an end in itself. For the rest, taking pictures is a casual and interesting hobby pursued mainly as a means of recording other activities. If you are one of these people, you probably consider a tripod impractical, and have no doubt learned to avoid hand-held shots at slow shutter speeds. Many photographers put their cameras away whenever the light gets dim.

But those are often the times when the light is best!

What can you do, then, when the Beautiful Picture appears before your eyes but your hands are fluttering like aspen leaves? Your choices are simple. If you obey the rules, you'll savor the view and skip the photograph. Or you can gamble the price of a picture and try the shot. Is there anything you can do to improve your odds? Absolutely! Better camera-handling is your ace in the hole.

Good camera-handling is essential for good photographs. Most photographers, whether beginners or pros, have some bad habits. Many simply hold the camera incorrectly. Take a look at your own technique. The best way to hold a 35mm SLR is to rest it in the palm of your left hand with your left thumb on the left side of the lens and your fingers on the right. (If this feels awkward, think back to your early tribulations with pencil and pen . . . and persevere!) Wrap your right hand solidly around the camera body, rest your index finger on the shutter release, and tuck those elbows against your body. Now you can shoot one notch slower than before.

How slow *do* you shoot? Camera salespeople advise beginners to use 1/125 of a second to be safe, but some of these novices leave the store without hearing the rest of the story: ". . . until you're comfortable and want to shoot slower." Believe it or not, some people get so stuck on the first part of this advice that their shutter dials might as well be welded at 1/125. Varying the shutter speed is not only okay, it's positively a good idea.

There is a time-honored and sensible guideline for determining the slowest shutter speed safe for a hand-held camera. Simply make the focal length of your lens the denominator of a fraction. Then match that figure to the closest shutter stop. This will be the slowest speed that will cancel the normal movement of your hand. Thus, your 50mm lens should produce sharp images at 1/60 of a second, your 135mm at 1/125, and so on.

Too often, though, this rule of thumb yields a shutter stop that's not slow enough for the situation. Slow films, dim light, and compositional needs may all demand slower shutter speeds. What does it take to get beyond these limits? Confidence, advanced camera-handling techniques, and the willingness to take a few inexpensive risks. Will you be able to get images that are perfectly sharp, as if they were aided by a tripod? Not always—but unless you're shooting for publication, the imperfections won't matter. Better to be able to show your friends a slightly imperfect image of a memorable event or inspiring scene than to have no photograph at all.

Suppose that you're struck by a view of trees and smaller plants while hiking through a forest. The scene fits well in your 50mm lens, but deep shade makes it so dark that your meter tells you to use a 1/30 of a second exposure. This is one stop slower than the rule advises. How can you stabilize the camera? Borrow an idea from target-shooters: Use the camera's carrying strap. Instead of letting it hang uselessly, slip the strap across your back and around your left arm. When you are focused and ready to shoot, tighten the strap by slightly expanding your upper body and pressing your eyebrow against the viewfinder until everything seems solid. Feel clumsy? Adjusting the strap may help. (Longer is better.) Twist yourself up like a pretzel if it helps you steady the camera. Have faith and be patient; the benefits will be clear to you after your next trip to the photo-finisher.

Later, with daylight fading, you may skirt the edge of a fine meadow backed by moun-

Gary Moon

Holding a camera steady depends on technique. Cradle the camera in the palm of your left hand with thumb and index finger gripping the lens-focusing ring. Place your right hand on the side of the camera body with your index finger on the shutter release.

SAFE AT ANY SPEED

Most amateur photographers pass up classic outdoor shots when the light starts to fade. Now there's no need—if you're steady as you go.

GARY MOON

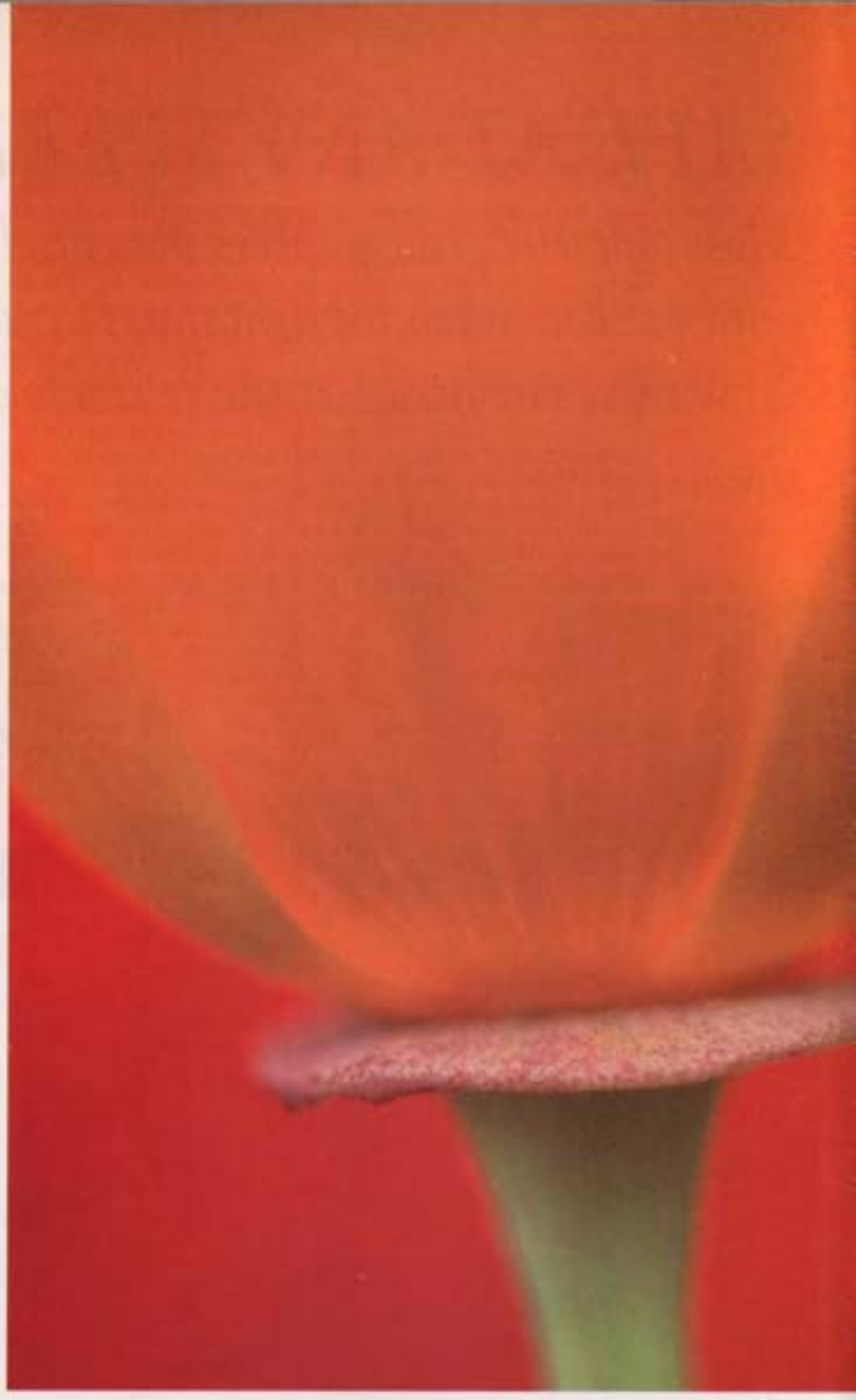
Shoot slower than the rules advise for graphic photos. A careful grip and tight camera strap steadied this 200mm shot at 1/30 of a second.

Gary Moon

Gary Moss

Capture the effect of moving water (above) by shooting at ⅛ or ¼ of a second in a well-braced sitting position, or with your camera resting securely on a rock.

Getting up close and personal with a poppy (right) is easy if you use a macro lens. The trick is to brace your elbows and pay attention to flower-shaking breezes. Listen to the wind and try to shoot when it lulls.



Gary Moss

Turn yourself into a tripod by sitting down and placing both elbows securely on upraised knees. You can steady yourself further by wrapping the camera strap around your shoulders and arms as shown. Tighten the strap by taking a deep breath; release it partway, and snap the shutter.

tains in alpenglow. You choose a nice composition with a 35mm lens, but to use the small aperture needed for good depth of field, the best speed you can get is ⅛ of a second. That's two speeds below what you "should" use, so you decide to skip the shot even though you really like it. Sound familiar? Don't give up! Try sitting down on the ground or on a boulder; lean your elbows on your thighs, and grip the camera as before, using the strap. A shutter speed of ⅛ should now be possible. Practice shooting from this posture; you'll find that it is extremely stable, and worth trying at speeds of ¼ or even ½ of a second. There's so little to lose and so much to gain, why not try it?

Looking more closely now at the meadow, you notice motion. It's a bobcat, the first you've ever seen. Luckily, you have a moment to switch to your zoom lens before the predator comes into view—but with slow Kodachrome film in the camera and no time to change, you're stuck with a 1/60 exposure. How can you hold the 200mm lens still enough to take the picture? You might try sitting down and using the strap technique; but for better stability, set the camera down on something solid and motionless, like a daypack lying flat on the ground. Rocks and downed trees work well for this, too. If you need a higher platform, try standing a foam pad or a sleeping bag on end. (Don't expect the bobcat to stand around while you unfasten your sleeping bag from your packframe, however!)

Some people take this technique a step further by cushioning the camera on soft items such as woolen or down clothing, but these can be too springy to be stable. It's better to put the camera right down on the ground. My favorite tripod substitute is made from a boulder and a bandanna. I always have a bandanna, and if I can find a boulder right where I want it, I put my camera on the rock and use the bandanna to level and protect it. This combination works as well as a tripod, although it doesn't compare in terms of mobility and adjustability. But unless there's a sudden earthquake, nothing could work better.

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Portray motion more effectively (top) by shooting at slow shutter speeds to blur the background and panning the action to keep your subject in focus. Keep steady by holding the camera with strap support and rotating your torso. Snapping a grizzly with a telephoto lens—if you can bear being even that close—demands proper camera handling and relaxed, light breathing.

Remember this rock-and-bandanna trick if you find a waterfall. To blur the water for effect, you'll need a speed between 1/15 and ½ of a second. Here especially, rocks and trees near the water must be in sharp focus to contrast with the blurred water. You can steady the camera by sitting if you are good at it, but a well-placed boulder and a level camera will serve you much better.

Now suppose you drop into a deep, shady canyon to find neither a suitable boulder nor a spot where sitting offers the perspective you want. You may resign yourself to a missed shot for lack of a tripod. But wait! Some inventor has combined a C-clamp with a bolt that fits a camera's tripod socket, a handy device that is now available commercially. Get yours out, fasten one end to your camera and the other to a stick, packframe, tree branch, or bicycle, and you may still get the picture you want.

If you don't mind carrying a small gadget or two, you may find some other products helpful. There's a good selection of tripod substitutes available, including belt pods, chest pods, monopods, and gunstock mounts. These work almost as well as a tripod and are much lighter. Look for them in photo stores and catalogs. Check also for those ingeniously conceived compact tripods, some as small as a toothpaste tube.

The lightest (and cheapest) tripod substitute is the string and bolt. To make one, attach about seven feet of strong string to a bolt that fits your camera's tripod socket; then simply stand on the string to increase the tension. You'll be much steadier and only a few grams heavier.

Many people on wilderness trips pass up beautiful photographs—not because they don't see them, but because they don't believe the shots are possible. Most of these photographers could capture a far broader range of beautiful photos simply by using a few tricks for holding and bracing the camera. If this sounds familiar, take heart and practice the techniques I've described. You'll soon be coming home pleased with the fun you've had getting impossible photographs by breaking the rules. □

GARY MOON *is an environmental educator and outdoor photographer based in Yosemite, Calif.*

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BIKE TOURING

DENNIS COELLO

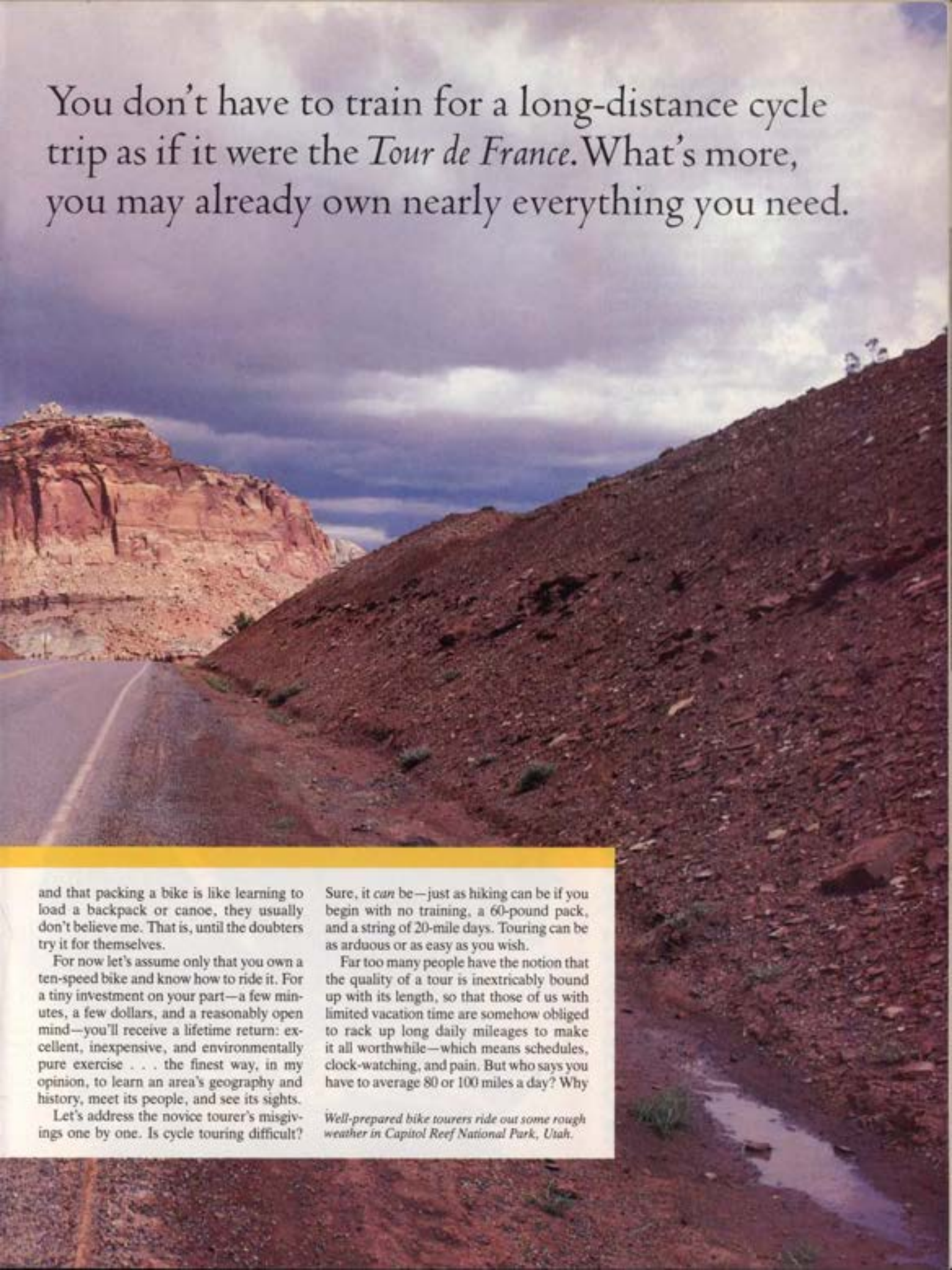
A RECENT GALLUP POLL revealed that bicycling is the second-most-popular recreational sport in America. But I'd wager that most of that is around-the-block-with-the-kids riding, or the Saturday morning pedal to breakfast, or maybe even a two- or three-hour weekend ride out of the city. A lot of folks these days also commute on two wheels.

I do that kind of pedaling, and enjoy it. But the kind I love, the kind I keep returning to year after year, is bicycle touring. And while I see many others actually traveling on bikes these days (a lot more than when I began in 1965), we tourers are still but a fraction of those 10 million Americans who ride regularly.

Why should this be? Most people who ask me about cycle touring seem to think it's too difficult for them, and that the equipment is too expensive. They wonder how you plan a long-distance ride if you've never been on one before, and say they haven't any idea how to pack a bike for the road.

When I smile and tell them you don't have to be in great physical shape, that hikers and campers already have most of the equipment they need, that planning a trip is a relatively easy step-by-step process,

You don't have to train for a long-distance cycle trip as if it were the *Tour de France*. What's more, you may already own nearly everything you need.



and that packing a bike is like learning to load a backpack or canoe, they usually don't believe me. That is, until the doubters try it for themselves.

For now let's assume only that you own a ten-speed bike and know how to ride it. For a tiny investment on your part—a few minutes, a few dollars, and a reasonably open mind—you'll receive a lifetime return: excellent, inexpensive, and environmentally pure exercise . . . the finest way, in my opinion, to learn an area's geography and history, meet its people, and see its sights.

Let's address the novice tourer's misgivings one by one. Is cycle touring difficult? Sure, it *can* be—just as hiking can be if you begin with no training, a 60-pound pack, and a string of 20-mile days. Touring can be as arduous or as easy as you wish.

Far too many people have the notion that the quality of a tour is inextricably bound up with its length, so that those of us with limited vacation time are somehow obliged to rack up long daily mileages to make it all worthwhile—which means schedules, clock-watching, and pain. But who says you have to average 80 or 100 miles a day? Why

Well-prepared bike tourers ride out some rough weather in Capitol Reef National Park, Utah.

not 35 or 40? We'd all be happier if we left the "wimp factor" to the realms of cinema and presidential politics.

I'll delve into all this a little later, when we talk about planning your trip, but for now let me say that most first tours are ruined *before* departure. Destinations and time frames are established before a person knows how many hours in the saddle—day after day—he or she can enjoy. Touring with friends may or may not be the solution. Group tours have certain advantages, particularly if you want to get a taste of touring before setting out alone. But they often include riders of greatly varying stamina who have the best intentions of training together beforehand, but almost invariably fail to do so.

So what's the answer? Try reversing the process. Train first, see what daily mileages are pleasurable for you, then choose a destination within range. Or if there's not much time for cycling before the trip, make plans as you go.

Most people who decide to take up cycle touring are already in good physical shape. But just as every sport places different demands on the body, pedaling long distances on a loaded bike has its own specific requirements. Jogging and aerobics can help improve your wind, and weight-lifting can develop the muscle groups most used in pedaling. But there's no better exercise for cycling than cycling itself.

It's best to begin training for a tour as early as you can. Start off with low mileages on a stripped bike over relatively level ground. Increase distance and difficulty of terrain as you grow stronger, and above all add weight to your bike in those increments necessary to get you pedaling with full touring weight several weeks before the trip. You know there's a difference between walking in the woods and hiking with a heavy pack; the same is true in cycling. Shoulder, hip, neck, and leg muscles must become used to the strain. In addition to the surprising number of muscles involved in pedaling, there are those contact points with the bike—feet, hands, and bottom.

Allow me one quick example. In 1974 I took off on a round-the-world ride. By that point I'd already toured for nearly a decade, but work, final exams, and goodbyes all conspired during that last month to allow me time only for the relatively weight-free ride to college. I still wince when I recall that first week on the road. My buddy and I cried our way across Illinois. Brand-new saddles and too-soft behinds taught us a lesson we'd never forget.

Would a high-tech, thin-shell, anatomic composite saddle have solved our problem? Perhaps—but the woeful condition of our posteriors was enough to nullify the bene-

fits of the fanciest rear gear. That's why it's up to you to assess your situation when figuring out how much expensive equipment you need to buy. Chances are you'll be able to get by with what you already own, plus a few specific items: rainwear, bike tools, panniers and other bike bags.

My first tour was a 1,700-mile, three-week trip on a three-speed. My "worlder" was done on a $115 ten-speed, a heavy but durable bike that served me well until it was crumpled by a Buick. I mention these two steeds to make the point that while expensive, lightweight models with 10, 15, or 18 speeds do make a ride easier, in the final analysis they are not absolutely necessary.

What *is* necessary is a bike in good working order. If you aren't a mechanic, wheel your machine into the shop for an overhaul, and tell them they've got your business if they'll show you how to fix a flat, adjust a derailleur, and replace a brake pad, gear cables, and brake cables. You probably won't have any mechanical trouble on your trip, but if you do, there's a good chance it will turn out to be something simple if you started on a well-tuned machine.

In preparing for your tour, you'll soon realize that there are as many "perfect" riding machines as there are "complete" equipment lists. So I'll simply describe the ten-speed touring bike I ride, list the clothing, tools, and other gear I pack along, and let you take it from there.

My bike has a *gear range* between 33 and 104. There isn't room here to explain how these numbers are derived, but they indicate a nice wide spread that allows pedaling comfort over varied terrains. Some cyclists prefer an even lower gear—24 or so—for climbing ease, but the only paved road climbs I've had trouble with are some hills in West Virginia, the Missouri Ozarks, and the western Ghats of India. The Rockies make for long pulls, but as a rule they aren't too steep. By the way, gearing can be changed without buying a new bike.

I've toured cross-country with upright handlebars, but prefer *drop bars* because I find the three riding positions they offer to be comfortable alternatives to the single position of upright bars. Position one is with hands close together near the middle of the bar. This allows the most upright posture. The second position is with hands over the hooded (padded) brakes, fingertips on the brake handles for quick stops. I tilt my bars upward a bit to make this position even more comfortable. The third, "full curl" position with hands on the bottom of the bar gives the least air resistance and greatest pedaling efficiency. I'm in position number two about 98 percent of the time.

What about *tires*? I ride high-pressure (at least 90 psi) "clinchers." The term means

there's a tube inside the tire, unlike "tubulars," which are tubeless. (Don't ask me about the terminology; I didn't invent it.) Clinchers are heavier than tubulars but far easier to repair. I also ride with tire liners, thin plastic strips that sit between the tire and tube to guard against nails, glass, and cactus needles. Do they help? Well, in six full months of touring last year I had only one flat. You can avoid unnecessary wheel or "rolling" weight by making sure your tires are the thin "skinwall" kind and that your wheels are alloy, not steel. You'll shave off a pound and a half this way, a very noticeable difference.

As for *pedals*, I advise you to purchase toe clips and straps. They'll take some getting used to, but they increase pedaling power dramatically by keeping only the ball of the foot on the pedal; a fulcrum action is thus delivered on every stroke. (Ask someone at your bike shop to show you the proper "ankling" technique.) Bike racers wear cleated shoes, then pull the straps tight around them to lock the feet in place. I'd be dead if I did this, and prefer to keep my straps loose for fast foot removal. But I do have two friends who tour this way. Dressed in black lycra racing shorts, rainbow-colored jerseys, and cleated Italian shoes, they just don't look right on touring bikes. It's like Mario Andretti behind the wheel of a Nova.

Many riders forego the protection of *fenders* to save weight, but I've never grown accustomed to that dark mud stripe that appears up my back, or to the spray in the face from the front wheel in wet weather.

I normally carry three *water bottles*, though I've had as many as eight mounted on my bike for desert rides. Finally, buy a good *air pump*, the kind without the twist-off valve attachment that lets out half the air you've just pumped in. And for heaven's sake, try it out before your ride!

I'VE ALREADY mentioned that every touring cyclist has a personalized equipment list. Yours will evolve over time, but for now I'll provide my own for guidance. Unless otherwise indicated, I take one of each item listed. Remember that the nature of your tour—length, season, geographic area, and so forth—will ultimately determine what you pack.

Shelter & Bedding

- Tent—*Take a self-supporting model if you'll be camping in sand or on slickrock.*
- Sleeping bag—*I prefer synthetic fill on long tours so I can launder the bag easily.*
- Ground pad

I generally avoid campgrounds, preferring quiet nights by myself in the woods or desert. But some of my most enjoyable and memorable times have been the result of asking to sleep in barns, garages, farmers' fields. . . . It's an excellent way to meet people.

Clothing

- T-shirts (3)—*Brightly colored for visibility, and so you'll look good in your slides.*
- Long-sleeved shirt
- Riding shorts (2)—*I don't care for the cargo pockets on most cycling shorts because things tend to fall out of them when I sit down. My preference is for regular pockets on loosely cut shorts made from durable fabric.*
- Belt—*I use a web-type money belt.*
- Undershorts (3)
- Long pants—*Very lightweight cotton.*
- Gym shorts—*For swimming, but they can also double as riding shorts in a pinch.*
- Insulated underwear—*Polypropylene.*
- Leggings—*Polypro or washable wool.*
- Socks (3 pairs)
- Riding shoes—*A stiff sole in the arch is mandatory to avoid soreness. Make sure they are also comfortable for walking.*
- Camp moccasins
- Bandannas (2)
- Riding gloves
- Baseball cap

Be sure to wear everything before you take it on tour; if it's going to shrink or fall apart, it's better that this happen at home. I suggest three pairs of socks, T-shirts, and underwear so you can have a clean set on, a spare in reserve, and the previous day's wear washed out by hand and drying on the rack. Make sure all your clothes can be washed together for the occasional laundromat stop.

Cold-Weather & Rain Gear

- Boots—*Lightweight, as waterproof as possible.*
- Neck gaiter—*Expandable, turtleneck-type protection; takes the place of a scarf.*
- Wool cap
- Face mask—*My recent winter rides have shown neoprene masks to be best at avoiding moisture buildup. Unlike other masks, these are not pulled on over the head, but conveniently wrapped around the face and held in place with a velcro closure.*
- Sweatshirt—*Heavy and warm, to replace the long-sleeved shirt from the list above.*
- Poncho
- Rain chaps
- Rain suit—*I use the poncho/rain chaps combination for warm-weather touring, and a rain suit for winter rides.*
- Rain overboots
- Gloves
- Goggles
- Down or synthetic-fill jacket

Personal

- Towel—*Small and thin.*
- Washcloth
- Soap—*Make sure it's biodegradable.*
- Soap dish
- Toothbrush and case
- Tooth powder
- Comb
- Toilet paper
- Deodorant
- Shampoo—*Again, biodegradable.*
- Waterless hand cleaner
- Nail brush
- Fingernail clipper

Miscellaneous

- Pocketknife
- Sheath knife
- Sunglasses and case
- Flashlight and batteries—*Small camping flex-head style.*
- Camera and film
- Rope—*I use 15 feet of parachute cord, available at surplus stores.*
- Ripstop repair tape
- Waterproof matches
- Notebook
- Paperback
- Pen
- Sewing kit
- Sierra Club cup
- Utensil set
- Can opener—*G.I. style*
- Panniers
- Racks (sometimes called carriers)
- Pants clips
- Compass
- Candle lantern or candles

You'll notice I haven't included a stove. I've carried different kinds on tours, but have avoided them for the past few years because of the hassle and weight, and because I prefer to eat breakfast and dinner in cafes and meet the locals. Lunch is most often cold, made from my pannier larder of

Safety for Safety's Sake

SAFETY, LIKE SUCCESS, must be built into a trip. Of course there's always the chance of being clipped by an errant motorist, but planning (early) and caution (later) will reduce the risks.

• Helmets are a must for maximum protection. Most recent tests indicate the safest models are those with fully enclosed tops and polystyrene foam liners.

• Don't tour at dawn, dusk, or night. Motorists aren't expecting bikers on the road, and even if you have a light, its puny beams offer scant protection. I rely upon reflectors and my riding flag for visibility on particularly overcast days. In emergencies you can affix a tiny camp flashlight to your handlebars.

• Don't leave home without a rearview mirror. My wife prefers the dental wrap-around-the-glasses kind; I like the kind that mounts above my brake handle.

• I ride with one large red reflector mounted at the back of my rear rack, and small yellow reflectors in each pedal pointing front and rear. A riding flag (a luminous orange pennant atop a fiberglass rod) is mounted on my front axle. This can also serve as an excellent whip: Withdrawn and brandished at charging dogs, it almost invariably ends the attack.

• Concerning attacks, most dogs will bark and chase a bit, but seldom bite. There can be that painful exception, though, so I prefer to rely on a prayer *and* a weapon. I like the flag, but most riders carry the postman's choice—a small aerosol can of "Halt!" Far worse than the possibility of dog bite, however, is the prospect of a frightened rider swerving into traffic. Keep your wits about you at all times on the road.

• Remember that a fully loaded touring bike is a completely different animal than you're probably used to riding; the handlebar bag prohibits a full view of your front tire, while panniers make you wider and more vulnerable to gusts of wind. Practice riding near other cyclists *before* a group tour, and determine who will speed ahead when cars appear and single-file riding is necessary.

• If you've chosen a tour made up primarily of state highways and secondary roads, you've already done much to avoid accidents. You should be careful to ride as far to the right as possible, and of course always on the shoulder if a good one is present. Use your rearview mirror to spot weavers and road hogs. Learn to read the road for trouble areas —summits, blind curves, long two-lane climbs.

• For minor accidents, a modest but sufficient first-aid kit should be packed along, including bandages, aspirin, disinfectant, insect repellent, and other items suitable for the bugs and brambles of the area you'll be touring.—*D.C.*

Riding flag

Product photos by Ed Caldwell

Thanks to New Valley Cyclery and Pacific Bicycle, both of San Francisco, for their assistance in preparing this article.

cheese, bread, peanut butter, and fruit, as are the hourly snacks I draw from my handlebar bag while riding.

Remember what I said earlier: Too many first-time cyclists lock themselves into unrealistic riding schedules before they know their own abilities. Avoid this problem by training early or by choosing a route that will allow for flexibility. Once you've chosen an area for your tour, it's time to begin research.

Start by looking at the region on a service-station map of the state. This will tell you if back roads are available, and how often towns will appear along your route. "Flat" maps are for motorists; cyclists are concerned with elevation gain and loss as much as distance. For this information you'll need a topographical map, available at libraries and some specialty sports shops, and from the U.S. Geological Survey distribution center nearest you. (The USGS will also send you, upon request, an index to the topographic maps of the area, a price list, and a free explanatory booklet entitled "Topographic Maps: Tools for Planning.") I usually plan my rides with the 1:500,000 series USGS topos, on which an inch equals eight miles. More detailed planning can be done with the 1:250,000 series. I add whatever information I've gleaned from that to the 1:500,000 series map, and photocopy it in sections to fit the map case that goes in my handlebar bag.

If I'm not familiar with the intended tour area, I return to the library to consult National Weather Bureau seasonal wind charts and maximum/minimum temperature and precipitation tables. None of these sources will guarantee good weather, of course, but they do give a good general idea of typical weather patterns for the season. Your local library will also have the addresses of state offices that provide free recreation information, and of chambers of commerce in the larger towns along your route.

You might consider joining one or more cyclists' organizations. The League of American Wheelmen (P.O. Box 988, Baltimore, MD 21203) publishes the annual *Cyclist's Almanac*, which lists the addresses of "tour information directors" and dates of notable events for every state, along with special books and maps for cyclists. Another group worth looking into—one that has been especially helpful to novice cyclists—is Bikecentennial (P.O. Box 8308, Missoula, MT 59807). They have excellent maps and tour information, available to members by mail and in some bike shops.

Finally, many first-time tourers begin with organized rides, such as those conducted by Sierra Club chapters and a number of commercial outfits. Cyclists are grouped by experience and strength, and a sag wagon is often provided. This physical—and emotional—support can make one's introduction to the sport almost painless. And having company at such a time can be very pleasant; a good friend of mine met his wife on such a trip.

Now you know what to take cycle touring with you, and your training and route planning have determined whether this first ride will be one of short daily distances and nightly motels or one involving camping. This brings us to loading the bike.

The most common setup for beginning riders includes a handlebar bag, rear rack, and relatively inexpensive panniers. This represents a small investment, and leaves the cyclist with useful equipment even if it turns out that touring isn't in the cards after all. (The rack and bags are excellent for commutes and weekend rides.)

Which rack should you buy? The more expensive models are lighter, stronger, and more stable, but I did my world ride with the least expensive rack around; and while I lived with the sway, many people would find a few dollars invested here to be well worthwhile. Visit your bike shop, look through a couple of cycling magazines, and write for catalogs. (Any single shop will carry a few brands at most, and some bags are available by mail order only.) I've road-tested almost every major brand of pannier, and of course have my favorite—for my pocketbook and my style of riding. But beauty—and the "best" panniers—are in the eye of the beholder.

Use front panniers if you can afford it, and if your road gear demands the room. An additional front rack will give you better weight distribution and the option of carrying more gear inside front bags; for heavy riders this can be important in reducing the strain on rear wheel spokes. Low-riding front panniers are more stable, but don't leave you a rack-top that can be used to store other items—a spare tire, a down coat in a stuff sack, etc. By the way, I've yet to find totally waterproof panniers. The answer—pure and simple—is rain covers.

From a purely mechanical standpoint, it's best to carry weight on your bike as low as possible and as close to the frame as your racks and bags will allow. Beyond this, the general rule of thumb in packing a bike is to carry between 60 and 70 percent of your weight in the rear, and the rest up front. Any more than 40 percent carried up front may make your steering begin to feel sluggish.

You'll have to work at finding the perfect place for each item. I pack my tent perpendicular to the rear rack and closest to the seat post. This is followed by my sleeping bag; the ground pad rides on top. I use bungies—thick elastic bands with coated metal hooks on either end—to hold these items in place.

Your pannier weight should be balanced evenly; otherwise you'll be steering toward the heavier side and blowing spokes. I've tried all kinds of systems: upper-torso clothing and tools on one side, lower-torso and miscellaneous on the other, food in front right bag, camera in front left, and so on. Just have some patience, and write down each item's location after the first week on the road. This will save you a good deal of trouble on your next tour.

Try your best not to carry more than 30 to 35 pounds of gear altogether. Touring is great fun, but not when you feel like a mule. Handlebar bags are extremely convenient for those items you may need while riding—food, sunglasses, and the like. But the bag is overloaded if it causes noticeable sway.

Good racks and packs mean a lot, as does a well-tuned bike. But don't forget that *you* are the heart of the tour—both engine and engineer—and that you decide (given your physical and mental condition) how far you'll go, how fast you'll travel, and how much fun you'll have on the ride.

A final word about where to tour. Let your interests and the availability of good side roads be your guide. My love for history has sent me on the paths of Coronado, Lewis and Clark, William Tecumseh Sherman, on the Gila and Santa Fe trails, and on the route of Dominguez and Escalante. My wife's consuming interest in entomology has brought on rides to areas and at times most of us would avoid, and has even sent us pedaling across half of Idaho one spring with butterfly nets in hand. Of course, the beautiful natural settings throughout our nation are also a constant lure.

Like the hiker, the cyclist is subject to all the elemental forces that created the landscape, and is thereby transformed from mere observer to active participant. But unlike the hiker the cyclist is also amazingly mobile, able to combine at will civilization and wilderness, camaraderie and solitude. From hot coffee, morning papers, and people in small-town cafes to midday rides on winding mountain roads and nighttimes spent beneath the stars or snug inside New England inns, cycle touring offers a kaleidoscope of daily options. And that means touring at its best. □

Dennis Coello *writes for bicycle and travel publications full-time. He has written several books about bicycle touring, including* Bicycle Touring in Utah, Bicycle Touring in Arizona, *and* The Mountain Bike Manual *(all Dream Garden Press).*

IF YOU HIT THE ROAD familiar with only the simpler sorts of repairs—flat tires, broken cables, brake-pad replacement, derailleur adjustment—your tool kit should consist of:

- Spare tube
- Tube patch kit
- Air-pressure gauge
- Spare brake cable
- Spare gear cable
- Spare brake pads
- Tire levers (2)
- Needle-nose pliers
- Crescent wrench (6")
- Screwdriver—*Small, thin, flat-blade tip for derailleur adjustment screws.*

If you want to be able to do all possible repairs, however, you'll need to add the following tools and parts:

- Channel locks—*Very small.*
- Allen wrenches—*One to fit every allen-head bolt on your bike.*
- Cone wrenches—*Two, with variable-size fittings of 13, 14, 15, and 16mm to fit front and rear wheels. Don't buy the heavy all-steel shop models.*
- Chain rivet tool
- Spoke wrench
- Cotterless crank removal tool—*If your bike has a cotterless crank.*
- Freewheel removal tool
- Freewheel pocket vise
- Spare tire—*I carry one for extended rides in desolate areas of the West; most bike shops can show you how to fold a clincher into a small circle.*
- Spare chain links (5)
- Spare spokes (6)
- Spare bearings—*Two of every size in your bike, in case of loss during maintenance.*
- Bearing grease
- Dri-lube—*This is a chain/derailleur lubricant that doesn't attract road dirt, dust, or sand.*

The tools on my "simple" repairs list cost very little. The entire tool kit is of course more costly, but it represents a lifetime investment. Take care of your tools and parts, don't lose them, and like your bike they'll last forever.—*D.C.*

Tools & Parts

We're all hooked on water, but America's most

TOXICS ON TAP

DENNIS PIPER AND FRED LADD

In 1981 the residents of a neighborhood in Battle Creek, Mich., received letters from the state health department advising them not to drink, bathe in, or cook with their well water. A private well system supplying about 80 households had been contaminated with a variety of chemicals, primarily industrial solvents and benzene, from leaking underground storage tanks owned by the Thomas Solvent Company. "We were not told what problems the chemicals would cause," recalls resident Jim Negus. "We started using bottled water from friends' houses outside the area because we didn't know what would happen to us if we continued to use our water."

THE STORY OF BATTLE CREEK is being repeated in communities across the country. Once thought to be the purest source of drinking water, groundwater is now viewed with growing apprehension as millions of people are faced with incidents of contamination.

Four years ago the Environmental Protection Agency (EPA) found that the drinking water of 28 percent of the 945 cities it studied contained measurable amounts of volatile organic chemicals. In 1983 the agency reported that 1,500 to 3,000 of the nation's groundwater supply systems contained arsenic, barium, and lead at levels higher than their standards for maximum permissible contamination. Today the EPA estimates that at least 8,000 private, public, and industrial wells are affected by toxic pollution.

Groundwater makes up 96 percent of our total freshwater resource. Underground aquifers supply drinking water for 117 million Americans, about half the population. Nearly 95 percent of the nation's rural population depends on well water, and 34 major cities rely entirely on groundwater for their municipal well-water systems. Wells also supply water for food processing, irrigation, livestock, and industry.

It's no wonder contaminated water is the suspected cause of a vast number of health problems reported around the country. Residents of the Los Paseos neighborhood in San Jose, Calif., were exposed to contaminants that had leaked into their well system from an underground storage tank owned by the Fairchild Camera and Instrument Company. When they noticed an increase in birth defects, they asked the state to conduct health studies. The California Department of Health Services reviewed 190 pregnancies in the area and found twice the normal number of spontaneous abortions. Among the live births, the rate of congenital heart defects was three times that of a control group.

In Woburn, Mass., two of eight municipal wells were found to contain traces of chemicals that had been buried or abandoned during the course of 130 years of industrial land use. A Harvard study of the 6,219 households affected found that childhood leukemia was more than twice the expected rate.

In Grey, Maine, groundwater used by 75 households was taint-

popular beverage may be hazardous to our health.

ed with 26 different chemicals that had been leaking from a nearby toxic dump. Of the five pregnancies that occurred in Grey over a five-year period, two ended in miscarriage and two infants died shortly after birth. "The water affected the children first, giving them headaches, dizzy spells, and stinging skin," says resident Cathy Hinds, who lost one child and has another who has suffered liver abnormalities.

Concerned for many years with the health effects of chemical contamination, Beverly Paigen, a research biochemist at Children's Hospital in Oakland, Calif., recently completed the kind of overview that the EPA has so far failed to undertake. Paigen examined the results of public and private health studies of people exposed to contaminated water nationwide. Among the health problems she found most often were damage to fetuses manifested in miscarriage, low birth weight, birth defects, and neonatal death; skin rashes and eye irritation; neurological problems, including seizures, hyperactive behavior, headaches, dizziness, and fainting; and respiratory problems. Paigen points out that "because cancers take so long to develop, they are not the most striking findings. Most serious is the fact that many of the chemicals found are neurotoxins, which have a more immediate and disturbing effect on the quality of life.

"Fetuses and children are at greatest risk," she explains. "They are especially sensitive because their systems are working full pace in the growing process, and the chemicals interfere."

Jim Negus was diagnosed with leukemia in 1982. "Our public health officials told me, 'Well, Mr. Negus, you just happen to be the man in the neighborhood who came down with the disease. Chemicals probably didn't have anything to do with it.'" Then he found out that the previous owner of his house also had leukemia. "Quite the coincidence, you know, two people in the same house just happen to get leukemia," he says. "What are the odds that it 'just happened,' compared with the odds the water may have caused it? The industry was there before the houses were built, before World War II."

PART OF THE REASON for controversy over the health effects of contaminated groundwater lies in the nature of the studies and the many pollutants involved. "There is no epidemiological study that can look at cause and effect directly," says Paigen. "All we can do is look at associations." Because these studies depend on associations between many variables, their design or methodology can create disagreement. The process is further complicated by the fact that most toxic chemicals are not retained by the body for any length of time, and so cannot be measured accurately.

Similarly, the exposure rates for many people have been below "safe" occupational standards. A toxicologist might say there is no danger at a certain level of exposure to a particular chemical, but health problems are occurring at levels below those standards. "Occupational standards are based on eight hours of exposure per day in a healthy adult male," Paigen says. "Because of the more constant exposure that could occur in a contaminated home, and considering the relative size of children, use of these standards is inappropriate."

In any event, experts don't agree on the exact cause of these health problems. Arthur Bloomer, chief of the Division of Epidemiological Studies for the Michigan Department of Public Health, explains, "At very low levels of exposure, we find that it's extremely difficult to establish cause-and-effect relationships in an individual. If a large enough number of people have been exposed, we can see if there is an increase in disease or deaths over what is expected. Where there is a mixture of compounds, we can't tell what caused the disease, nor can we ever give final assurance that the disease *wasn't* caused by a particular chemical. All we can do is eliminate or reduce exposure where possible."

That's a difficult solution to put into practice, given the widespread dependence on groundwater and its vulnerability to contamination. The poisons come from many places: leaking underground storage tanks, inadequate landfills or other toxic waste dumps, heavy industry, agricultural chemicals, and runoff from city streets. Contamination may also come from septic tank systems, saltwater intrusion, oil and gas drilling, mining, industrial spills and accidents, and forest fires.

Once contaminated, it is difficult if not impossible to return groundwater to its natural condition. In many instances wells are closed, and bottled water and public showers are provided, but in some cases residents have no choice but to continue using contaminated water until a new source is found. Either a new well must be drilled or, where possible, residents must pay for hookup to city water systems.

"We have very serious chemical contamination of our groundwater in Michigan," says Negus, "but I think a more serious problem is the political contamination in our bureaucratic system. Just trying to get help toward the solution can be a much bigger problem than actually cleaning up the contamination. Our system isn't geared to do anything for people in a timely fashion. It costs too many millions of dollars to clean up properly, and there are thousands of people waiting for help with the same problem. Agencies are going to do as little as they possibly can, because that's all they can afford *to do."*

WHILE THE ANGER, FEAR, and frustration associated with contaminated water supplies continue to grow, the federal government offers little relief. Although many statutes authorize relevant programs, there is no single law or

agency designed specifically to protect and manage groundwater.

After four years of revision, the EPA issued a formal groundwater protection strategy in 1984, but it is primarily organizational. Two major components are the formation of the Office of Groundwater Protection and the definition of state-EPA partnership roles. Under this partnership, the agency will provide technical assistance in analyzing problems and designing state water-protection programs, and it will encourage states to make full use of existing grant programs. The EPA will also help develop research programs directed toward improving monitoring technology, prediction and assessment tools, and aquifer cleanup methods.

The states, however, are expected to play the principal role in protecting their groundwater. "It's a states' rights issue," says Marion Mlay, director of the EPA's Office of Groundwater Protection. "The states have responsibility because they have the laws that directly protect groundwater. Land-use policies and resources are state-controlled."

The EPA plan has not met with high critical acclaim. "Although the groundwater protection strategy of the EPA acknowledges the need for comprehensive resource management, the details of the strategy do not fully provide for it," the congressional Office of Technology Assessment stated in a recent study on groundwater.

Environmentalists are not impressed with the EPA strategy, either. They feel that federal leadership is essential. "The agency has abdicated its responsibility by dumping this complicated technical problem onto state and local governments, which are ill-equipped to handle it," says Rose McCullough, the Sierra Club's Southern Plains Representative. "The EPA has talked about a groundwater program for years, but it has so far failed to suggest a single effective piece of legislation to protect people's health."

The new groundwater strategy has also meant little to those with

Groundwater & the Law

"THERE IS BREWING in Washington an effort by some to establish federal control over groundwater," James Watt warned western governors in early 1983. That bureaucratic conspiracy must have departed with the Interior Secretary, for today the national programs to protect groundwater remain undefined, uncoordinated, and underfunded.

There are 16 federal laws that have some impact on groundwater, but not one deals comprehensively with its regulation and management. Inconsistencies, duplication, and deficiencies abound. Current laws offer no protection against most contaminants; mandatory drinking water standards exist for only 18 of the more than 200 contaminants found in groundwater. Although approximately one fifth of the population depends on private wells, existing laws cover only public drinking water supplies. Pollution from nonpoint sources, such as highway deicing salts and agricultural runoff, escapes federal jurisdiction.

But as groundwater contamination has become commonplace, lawmakers have begun to address the issue. In its consideration of some of the major statutes that affect groundwater, Congress is debating or has already included provisions that strengthen groundwater protection. For example:

- The Safe Drinking Water Act of 1974, created to ensure that most public water supplies meet minimum health standards, is

now up for reauthorization. The Senate has passed legislation sponsored by Sen. Dave Durenberger (R-Minn.) that would require the EPA to set standards for approximately 85 drinking water contaminants within the next three years. The bill would also require that the public be notified within 14 days after contamination levels violate drinking water standards. Although the bill does not provide comprehensive groundwater protection, Sen. Durenberger plans to introduce separate groundwater legislation in the fall. At press time the House of Representatives was still debating drinking water legislation introduced by Reps. Edward Madigan (R-Ill.) and Henry Waxman (D-Calif.). Their proposal does not have the strong standard-setting and public-notification provisions contained in the Senate bill, but it does include a national program requiring states to develop their own groundwater protection programs.

• The Resource Conservation and Recovery Act regulates the disposal of hazardous waste. It aims to protect groundwater by preventing toxic leachate from contaminating landfills and other sources. Reauthorized by Congress in October 1984, the law now contains several provisions that close significant loopholes.

For the first time the law regulates generators of small quantities of hazardous wastes. The EPA previously exempted those who generated less than 2,200 pounds of waste per month, but the new version of the law requires that it regulate generators of more than 220 pounds per month.

The act as reauthorized establishes a national regulatory program for underground storage tanks containing petroleum products and other hazardous substances. It requires the EPA to issue rules for leak-detection systems and performance standards for new tanks. The law also limits land disposal of hazardous wastes and bans wastes in underground mines and salt formations until the EPA takes regulatory action.

• Congress is currently debating reauthorization of the Comprehensive Environmental Response, Compensation and Liability Act, or Superfund, due to come up for floor votes later this summer. The act provides for the cleanup of hazardous waste sites, which could already number in the tens of thousands and cost more than $100 billion to clean up.

Of the 546 sites on the Superfund priority list, 410 had groundwater contamination problems. According to a report by the Office of Technology Assessment, more than 8 million people use groundwater from these sites. For many of these people, it is the sole source of drinking water.

The Senate is considering a $7.5-billion Superfund bill, S.51, introduced by Sen. Robert Stafford (R-Ver.). The bill contains several strengthening provisions, including a requirement that the EPA provide drinking and household water to those whose water supplies have been contaminated by a waste dump. But in addition to falling far short of the funds needed, the bill contains no schedule or mandatory standards for cleanup, and it does not cover underground storage tanks in its cleanup requirements.

In the House, Rep. Gerry Sikorski (D-Minn.) has introduced a Superfund reauthorization bill that is supported by environmentalists. H.R. 2022 would increase funding to $13.5 billion over the next five years and put the EPA on a strict, realistic schedule to increase the pace of cleanup.

poisoned water. "The state of Maine first received our complaints in 1973 and finally acknowledged the problem in late 1977," says Hinds. "It is now 1985, and there is still no major cleanup effort."

But as cleanup costs soar into the billions of dollars, states are beginning to realize that prevention measures are essential. The EPA estimates that 32 states have adopted their own groundwater standards. Some are attempting to control land use by mapping aquifer locations, including recharge and discharge zones, and then restricting industrial or agricultural activities within them. The Massachusetts legislature recently appropriated $10 million to buy land or development rights over aquifers, and 26 land-use projects are currently under way. In an effort to protect a new well field, Florida has virtually closed to industry a 90-square-mile area around the aquifer.

States can control specific contamination sources by passing stringent standard-setting legislation for underground storage tanks, limiting or banning the use of toxic cleaning agents, and restricting the use of pesticides. California and Michigan, for example, have passed bills establishing design criteria, registration, and inspection of underground storage tanks.

Some states have adopted classification systems that set water-quality standards according to an aquifer's projected use. But others—such as Michigan, where groundwater lies near the surface and underlies much of the state—reject classification. They claim that such systems allow further degradation of slightly contaminated water while giving no protection to large aquifers.

In general, states are hindered by the lack of a coherent federal model and by inadequate funding and insufficient regulation at the national level. The inertia displayed by Congress and the regulatory agencies belies the urgency of the situation. "We think we have a long-term problem," says the EPA's Mlay, "one that won't go away easily. But it can be dealt with, and we need to do it. It will become a crisis only if we ignore it."

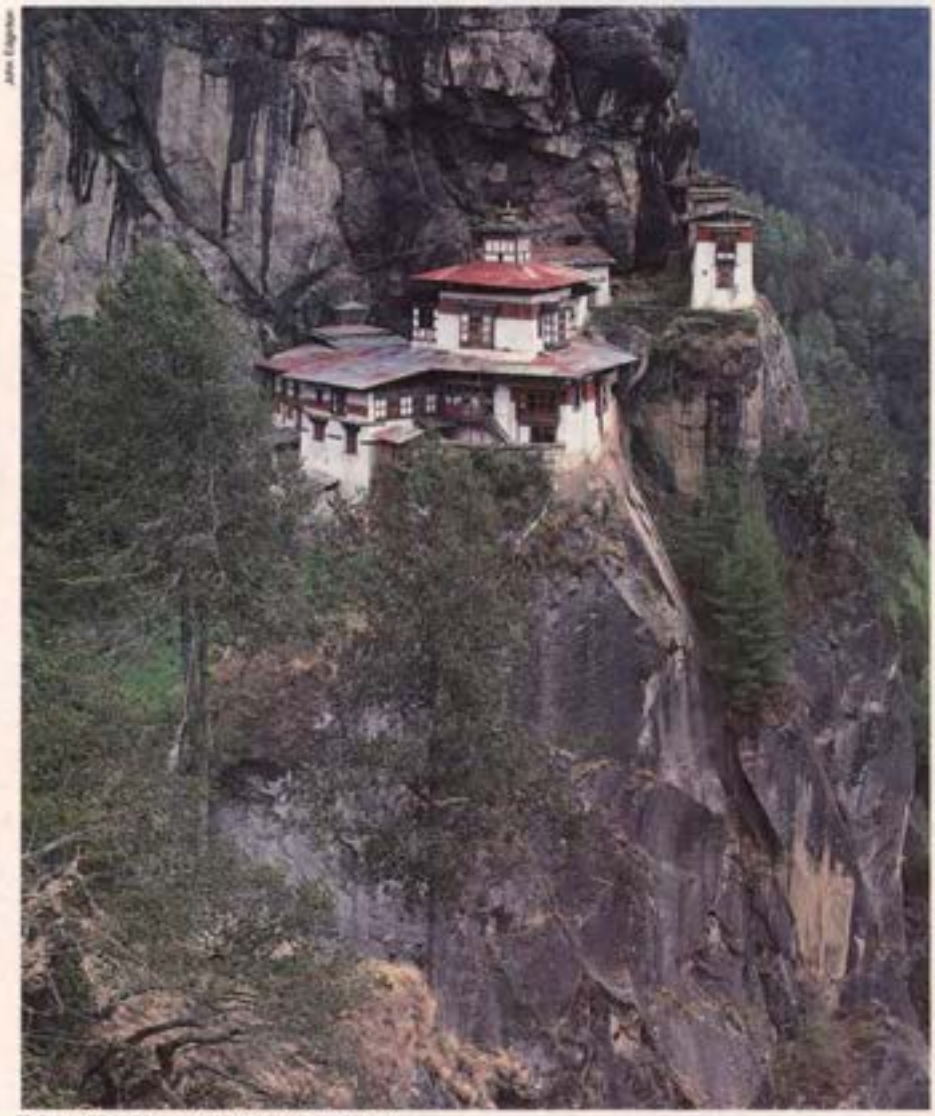
Many people no longer have this luxury. Those who have used contaminated water for extended periods have had significant health problems that they believe are related to the water. They have watched their property values plummet while those responsible for the contamination frequently escape through bankruptcy courts. Their trust in government agencies has evaporated. For them, the problem is already a crisis. □

DENNIS PIPER *and* FRED LADD *are co-authors of "Is Your Water Safe to Drink?," a public television documentary on groundwater contamination in Michigan.*

A Preview of 1986 Foreign Trips

SIERRA CLUB OUTINGS

Now is the time to begin planning your exotic vacation for 1986! The Sierra Club is offering a wide variety of foreign trips—from trekking in the Dragon Kingdom of Bhutan, to floating peacefully down Britain's canal system in converted narrowboats. ▲ Our trips are conservation-oriented and are planned and led by dedicated and enthusiastic volunteer members—making Sierra Club trips different from any other group tours. The following pages give you a preview of the exciting and varied choices that await you in 1986. ▲ Send in the coupon on page 66 to obtain the detailed descriptions of trips that interest you. The dates and costs of foreign trips are subject to change. Please see the January/February issue of *Sierra* for our reservation and cancellation policy, and an application form to sign up.



Taksang Monastery "Tiger's Nest," Bhutan

AFRICA

(735) Tanzania Wildlife Safari: Zanzibar to Serengeti—June 20–July 4. *Leader, Mary O'Connor, 2504 Webster St., Palo Alto, CA 94301. Cost: $1,840.* Zanzibar, a fabled island with a romantic past, beckons us to visit its reef life, large tortoises, and clove plantations. We then move on to some of Africa's most famous game parks, with their prolific herds. We'll camp in Serengeti National Park, Selous Game Reserve, Lake Manyara National Park, and inside Ngorongoro Crater. We'll also visit prehistoric Olduvai Gorge and Masai villages. Travel will be by plane, boat, and four-wheel-drive vehicle. Some nights will be spent in hotels. This trip is suitable for anyone in good physical condition.

(765) Exploring Namibia, Africa—July 6–19. *Leader, Pete Nelson, 5906 Dirac St., San Diego, CA 92122. Cost: $1,805.* Namibia (once South-West Africa) is a land of woodland savanna, intermittent rivers, and desert. On this trip we plan to visit the Namib desert dunes (to 1,000 feet) on the shipwreck-littered Skeleton Coast; explore steep-walled canyons, rock-painting sites, and petrified forest; and tour Etosha National Park to observe its rich herds of wildlife. We will meet Namibia's people, including the Hottentot, Ovambos, and Bushmen.

(800) Kenya Adventure—A Wildlife Odyssey, Africa—July 14–August 5. *Leader, Ruth Dyche, 2747 Kring Dr., San Jose, CA 95125. Cost: TBA.* The largest concentration of game animals in the

world is found in Kenya. We will visit the premier game reserves of this diverse and fascinating country, and have many opportunities to observe and photograph the wildlife that reside there. Our trip is scheduled to coincide with the migration of great herds of wildebeest, as well as other migrating game. Included will be a three-day float trip on the Tana River, Kenya's largest. The birdlife is prolific along its banks, and many species of animals and waterfowl are seen in and along the river. We will visit different native people in their villages and in the countryside. Our transportation will be primarily by Land-Rover, and nights will be spent in tented camps or game lodges.

ASIA

(655) Arun Valley Christmas Trek, Nepal—December 21, 1985–January 11, 1986. *Leader, Ginger Harmon, Berth 20, Issaquah Dock, Waldo Point Harbor, Sausalito, CA 94965. Cost: $1,150.* Come spend your Christmas holiday in this seldom-traveled valley offering views of three of the four highest peaks in the world: Everest, Makalu, and Kanchenjunga. The Arun Valley, the deepest in the world, lies between Makalu and Kanchenjunga. Starting below 3,000 feet, we will eventually reach a maximum of 13,000 feet on a ridgetop high above the Arun. The relatively low altitude of this full-service trek makes it an ideal winter trip. Leader approval required.

(685) Langtang Trek, Nepal—March 17–April 12. *Leader, John Garcia, 124 Romero Circle, Alamo, CA 94507. Cost: $1,235.* Just south of Tibet is Nepal's famous Langtang National Park, site of this moderate 22-day full-service trek. The trek will feature rhododendrons in bloom, Yosemite-like waterfalls and rock formations, glaciers, alpine lakes, yaks, local cheese factories, and of course, the very hospitable Nepalese people. Elevations will range from 2,000 to 15,000 feet. Leader approval required.

(690) Manaslu Circle Trek, Nepal—April 21–May 24. *Leader, Kern Hildebrand, 228 Fairlawn Dr., Berkeley, CA 94708. Cost: TBA.* Manaslu, one of the world's greatest peaks at 26,660 feet, can be circled to the north by crossing the 17,100-foot pass, Larkya La. Following the Buri Gandaki, the Dudh Khola, and the Marsyandi Khola, this extended trek passes very near the Tibetan border. We will cross spectacular terrain and visit villages and *gompas* along the way. This is an economy trek.

(710) Mt. Kailas and Lake Manasarovar, Tibet—May, 1986. *Leader, Peter Overmire, 293 Union St., San Francisco, CA 94133. Cost: TBA.* For millenia, pilgrims from all parts of Central Asia—Bhutan, Nepal, India, Tibet—have made the journey to the mountain most holy to Buddhist and Hindu alike: Kailas. Over all this time perhaps only two dozen Westerners, usually disguised as Hindus,

Trekking in Nepal

have seen this mountain and its lake. As this issue of *Sierra* goes to press, this area of Western Tibet is opening to limited trekking, entering from Nepal. Trip price, date, length, and difficulty should be available within two months.

(695) Annapurna Circle Trek, Nepal—June 9–July 9. *Leader, Peter Owens, 117 E. Santa Inez, San Mateo, CA 94401. Cost: $1,100.* This moderate 27-day economy trek will circle the Annapurna Massif by a route that takes us up the Manang Valley and over 17,650-foot Thorung La Pass. We then descend to Muktinath, a sacred shrine for both Hindus and Buddhists, and proceed down the awesome Kali Gandaki gorge between Annapurna (26,540) and Dhaulaghiri (26,810). This monsoon-season trek will see some rain showers during the first and last week, but the middle two weeks will be in the "rain shadow" of the Himalaya where relatively arid conditions prevail. This is the time to see Nepal without the hordes of other trekkers, when the wildflowers are at their best. Leader approval required.

(790) Wilderness and Culture of the Great Manchurian Basin, China—July 27–August 17. *Leader, Jack Holmes, 1711 Cork Pl., Davis, CA 95616. Cost: $2,220.* This excursion is designed to enable you to experience the wilderness and cultural flavor of the traditional, yet actively developing, northeastern region of China. There will be two short backpack trips: a four-night exploration of an untracked rim of a large volcanic crater lake, and a three-night exploration of a very rugged and picturesque winding river valley. We will be traveling through some of the last remaining tiger habitat in China. Time is scheduled for visiting cultural and historical features of the three key cities of the region, some unique granitic formations, and a health hot springs. Transportation will be by plane, train, and jeep. Accommodations will be the best available.

(795) Ladakh to Kashmir Trek, India—August 4–29. *Leader, Peter Overmire, 293 Union St., San Francisco, CA 94133. Cost: $1,290.* This 26-day trip starts in Delhi, India. We fly to Srinagar in Kashmir, and then take jeeps to Leh, the Buddhist capital of Ladakh. Two days here provide time for acclimatizing and visiting the Tibetan Monasteries of the Indus Valley. In 19 trekking days we go south over the Himalayan Range, from desert-like Ladakh to the lush, green Vale of Kashmir, crossing several passes up to 17,000 feet. Two luxurious nights on Dal Lake houseboats end our trip.

(825) Trekking in the Dragon Kingdom, Bhutan—September 27–October 25. *Leaders, Jane and John Edginton, 2733 Buena Vista Way, Berkeley, CA 94708. Cost: $2,850.* The fascinating and secluded Kingdom of Bhutan has remained closed to Western visitors until recently. The people of this tiny forested country (long known as the Land of the Peaceful Dragon) high in the eastern Himalaya have retained their colorful traditional native dress, unique and highly decorative architecture, and their ancient culture and Buddhist religion. With two separate sampler treks, our trip emphasizes both the culture of Bhutan and its spectacular mountain scenery. We will explore the western region near the sacred mountain of Chomolhari (23,997) and the less-visited, botanically and culturally richer region of central Bhutan. We will visit ancient and unique monasteries including famous Taksang, the cliff-hanging Tiger's Nest, and several of the unique fortress-monasteries called *dzongs*. Trekking distances will average 10–12 miles per day, and we may get as high as 16,000 feet, but only a daypack need be carried. Bhutan's policy of limiting tourists and trekkers increases the price for this special

experience somewhat above other treks, but this remote, exotic mountain kingdom and its wonderful, warm people are well worth it.

(840) Mt. Everest Base Camp/Backpack and Chitwan Park, Nepal—October 11–November 3. *Leader, Mike Brandt, 10229 Variel Ave., Unit 22, Chatsworth, CA 91311. Cost: TBA.* This unique trek to Mt. Everest Base Camp is a first for the Sierra Club. On this backpack trek in the Solu Khumbu, one of the most majestic areas in the world, all members will backpack, cook meals, and clean the mess gear. Starting at Lukla, we will trek through Sherpa country to Namche Bazaar, visiting homes of the Sherpas in Thame and the awesome Tengboche Monastery. We continue on to Gorak Shep and will have an opportunity for an optional climb of Kala Patar (18,100) to view Mt. Everest (29,028), and a dayhike to Everest Base Camp (17,300). We will return to Lukla and then Kathmandu. The 14-day backpack will be a true Himalayan challenge. We also plan to drive to Chitwan National Park to see this wildlife sanctuary. Leader approval required.

(845) China Recycled—Bike and Hike—October 12–November 1. *Leader, Phil Gowing, 2730 Mabury Square, San Jose, CA 95133. Cost: $2,045.* A repeat of the popular Zhengzhou–Xi'an bike trips of 1983 and 1984, with exploration days scheduled for both Beijing (Peking) and Shanghai. The Great Wall, the Terra Cotta Army near Lintong, and the Zen Buddhist Monastery at Shoalin are among the many attractions to be visited. Hiking in the Song Mountains and climbing Huaxian, the Holy Mountain, are possibilities. At night we stay in local hotels and guesthouses, some more comfortable than others. Leader approval required.

(850) Tibet–Nepal, A Trans-Himalayan Trek—October 27–November 28. *Leader, Wayne R. Woodruff, P.O. Box 614, Livermore, CA 94550. Cost: TBA.* Recently, agreement between China and Nepal has been reached to allow treks from Nepal into Tibet and return. A full-service trek of four weeks starting in Nepal and crossing into Tibet at the best available location is planned; a visit to the Rongbuk Monastery ruins on the north side of Everest and Lhasa may be possible. Please contact the leader for firm information on dates, route, expenses, etc. Information should be available by early fall 1985. High altitudes and long days of trekking mean the trip will be moderate to strenuous depending on your physical condition. The trip cost is estimated to be between $2,000 and $3,000. Leader approval required.

(860) Rolwaling Valley, Nepal—November 15–December 6. *Leader, Patrick Colgan, P.O. Box 325, La Honda, CA 94020. Cost: TBA.* In the language of the Sherpa, Rolwaling means the "Furrow," a high, mysterious, sparsely populated valley of remote yak pastures and fascinating tales of the Yeti. Surrounded by massive, jumbled rock escarpments and fierce, knife-edge ice ridges, it is dominated by Gaurishankar (23,442), the most holy mountain of the Sherpa. Our moderately paced, unregimented 21-day economy trek takes us from Charikot along the Bhote Kosi River through Sherpa and Tamang country. Accompanied only by porters and kitchen staff, we will encounter few trekkers as we negotiate the 12,000- to 13,000-foot, often snowbound passes en route to the wild Rolwaling. Our highest camp will be about 13,000 feet. There will be several layover days for side hikes and lots of time throughout to photograph, drink *chia* with local families, and visit *gompas*. Leader approval required.

(865) Annapurna Christmas, Nepal—December 20, 1986–January 3, 1987. *Leader, Peter Owens, 117 E. Santa Inez, San Mateo, CA 94401. Cost: TBA.* Come spend the Christmas holidays on this culturally oriented trip to the Gurung villages of the Annapurna range. Great views of these 25,000-foot giants, and many new friends from our local staff are on the itinerary. The highest camp on this moderate economy trek will be about 11,000 feet. Leader approval required.

EUROPE

(675) Cross-Country Skiing in the Austrian Alps—January 5–19. *Leader, Anneliese Lass-Roth, 712 Taylor Ave., Alameda, CA 94501. Cost: $1,000.* We will spend 15 days cross-country skiing in the "Heart of Europe"—Austria. This trip is designed for beginners and intermediates. Previous ski experience is not necessary. Accommodations will be in comfortable hotels. Trip price also includes equipment rental and cross-country ski instruction by a certified Nordic ski instructor.

(687) Beginning Ski Touring, Austria—March 30–April 13. *Leader, Wayne R. Woodruff, P.O. Box 614, Livermore, CA 94550. Cost: $1,270.* This trip offers beginning instruction on ski-touring techniques and equipment, followed by easy ski tours and peak climbing away from the lifts of the Montafon Valley of western Austria. During our first week in Schruns, our training will be off the groomed runs at nearby ski areas. The second week we will stay at an alpine hut with our instructors, high in the Alps below Silvrettahorn and the Grosslitzner. There will be many opportunities for tours in the area, including a tour over the pass to Klosters, Switzerland. Ski-touring equipment is included in the trip price. The trip will be moderate; intermediate downhill skiing ability and leader approval are required.

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

(705) Walking in the West Country and the Lake District, England—May 10–24. *Leader, Dick Terwilliger, 7339 Pinecastle Rd., Falls Church, VA 22043. Cost: TBA.* Staying in a different guesthouse for each of two weeks, we shall be dayhiking in two of England's most interesting walking regions. The first week's hiking will be in the National Park of Exmoor, on England's southwest peninsula. Exmoor is a moorland plateau seamed with deep wooded valleys, and it contains natural beauty of incomparable variety. In the second week we move to the northwestern county of Cumbria, an area of moors, fells (mountains), lakes, and waterfalls, where our footpaths and hiking routes will take us through some of the best walking country in the entire Lake District. The Lake District National Park, England's largest park, is ideal countryside for hikers of all calibers.

(715) The Mountains of Portugal for Walking and Hiking—May 25–June 14. *Leaders, Mildred and Tony Look, 411 Los Ninos Way, Los Altos, CA 94022. Cost: $2,000.* Ten major mountain ranges, rising

from 4,500 feet to the Serra da Estrola at 6,500 feet, separate the deep river valleys that rise near the Spanish border. The walks and hikes in and around these mountain ranges take place in oak, pine, and fir woodlands. These hikes can be as moderate or strenuous as desired. Photography, nature study (including spring wildflowers), and historic interpretations will be an important part of our itinerary. Our route, while traveling in passenger vans, will be north and east of Lisbon. A valuable addition to the trip will be the Portuguese guide who will travel with our party.

(725) Turkey: A Classic Overview—June 18–July 11. *Leader, Ray Des Camp, 510 Tyndall St., Los Altos, CA 94022. Cost: $2,045.* Anatolia, bridge between Asia and Europe, has from time immemorial hosted a long procession of peoples: Hittites, Phrygians, Greeks, Persians, Romans, Byzantines, and finally Turks. Starting in Istanbul, we'll tour Turkey from the Black Sea to the Mediterranean; from the Aegean to Cappadocia. We'll visit the most celebrated sites, including the Hittite capital, Hatushas (2nd millenium BC); Troy, made famous by Homer's *Iliad*; and Ephesus, one of the best-preserved Roman cities in the world. We'll spend several days along the beautiful Turquoise Coast, from Bodrum to Antalya and Alanya on the Mediterranean, and visit Cappadocia with its fantastic fairy chimneys and underground cities. There'll be time to meet the Turkish people and to enjoy their colorful music, garb, and arts and crafts.

(730) Inland Waterways of England—June, 1986. *Leader, Marleen S. Van Horne, 423 S. 12th St., San Jose, CA 95112. Cost: TBA.* Step back 200 years to travel the Gentle Highway as it flows through the industrial centers of England and into the countryside. Drift peacefully past farm and village as a passenger on a converted narrowboat, the traditional freight carrier of Britain's canal system. Traverse the locks, tunnels, and aqueducts that made this mode of transportation possible. Hike the towpath, birdwatch, or people-watch as you meander through the heart of England.

(740) Bike and Hike in Ireland—June 22–July 5. *Leaders, Frances and Patrick Colgan, P.O. Box 325, La Honda, CA 94020. Cost: $1,215.* Ireland is one of the most magnificent and exotic places in the world. The special magic of this ancient and mystical land starts the moment we step off the plane in Shannon and get on our bikes. It continues for two glorious and memorable weeks as we leisurely meander north along Erin's beautiful west coast. We will cycle peacefully through the remote backroads of Clare, Galway, Mayo, and Sligo—all the way to the Bluestack Mountains of Donegal. A sagwagon will ferry our dunnage and supplies. Nights will be spent in traditional Irish farms and guesthouses.

(750) The Unknown Pyrenees, Spain—June 29–July 12. *Leader, John Doering, 6435 Freedom Blvd., Aptos, CA 95003. Cost: $890.* A chartered bus will take us to

Thomatal in the city of Salzburg, Austria

Torla, Viella, Benasque, Tahull, and other seldom-visited villages of the spectacular Pyrenees. We will walk through Spain's most beautiful parks, Aigues Tortes and Ordessa; attend an ancient ceremony in an abandoned village; and sleep in mountain *refugios* or small hotels that provide excellent meals. Snow permitting, there may be a short side trip into France, or a chance to bag an 11,000-foot peak. Expect several ten-mile days at elevations of 6,000 to 8,000 feet. The trip ends in the cosmopolitan seaport of Barcelona.

(755) Photographing the Alps—June 29–July 14. *Leader, Dolph Amster, P.O. Box 1106, Ridgecrest, CA 93555. Cost: TBA.* We meet in historic Salzburg and explore the city and surrounding lake region for one to two days. We then travel to Innsbruck, from which we make daily trips into the Stubai Valley with its spectacular views, and to the Dolomites of Italy. A week later we go by bus to the Bernese Oberland of Switzerland, where our daily adventures may include a trip on a narrow-gauge railroad and dinner at a Swiss farmhouse. Accommodations will be in comfortable hotels, and the hiking will be leisurely. The leader is an accomplished, trained photographer who will share his love of this expressive medium with trip members. Some hiking experience is required.

(760) France: The Southwest—June 30–July 11. *Leader, Lynne Simpson, 1300 Carter Rd., Sacramento, CA 95825. Cost: $1,595.* Beginning in the seaport town of Bordeaux, this trip will focus on the less-visited southwestern region of France. Our walks in the regional park of Landes de Gascogne, one of the country's most scenic areas, will offer us preserves of piney forests and lowland coastal areas. Moving east, we will leisurely explore areas rich in beauty and gastronomical delights. Accommodations will be in hospitable (often family-run) rural inns. *La Belle France* at its best!

(770) Slovenian Alps, Yugoslavia—July 13–26. *Leader, Fred Gooding, 8915 Montgomery Ave., N. Chevy Chase, MD 20815. Cost: $815.* We will travel with daypacks as we hut-hop in the two principal ranges of northern Yugoslavia: the Kamnik and Julian alps. The huts are excellent and are off of Europe's beaten path. Our guide will be a young Yugoslavian mountaineer/doctor who has assisted on three previous Sierra Club outings. There will be time to climb Mt. Triglav, the highest in the country, and to sightsee in the Slovenian capital of Ljubljana and the resort city of Bled.

(775) Basqueland Adventure, France and Spain—July 14–27. *Leader, Nancy Auker, 120 Sheridan Rd., Oakland, CA 94618. Cost: $1,100.* Crossing back and forth across the crest of the Pyrenees, which forms the border, we will see the prehistoric menhirs and circular gravestones that identify a unique civilization. Five layover days permit us to visit a Basque museum and a 12th-century Romanesque church. We will also have the opportunity to join the Basques at a *pelote* game or a *fête* featuring an ancient morality play, balladeers, and skillful dancers. A van carries all baggage, except lunch, to our next *gîte*, where a French cook will prepare an excellent meal each evening.

(780) The Lotschental: A View of Rural Switzerland—July 21–31. *Leader, Ray Simpson, 1300 Carter Rd., Sacramento, CA 95864. Cost: $975.* This trip explores the Lotschental, a high mountain valley east of Geneva. Each day we walk through Alpine countryside and visit the idyllic villages of Ferden, Kippel, and Fafleralp.

Hiking will be on both level and switchback trails that climb to passes affording views of the legendary giants of the Alps—the Jungfrau, the Matterhorn, and Monte Rosa. Moderately strenuous hikes (plus a short glacier crossing) provide interesting, challenging days complimented by overnights in comfortable mountain inns or family-run hotels.

(785) The First Foreign Service Trip, England and Wales—July 21–August 7. *Leader, Don Coppock, 1485A Church St., San Francisco, CA 94131. Cost: TBA.* This moderately strenuous trip will combine the satisfaction and fun of a service trip with the adventure of a foreign outing. Working beside local hosts, trip members will learn trail-building and conservation techniques as practiced in Britain. The itinerary leaves free days for hiking in the countryside surrounding our two base camps; exploring English country inns and estates in the Peak District National Park; and visiting the castles and towns of the Welsh coast from Snowdonia National Park.

(805) Cycling the French Lake and Spa Region, France—August, 1986. *Leader, Richard Weiss, 448 Wellesley St., Toronto, Canada M4X 1H7. Cost: TBA.* This cycling holiday will take us to Haute Savoie and three of the most beautiful lakes in Europe: Lacdu Bourget, Lac d'Annecy, and Lake Geneva. With three or four days in each location, we will have time to leisurely explore the villages, vineyards, forests, and lakes of this region. Sagwagon and bikes will be provided.

(810) Mountain Hiking in Swedish Lappland—August 21–September 5. *Leader, Bob Paul, 13017 Caminito Mar Villa, Del Mar, CA 92014. Cost: $1,615.* Come hike the rugged trails of Padjelanta National Park, an extensive mountain plateau in northern Sweden. This moderately strenuous tour through birch and pine forests and alpine meadows offers visits to see Lapp villages, reindeer herds, and unique flora and fauna. Staying in mountain stations and huts, we will meet the friendly Swedes and other mountain travelers. Leader approval required.

(815) Hiking in the Austrian Alps: Vorarlberg and Tirol—September 1–11. *Leader, Ann Hildebrand, 1615 Lincoln Rd., Stockton, CA 95207. Cost: TBA.* For ten days we will escape for a wonderful rural, alpine experience: hiking in the Vorarlberg and Tirol regions of Austria. The difficulty of the hike will be moderate; we need carry only our personal gear. Accommodations will be in Alpine Club huts and comfortable hotels where we will enjoy the renowned Austrian *Gemütlichkeit.* Leader approval required.

(830) Mediterranean Sailing Adventure—September 29–October 12. *Leader, John Garcia, 124 Romero Circle, Alamo, CA 94507. Cost: $1,620.* Since the beginning of time the gods have entrusted the Greeks with the sea, and the Greek sea and the shores it touches would be endowed with natural beauty, mystery, and liquid-sapphire water. Now we can share in this rich, seafaring tradition and sail these ancient waters. There will be a captain and we will be the crew aboard 39-foot sloops. We begin our adventure on the island of Rhodes, then sail along the Turkish Coast, visiting archaelogical sites from Lycian, Carian, Greek, Roman, and Byzantine civilizations, as well as charming Turkish villages. We will swim in the blue-green waters of the Aegean Sea, or visit wilderness coves and beaches. We will learn to sail and possibly have our own regatta at the end of the trip.

(835) Oktoberfest in the Rhineland, West Germany—October 1–11. *Leader, Bud Bollock, 1906 Edgewood Dr., Palo Alto, CA 94303. Cost: TBA.* Explore the historic and legendary Rhine Valley on a series of easy dayhikes, experiencing the enchanting scenery highlighted by fall colors. We have scheduled our visit to coincide with the grape harvest and the Oktoberfest, widely celebrated in quaint villages and *Biergartens* alike. We will have the opportunity to observe the farming, conservation, and reforestation methods which have preserved the land over many centuries. Each night will be spent in a comfortable hotel featuring delicious food and drink.

JAPAN

(820) Autumn Walks in Japan—September 20–October 18. *Leaders, Mildred and Tony Look, 411 Los Ninos Way, Los Altos, CA 94022. Cost: TBA.* Brilliant crimson will be touching the mountainsides as we walk in Nikko and Joshinets-Koigan National Parks, and on the Noto Peninsula and Oki Island. Day walks can be as strenuous or leisurely as desired during our three or four layover days staying in Japanese inns or *ōnsens.* Travel will be by train or bus in the company of a Japanese guide. Stops are scheduled at famous gardens, temples, and shrines. A Kyoto visit is optional for those who wish to extend their stay in Japan until October 24.

MIDDLE EAST

(855) Egypt and Israel by Bike and Boot—November 5–20. *Leader, Len Lewis, 2106-A Clinton Ave., Alameda, CA 94501. Cost: $1,740.* This leisurely 16-day trip will take us from the bazaars of exotic Cairo to Tel Aviv, the capital of Israel. On the way we will visit the Valley of the Kings at Luxor, King Solomon's Mines, the birthplace of Jesus at Bethlehem, and the fabled forests of Carmel. Our cycling will be limited to easy day rides, with our major distances being traveled by train or bus. We will moderate our pace to fully enjoy the country. Our nights will be spent in first-class hotels or country inns. A memorable experience for the young at heart.

PACIFIC BASIN

(665) Australia, Land of the Sun—December 30, 1985–January 19, 1986. *Leader, Kent Erskine, 272 Orange Ave., Ashland, OR 97520. Cost: TBA.* We'll experience Australia as others rarely do: from the islands of the Great Barrier Reef through lush coastal forests, along beautiful river valleys, and over the crest to the interior. This trip offers a range of exciting activities: a night at a sea-turtle nesting beach, a tropical river trip, visits to critical habitats to see unusual wildlife, and sojourns in cities to experience the best of the Australian people. Travel by boat, train, plane, and (most enjoyably) by foot will bring us closer to this fabulous land.

(680) New Zealand Featuring Fiordland—March 7–30. *Leader, Vicky Hoover, P.O. Box 723, Livermore, CA 94550. Cost: $1,600.* We will explore several of the South Island's spectacular fiords and mountain areas via three backpack jaunts between huts. Car-camping intervals plus auxiliary boat and air travel will help us to sample the remarkable variety of "down under" scenery. The last week of this 23-day outing will take us by ferry to the North Island and will include tramping in remote Urewera National Park. Leader approval required.

SOUTH AMERICA

(670) Bio-Bio River Run, Chile—December 21, 1985–January 3, 1986. *Leader, Blaine LeCheminant, 1857 Via Barrett, San Lorenzo, CA 94580. Cost: $2,280.* A clear, crisp course that cascades almost continuously, the Bio-Bio is Chile's largest river. Tumbling down the steep western slope of the Andes through the

"Switzerland of South America," it surpasses all American rivers in raw beauty and powerful rapids. It seems the dream river actualized: clear, clean water, hot springs, an active volcano, tributary waterfalls, glaciers, unbelievable panoramas, alpine lakes, and summer weather. Look south to the Bio-Bio.

(720) Peru: Land of the Inca—May 25–June 16. *Leader, David Horsley, 4285 Gilbert St., Oakland, CA 94611. Cost: $1,965.* This 23-day adventure is designed to give us a full experience of Peru—from past to present. It will offer sightseeing in the cities of Lima, Cuzco, and Huaraz; trekking through the magnificent mountain scenery of the Cordilla Blanca, with peaks towering over 20,000 feet; and exploring extraordinary Inca ruins at Machu Picchu, Pisac, and Ollantayambo. We also plan a thrilling whitewater raft trip (through the "Sacred Valley of the Incas") on the Urubamba River; aerial viewing of the mysterious archaelogical "Nazca Lines"; and a visit by boat to the incredible seabird colonies on the Ballestes Islands. This unforgettable experience of the Peruvian peoples and country will prove to be richly rewarding.

(745) Bolivia—Quiet Jewel of the Andes—June 22–July 13. *Leader, Charles Schultz, 1024-C Los Gamos Rd., San Rafael, CA 94903. Cost: $1,755.* Bolivia has been only lightly touched by foreign travelers. From her offerings we will sample the following: the jungle of the upper Amazon basin on the Tuichi River; Sucre, rich in colonial setting and considered the most beautiful city in Bolivia; Potosi, dating from the time of the conquest; Lake Titicaca and environs, whence rose the original Inca. We shall cap our stay with a six-day trek in the Apolobamba Range, where snowy peaks tower and condors soar overhead.

1985/1986 WINTER TRIPS

(25) Aztec-Mayan Tour, Mexico—October 27–November 16, 1985. *Leader, TBA. Cost: $1,300.* Would you like to learn about the pre-Cortez Aztec-Mayan civilization, encounter a non-English-speaking culture head-on, camp in primitive areas, and exercise control over the pace of your trip with companions of similar interests? Join us and tour southern Mexico by van, starting in Mexico City. As we travel to the tip of the Yucatan Peninsula and return, we will visit the magnificent archaeological sites of Tula, Teotihuacan, Tulum, Chichen Itza, Palenque, Monte Alban, Mitla, and many more. We will camp whenever possible on beaches or in the countryside, but up to seven nights will be spent in motels.

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

(396) Adirondack Ski Tour, New York—February 2–7. *Leader, Walter Blank, RD 1, Box 85, Ghent, NY 12075. Cost: $335.* This trip takes us through the heart of the Adirondack forest preserve, with a different destination each night. We traverse hidden valleys, ski through high mountain passes, and cross frozen wilderness lakes. Some of the scenery is the most spectacular in the eastern United States. Your baggage will be transported for you from inn to inn. The trip leader is a certified Nordic instructor.

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EILEEN DOCEKAL

HOW SEEDS TRAVEL

The feathery styles of the long-plumed avens are covered with hairs and act as sails for the small seeds located at their ends.

Hickory nuts gathered by a squirrel for winter meals were probably forgotten, and may produce a new tree.

SEEDS FOR A FLOWER or vegetable garden come neatly packaged and ready to plant. So, in fact, do wild seeds. The difference is that wild seeds are enclosed in fruits, nuts, or pods of some kind, not in tidy little packets. What's more, there aren't any gardeners to do the planting. It's up to the plants themselves to get their seeds spread around so a new generation of plants can get started.

Plants use a number of methods to sow their seeds. Some let the wind do the job, while others let a stream or river carry their seeds to new ground. Certain seeds hitch rides on humans or animals; others are scattered in miniature explosions when their pods dry out.

Seeds that are spread by the wind have special attachments on their hard coats that act like sails or wings. The slightest puff of air, breath, or even the movement of a large animal will send dandelion seeds floating long distances. Milkweed seeds blow about in a similar way, but they are housed in a pod that opens on only one side, rolling back from top to bottom like the lid on a sardine can. Inside, the seeds are arranged in a compact spiral. Strong breezes loosen the light, fluffy seeds one by one throughout the fall and winter.

Maple, ash, and elm trees also rely on the wind to spread their seeds. Instead of silky sails, maple and elm seeds have two thin, sturdy wings on which to glide. Ash seeds have only one wing; they look like tiny canoe paddles as they sail through the air. A slight twist in the blades of these "helicopters" allows the seeds to fly long distances before they fall to earth.

The tumbleweed takes a different approach. Instead of letting its seeds float away, the whole tumbleweed is blown about by the wind. As it bounces along, its seeds are shaken loose and fall to the ground.

Winglike attachments help the rather heavy Japanese maple seed sail away from its parent tree on strong spring breezes.

Hitchhiking seeds, such as burs and stickers, use hooks to catch onto fur or clothing. If you look closely at a cocklebur, you'll see that it has sharp-looking barbs that can grab tightly onto your pant leg or sweater. These same barbs also keep the seed from being eaten by animals. The prickly seed casing will fasten onto an animal's fur only when the seed is mature. Before then, its hooks and barbs are covered up.

The berries and fruits we like to eat are also meant to attract birds and other animals as a way of spreading the plants' seeds. Animals eat the fruits, seeds and all. The seeds then pass through the animals' digestive systems and are deposited on the ground in excrement, or "scat." The only effect the animals' digestive juices have on the seeds is to soften their hard shells,

The hard outer shell of the bittersweet fruit opens when the seeds are mature. Birds and animals then scatter the seeds.

making it easier for them to germinate when conditions are right.

Not all plants rely on wind, water, or animals to spread their seeds. Some plants have developed ways to "throw" their seeds in all directions. The jewel weed is often called the touch-me-not because its ripe seed pod dries tight as a spring and snaps open violently when it is touched, flinging seeds hither and yon.

Beans, peas, and the California poppy scatter their seeds in a slightly different manner. The sides of their pods dry unevenly, and this causes the pods to twist until they suddenly spring open. These exploding seed pods do more than spread seeds—they can also scare away animals looking for a meal.

Drying bean pods will twist until they spring open, scattering their seeds on the ground.

No matter what method a plant uses to sow its seeds, the goal is the same: to get them to a place where they can grow. Not every seed will land in a spot with enough water and the right kind of soil. That's one reason plants have so many seeds. At least a few of them will germinate and produce food for humans and animals, as well as a new generation of seeds for the next crop of plants in a never-ending cycle.

A tightly closed Bishop pine cone protects its immature seeds from hungry jays and squirrels.

EILEEN DOCEKAL *is a naturalist and environmental educator living in Tulsa, Okla. She wrote "Clouds" for the March/April 1985* Sierra.

Tumbleweeds in Joshua Tree National Park sow their seeds as the wind bumps them over the rough ground.

Pieces of the jumping cactus hook onto passersby with barbed spines. If all goes well, the "hitchhiker" will land in a spot where it can grow.

To Save a Place of Wonder

Preserving the Queen Charlotte Islands

ROBERT RAINER

Islands at the Edge, by the Islands Protection Society. Douglas and McIntyre (1615 Venables St., Vancouver, B.C. V5L 2H1), 1984. $29.95, cloth.

One hundred kilometers off the coast of British Columbia, nestled within the Queen Charlotte Islands, there lies a smaller archipelago so renowned for its peculiar natural wealth that it has been dubbed the "Canadian Galápagos." Indisputably, the 138 islands collectively called South Moresby are biologically rich. Bald eagles nest in densities unrivaled elsewhere in Canada, and peregrine falcons make their home here in the greatest concentrations found on Earth. The world's largest black bears, a million seabirds, and the largest sea lion population on the West Coast find shelter in this wilderness only recently become famous.

In 1974 a British Columbia logging company applied for permission to log Burnaby Island, one of a dozen islands that make up the bulk of South Moresby. Opposition grew steadily—first from the Haida, native users of the area, then from other locals dismayed by the company's record of ecological devastation. A decade-long battle involving conservationists, biologists, the Haida, and the logging industry left the islands and the government of British Co-

lumbia with a choice of four options, ranging from allowing cuts of as much as 90 percent of South Moresby's trees to allowing just 28 percent (Option 4).

In May, Canadian environmentalists met with federal Minister of Environment Suzanne Blais-Grenier to urge her to consider making South Moresby a national park, despite her position that no new national parks would be established because of the federal deficit. The Sierra Club supports total preservation of the islands, and is considering Blais-Grenier's suggestion that the public raise funds to create the park. But "to simply state that the Sierra Club supports an Option 4 or total preservation position on South Moresby does not tell the whole story," warns Jean Hyntka, Conservation Director of the Sierra Club of Western Canada, "especially in light of the province's newly introduced Option 1A"—a plan that would allow extensive logging and mining of the proposed park area. "The public is preparing for a vigorous battle on this one," Hyntka says.

Islands at the Edge is the conservation statement South Moresby needs now. Eight contributors to the text—including Jacques Cousteau, who wrote the foreword—argue eloquently for preservation of the islands. Haida artist Bill Reid writes in "These Shining Islands," his tone-setting overview of land exploitation in South Moresby: "Almost every place in the world—from the tropical rain forests to the Antarctic, from Lake Baikal to Lake Superior—the effects of the tremendous crushing, consuming, destroying, transferring thrust of energy either have or soon will be felt. It is a wave that started on the smallest continent and spread outwards around the sphere of the planet until it has eventually, inevitably, closed in upon itself. Today the wave reverberates in small, scattered centres of turbulence, lashing with undiminished avarice at the few isolated enclaves it has yet to consume. One of these is South Moresby in the Queen Charlotte Islands."

Four chapters on South Moresby's natural history in the second section of the book illustrate the islands' superlative biological qualities, and explain why the Haida call the area *Gwaaia Haanas*, "Place of Wonder." Bristol Foster, who specializes in the evolution of Queen Charlotte mammals, describes the islands as an "evolutionary showcase." Here the naturalist can find the most endemic and disjunct (geographically separated) species of plants and animals in Canada.

While the second section vividly depicts South Moresby's natural attributes, the final section of *Islands at the Edge* pleads forcibly for the preservation of these qualities. John Broadhead, a director of the

Islands Protection Society, sums up the consequences of humanity's gluttonous hunger for trees: In just 30 years half the world's forests have been cut, and every minute, somewhere on the globe, 50 more acres of trees are being axed. In British Columbia the Timber Supply Area system allows small companies one-time logging rights without any obligation to care for and reseed the land. Consequently, although the Queen Charlotte Timber Supply Area can grow trees at the rate of 233,000 cubic metres per year, current cutting is extracting double that amount.

Tourism also troubles the islands. In "Visitors Who Do Not Remain," another director of the Islands Protection Society, Thom Henley, suggests that the austere measures adopted to protect the Galápagos from human intrusion may become necessary on South Moresby to ensure continuation of its prolific and delicate food chains.

Islands at the Edge does not attempt to describe all of South Moresby's natural wonders, nor does it delve into the rich Haida culture that flourished on the islands for thousands of years. It does attempt to spawn an awareness of present land-use conflicts on South Moresby, and to establish that the islands' forest resources can be exploited only at extreme cost to the region's ecology and aesthetic appeal. The book also promotes a global message: Learning to address growing human alienation from the Earth is the monumental challenge we all face.

This, then, is a book for naturalists, conservationists, and anyone who appreciates unsullied places. Each chapter is sumptuously illustrated with sharply reproduced color photographs portraying both the beauty and fragility of the islands' ecology. The cover, featuring an aerial shot of Juan Perez Sound, evokes the mystery and grandeur that attracted an elevenfold increase in visitors to South Moresby between 1978 and 1982. In stark contrast, a photograph of an island logged ten years ago shows steep slopes devoid of life, the soil washed to sea, the hills grotesquely slashed by landslide scars.

A final note: The price of the book is an investment in the conservation of one of the world's pristine natural places. All proceeds go to the Islands Protection Society as it prepares for the coming decision on the fate of South Moresby.

ROBERT RAINER *is a freelance writer living in North Vancouver, B.C.*

USEFUL SUBVERSION

HAROLD GILLIAM

Deep Ecology, by Bill Devall and George Sessions. Gibbs M. Smith, Inc., 1984; $15.95, cloth.
Deep Ecology, edited by Michael Tobias. Avant Books, 1984. $12.95, paper.

FOR SEVERAL YEARS the esoteric phenomenon known as "deep ecology" has been discussed in figuratively hushed tones in academic circles and recondite journals as if it were some sort of deep conspiracy.

Although no conspiracy is apparent, there is little doubt that deep ecology is subversive. Whether it amounts to good or bad subversion depends on your point of view.

With the publication of two books both called *Deep Ecology*, the subject has now come out of the academic closet and is destined to face the light of day in the wider public media.

Deep Ecology by Bill Devall and George Sessions, former colleagues on the faculty of Humboldt State University (Sessions now teaches at Sierra College), is an introduction to the subject published by Gibbs M. Smith, Inc. The other *Deep Ecology* is an anthology issued by Avant Books and edited by ex-Dartmouth professor and filmmaker Michael Tobias, with contributions by such philosophical heavyweights as Garrett Hardin, Herman Daly, Roderick Nash, Murray Bookchin, Paolo Soleri, and Arne Naess, the Norwegian philosopher who first coined the term.

Both books offer some illuminating views into an area where definitions have not yet been pinned down with any precision. Deep ecology rejects the "dominant world view" that nature and its species exist to serve humans; it affirms the "intrinsic value" of other species apart from human purposes; it encourages a direct spiritual relation to nature, including ritual observance of seasonal cycles; it rejects consumerism in favor of voluntary simplicity; it calls for a decrease in the human population of the Earth; and it advocates direct action at the grassroots level to resist or repair the environmental damage done by industrialism.

From this point of view, the old-fashioned, conservation-minded, politically oriented, Sierra Club, reformist "shallow ecology"—or environmentalism—is really only

a band-aid approach to a mortal disease.

Conventional environmentalists can only fight a defensive rearguard action against the worst kinds of environmental exploitation because they rely on piecemeal measures and fail to challenge the basic assumptions of economic growth. They fall into the trap of using the language and tactics of resource economists, "language which converts ecology into input-output models and forests into commodity production systems. In order to play the game of politics, they will be required to compromise on every piece of legislation in which they are interested." So say the uncompromising Devall and Sessions.

"Deep ecology," they write, "is a process of ever-deeper questioning of ourselves, the assumptions of the dominant worldview in our culture. . . ."

There is much to be said for this point of view. It is quite true that conventional environmentalism in the 1980s often gets bogged down in political tactics, legalistic thickets, and cost/benefit analyses, and neglects the profound need for changes in our basic assumptions about our relation to the natural world.

It is quite true, as the deep ecologists maintain, that in developing a direct relation to nature, individuals can find the kind of psychological roots that provide inner strength in a time of upheaval. Wisely, both of these books look for those roots not only in science and rational analysis but in poetry and religion—in Robinson Jeffers, Gary Snyder, William Everson, for example, as well as in the nature religions of American Indian tribes.

Deep ecology in some respects is truly subversive: It subverts the traditional view that the human role is to conquer nature or beat it into submission; it subverts the implicit assumption that the highest good in life is to accumulate ever-greater quantities of the consumer goods whose virtues are drummed into us by the relentless barrage of TV commercials; it subverts the dogma that every project or major policy decision must be evaluated entirely in terms of its contribution to jobs and profits.

So far, so good. But when it comes to deep ecology's own positive principles, the picture is less clear. For my taste, its philosophical assumptions are still murky and its implications for action do not always correspond to reality.

For example, in their criticism of the conventional "anthropocentric worldview," Devall and Sessions, along with Naess, maintain that all forms of life have "intrinsic value" apart from any human considerations. They assume that humans have no right to control or reduce the populations of other life forms "except to satisfy vital needs."

But who decides which needs are vital? Do Eskimos have the right to kill whales for subsistence? If Eskimos, why not the Japanese or Norwegian fishermen who also depend on them for subsistence? Is killing cattle for beef or shoe leather a vital human need?

If other forms of life have intrinsic value and should not be sacrificed to human purposes, it is hard to justify any killing, even for vital human needs, because presumably the animal—or plant or microbe—has a greater need for its own life than the human need for taking that life. The assumption of the intrinsic—presumably equal—value of all life is not very helpful as a guide to action. Maybe enlightened anthropocentrism is the best we can do.

Devall and Sessions are critical of the "stewardship" philosophy of the late microbiologist Rene Dubos and farmer-poet Wendell Berry, who express the biblical view that humans are stewards of the Earth, responsible for taking good care of it and its species. Deep ecologists deny that humans have the right to be in charge of the planet.

"Berry is very much in the Christian

stewardship tradition," Devall and Sessions write, "when he argues that the land must be 'used' by humans. . . . He also holds that we can't 'preserve more than a small portion of the land in wilderness.' But wilderness or near-wilderness is required as habitat for *all* of the Earth's wild creatures."

It is possible to agree that large areas of wilderness are essential, and still confront the fact, as Berry does, that humans require a substantial portion of the Earth for sustenance and that responsible stewardship is also essential.

It is simply not true that "wilderness or near-wilderness is required as a habitat for all of the Earth's wild creatures." Many animals have adapted quite well to human habitation; there are more birds now, for example, in densely populated San Francisco than there were before the city was built. Golden Gate Park teems with wildlife that was not there when the area was mostly dunes. Urban planning can provide for wildlife in cities, and the best kind of farming leaves at least hedgerows and woodlots where wild populations can co-exist with agriculture, maintaining a semblance of ecological balance.

The deep ecologists (at least Devall and Sessions), preoccupied with the idea of wilderness, neglect the practical problems of managing wisely the much larger areas where humans are ineluctably in control. The needed balance between humans and nature involves not only wilderness but the development of a sustainable agriculture and a sustainable industrial base. As of now, we have neither.

I would feel better about the deep ecologists if they would come down out of philosophical cloudland and grapple with some of the tough questions of real life. I would also feel better if some of the hard-headed, bottom-line-motivated managers who are running business and government would take some time to contemplate the long-range future and ultimate values involved in deep ecology.

The gap badly needs to be bridged; our future on the planet would be less precarious if the two camps could come together in an earnest exchange of views.

Meantime, the deep ecologists are providing the beginnings of a much-needed new look at our society's goals and purposes in a time of turmoil. Drawing on the thought of people like John Muir, Aldo Leopold, Lewis Mumford, David Brower, Theodore Roszak, Stewart Udall, and Gary Snyder, they are working toward a new concept of the relation of humans to the Earth.

Deep ecology may be subversive, but it's the kind of subversion we can use. It may in some respects be fuzzy and imprecise, but that's the way it is with all new ideas. I suspect we're seeing the beginning of something big.

HAROLD GILLIAM *is a veteran environmentalist.*

RECREATING THE LANDSCAPE

JOHN WALTER

Meeting the Expectations of the Land, edited by Wes Jackson, Wendell Berry, and Bruce Coleman. North Point Press, 1984. $22.50, cloth; $12.50, paper.

IT WAS JUST FIVE years ago that James Risser of the *Des Moines Register* won a Pulitzer Prize for reporting on the environmental crisis "down on the farm." (His more recent report on soil conservation, "The Other Farm Crisis," appeared in the May/June *Sierra*.) Risser's *Register* series revealed the serious trouble brewing beneath the beauty of long neat rows of corn and soybeans in the Midwest. In those days there was still a sense that soil erosion and water pollution could be given a technological quick fix, or perhaps patched up by tinkering with the next farm bill. But the signs of stress have since deepened into a full-scale crisis, and the country's agricultural community has entered a period of soul-searching.

The publication of this collection of essays in "sustainable agriculture and stewardship" is thus well timed. The contributors—a mix of environmentalists, poets, writers, and New Age agrarians and researchers—share the view that modern commercial agriculture has relied too heavily on energy, chemicals, and capital. This book is much more than a litany of sins, however. Read together, the 17 essays suggest a loose set of guidelines for making the American agricultural landscape a more ecologically sound place.

According to California soil scientist Hans Jenny, such a transformation might well begin with a fuller appreciation of agriculture's most basic substance: soil. In his vivid portrayal of the "eternal night of the soil teeming with life" one begins to appreciate the drama and beauty that takes place beneath our feet—akin to the beauty of mountains, rivers, and forests.

In an essay that reveals a hand practiced at scooping manure and pitching hay, Gene Logsdon explores some of the natural rela-

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tionships that have sustained the traditional mixed grain-and-livestock farm. With loving detail he describes the web of ecological processes that surround the humble pasture "cowpie." Through the farmer's bucolic eyes we learn that, during the summer, his chickens "get most of their protein supplement by eating blood-gorged flies off the cows." Soil, plants, animals, and people all benefit from the symbiotic relationships that have traditionally provided agriculture with its resiliency, but that have been lost in the shift to factory-type farms. Logsdon's conclusion is a recurring theme in many of the essays: For a sustainable agriculture to flourish, the whole community must be nurtured in traditions that "derive happiness and humane satisfaction from a life that eschews the kind of consumerism, leisure, and delirious pursuit of novelty that characterizes our society."

Likewise, Center for Rural Affairs Co-Director Marty Strange believes a sustainable commercial agriculture needs to be built on the traditional agrarian values of conservation, independence, self-reliance, family, and community. These values are threatened by public policy that has long been skewed in favor of big industrial agriculture. But our public policies are not set in concrete—they are a matter of choice. Strange concludes by issuing a challenge: "Let us see if big farms prevail in an economy not biased in their favor. Let us see who survives in an agriculture designed for sustainability."

In their search for the foundations of sustainable agriculture, these essays track across a range of ecological, economic, political, and cultural concerns. Many of them introduce bold ideas into the arena of agricultural policy. For example, historian Donald Worster suggests in one of his two contributions that a new Homestead Act is needed to reverse the mid-19th-century example that sent settlers west with farming practices born of more humid regions. Wes Jackson and Marty Bender describe their research on perennial polycultures, cropping systems that would mirror natural ecosystems. (Unlike a monoculture, a perennial polyculture does not require annual tillage and planting, and it provides natural fertilization and pest control.) Stephen Gliessman describes how the science of ecology can be applied to solving problems of agricultural production, and John Todd imagines the restoration of depleted ecosystems through "a vast storehouse of knowledge currently locked up in the insular reaches of academic and scientific institutions." Poet Gary Snyder, in his essay "Good, Wild, Sacred," contends that a sustainable agriculture needs to incorporate something of the wildness of nature.

In response to the inevitable criticism that the book strays too far from reality, one need only point to Strange's successful fight to limit corporate farming in Nebraska, and the influence Jackson's research is having elsewhere. But to extend the work's readership in agricultural circles, some recognition might have been given here to the many threads of stewardship that *are* evolving in the agricultural establishment. These include certain aspects of conservation tillage, for example, as well as integrated pest management and an emerging interest among farmers in enterprise diversification. Such an effort might have further helped to promote dialogue between the alternative voices represented in this book and the many agriculturalists who are finding that now is the season—more than ever—to sow new ideas.

JOHN WALTER, *an associate editor for* Successful Farming *magazine, has written for numerous agricultural publications.*

THE CHALLENGE CONTINUES

KAI N. LEE

Environmental Policy in the 1980s: Reagan's New Agenda, edited by Norman J. Vig and Michael E. Kraft. Congressional Quarterly Press, 1984; $12.95, paper.

MORE THAN EIGHT decades have passed since Teddy Roosevelt established the national forests by presidential fiat. That action put the word *conservation* in the political lexicon and gave rise to the great Republican tributary of modern environmentalism. Ronald Reagan dammed that stream in 1981.

Norman Vig and Michael Kraft have compiled analyses by 17 political scientists and sociologists in this chronicle of the Reagan revolution in environmental policy. Their work is detailed, scholarly, and surprisingly unanimous in the conclusions reached. As public policy the Reagan environmental program has failed. But in launching a counterattack on environmental activism in the federal government, Reagan and his lieutenants have succeeded in debilitating environmental agencies and undermining a decade of hard work by citizen groups, industry, and their allies.

The failure of Reagan's environmental policy is well known. Interior Secretary James Watt and EPA Administrator Anne Burford were driven from office, while the

President's legislative agenda continues to founder in stalemate. But if the Reaganites have not been able to improve policy according to their lights, they did succeed in the wholesale reduction of government's ability to fulfill its existing responsibilities.

In this the budget has been their broadsword. Seizing the initiative when they came into office, they used the congressional budget process to force government-wide reductions in domestic funding. Over the next two years the EPA's budget fell precipitously while nearly a quarter of its staff positions were eliminated. Federal assistance to state and local governments was curtailed at the same time as regulatory and program responsibilities were pushed onto lower levels of government in the name of federalism. Environmental research was sharply reduced while action on acid rain was repeatedly deferred because scientific uncertainties were said to require additional study.

Editors Vig and Kraft and their colleagues examine the Reagan strategy and its effects on the principal areas of environmental policy. The administration's budgetary success is well described by Robert V. Bartlett. Lost opportunities in regulatory and legislative reform are analyzed in perceptive chapters by Richard N. L. Andrews, Richard J. Tobin, Paul J. Culhane, and Helen M. Ingram and Dean E. Mann. Edwin H. Clark II observes that environmental programs have trivial economic effects. Budget cuts have been of little benefit to business despite their substantial impact on public policy. Robert Cameron Mitchell's careful discussion of public opinion is useful reading for citizens puzzled by the wide support enjoyed simultaneously by Ronald Reagan and environmental quality.

The human and organizational effects of the Reagan revolution will be felt for a long time, as J. Clarence Davies points out. The White House Council on Environmental Quality, once the Central Intelligence Agency of the environment, has been all but abolished. Environmentalists and moderate business groups that supported reforms in law and policy have been shut out of administration discussions. The Office of Management and Budget has consolidated its influence and power, shifting the burden of proof toward reformers of existing industrial practices when setting federal regulations. The best people in the civil service left when they could; institutional memory dims. Those losses would take more than money to repair even if the money were forthcoming.

Yet the environment was only a minor theme in the 1984 election. This was in part the result of a Reagan campaign decision to avoid issues altogether; it was also a

consequence of the 1983 appointments of William Ruckelshaus at the EPA and William Clark at the Department of Interior, which lanced the controversies surrounding Watt and Burford. But Congress has sustained the status quo through inaction. Federal courts, once the wellspring of environmental rights, increasingly defer to administrative discretion. The citizenry acquiesces to the Teflon presidency. Looming over all are the federal deficit and ballooning interest payments on the national debt, the real limits to activist public policy.

The hard question is whether the environmental policies of the 1970s would have been sustainable in the 1980s in any event. As it is, environmentalists can blame Ronald Reagan. But the challenge that Theodore Roosevelt grasped—to reconcile industrialism with its resource base—has yet to be faced by any administration. Reagan's attempt to shape environmental policy has not ended. Knowing how that attempt started is fundamental to any effective response; this is the value of the present book.

KAI N. LEE *is associate professor of environmental studies and political science at the University of Washington.*

BRIEF REVIEWS

Adventures On & Off Interstate 80, by Eleanor Huggins and John Olmsted. Tioga Publishing Company (P.O. Box 98, Palo Alto, CA 94302), 1985. $12.95, paper.

HUGGINS AND OLMSTED'S new book presents California residents and tourists with a unique opportunity to experience the geological, ecological, and historical richness of the state's landscape, from "San Francisco's Pacific shore to Nevada's desert sands." *Adventures* takes the reader on a series of tours along the well-traveled I-80 corridor, with chapters covering trip planning, exploration, "favorite diversions," and historical literature.

What distinguishes this book from many Bay Area road guides on bookstore shelves is the authors' evident care for the land and its people, their explanation of the many influences on a region's development, and their lively style. The chapter on San Francisco, for example, contains much eye-opening material presented in an entertaining manner. The book's introduction covers the geology and history of the area I-80 traverses.

There's one further attraction: *Adventures On & Off Interstate 80* lists disability-accessible sites and trails. Co-author Eleanor Huggins, a former editor of the Loma Prieta Chapter's newsletter, has an extensive background in environmental education. The writers have combined their efforts to produce a well-crafted guidebook to some underappreciated areas within easy driving distance of the Oakland Bay Bridge toll plaza.—*David Modjeska*

From Grassland to Glacier: The Natural History of Colorado, by Cornelia Fleischer Mutel and John C. Emerick. Johnson Books (1880 S. 57th Court, Boulder, CO 80301), 1984; $9.95, paper.

TWO WORKING biologists have produced a well-organized and highly readable natural history guide that offers the lay person a detailed summary of the major Colorado ecosystems. Each section is accented by photographs, illustrations, and lists of flora and fauna. A glossary of scientific terms follows the text.

Unusual for a book of this genre are the self-guided auto tours featured at the end. Between 30 and 130 miles in length, these tours offer the armchair naturalist an opportunity to view each of the ecosystems with a minimum of effort. Small enough to be carried in the field, the nontechnical *From Grassland to Glacier* would make a fine addition to the library of any amateur naturalist.—*Al Buchanan*

The Forest Service (second edition), by Michael Frome. Westview Press, 1984. $25, cloth.

THE FOREST SERVICE is one of the most enduring reminders of this country's progressive era: an agency devoted to public ownership and management of a vast amount of land in a nation otherwise committed to private enterprise. This revised editon of Michael Frome's 1971 history of the Forest Service emphasizes the transmogrification of the agency's public image from that of rangers protecting forests to, more recently, that of forest-killers interested only in corporate profits.

Less than a quarter of this detailed, balanced book is devoted to the agency's early history. The remainder examines each of the resource controversies and critical issues now facing the Forest Service. Wilderness, pesticides, wildlife, mining, oil and gas drilling, and sales below cost are among the many topics Frome discusses.

The book concludes with the suggestion that the agency's "bigness induces the blight of blandness." Frome clearly would like the Forest Service to return to its leadership role in the conservation movement, promoting recycling, preservation of natural ecosystems, and the protection of diminishing resources. He leaves it up to us—and the people who run the agency—to determine how that can happen.—*Randal O'Toole* □

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From Zero to Seventy-Five

Vigil at a Least Tern Nesting Ground

AILEEN KILGORE HENDERSON

There are more ways to birdwatch than looking through binoculars and flipping pages in an identification book. That's one of the first of many things our family learned when we got involved in a project to protect an endangered colony of California least terns in the San Diego area. Until then our conservation efforts had meant dealing with inanimate objects: recycling bottles, newspapers, and aluminum cans, using gray water, and composting.

The least tern project involved working with a living creature that was rapidly being exterminated by humans who covet its bayside nesting ground for hotel buildings, motorcycle racing, or just letting their dogs run loose. As a result of such activity, the area's 200 or so adult terns had been unable to raise a single chick to maturity the previous summer.

To prevent a repeat of this disaster, the San Diego chapter of the Cetacean Society organized a project to guard the terns' nesting site. Volunteers would watch the area for two-hour shifts from daylight to dark on weekends—the most perilous time—and

Dugald Stermer

make occasional checks many times a day during the rest of the week.

Giving up precious weekend time to such a project took some thought and discussion within our family. Wasn't it a losing cause? How could such a feeble volunteer effort help save this endangered species? Before the summer was over we realized that the privilege had been all ours: We had come to know what must surely be one of Earth's most beautiful and interesting creatures.

As soon as the birds began appearing from their winter quarters in Central America, we took up our guard duty. Equipped with binoculars, sun hats, and drinking water, we established ourselves on a road embankment that gave us an overview of the nesting site. Fully exposed to the sun all day, the 20 acres were tightly framed by freeways on all four sides. The pale waves of sand appeared colorless at first, but familiarity revealed polished yellow buttercup blossoms and russet-tinged ice plants—sparse growth living the most subdued existence possible in order to conserve moisture. The forked-tailed, streamlined, nine-inch-long terns seemed foreign to this color scheme with their dramatic black, white, and gray bodies underslung with tiny webbed feet.

Since there were no visible differences between the sexes, we could recognize male and female terns only by the roles they played. We were fascinated by their courtship activities. The male caught a small fish in the nearby bay and flew about with it in his beak. The female stretched her neck out as she walked along on the ground or flew with him in the air. During the entire ritual the male retained the fish in his beak. Mating was accomplished speedily; then the female accepted the fish. The male flew away, leaving her preening on the ground.

Within two to three weeks after mating, the usual two and occasionally three eggs appeared in random clusters over the open acreage, without a nest to pad or confine them. Ironically, tire tracks were a favorite place to deposit them! The flecked eggs were so like the background mixture of sand and shell that it was easy to understand how a motorcyclist could spin across the nesting ground dozens of times without realizing that countless eggs were being destroyed with each pass.

We had no power to require cyclists to stay out of the area, but they always left willingly after hearing our explanation. None of them had been aware of the birds, and all of them seemed willing to cooperate. Stray dogs were not so easily influenced, however. When we arrived one morning, the air was flashing with angry terns giving their querulous alarms—very disagreeable to hear—and their sharp cries.

Toward the center of the area we saw the target of all this rage and distress: a large black dog, digging busily in the sand.

Quickly, we called the dog. It stopped to look at us suspiciously. Thinking we could persuade it to come out, we approached slowly through the maze of swooping, strident terns. The dog withdrew under a bush. The birds then turned their full attention to us. Such threatening beaks, powered by anger! Such indignant cries jabbing at our eardrums! Their swift wings and fiercely spread tails rustled about our heads like starched taffeta. Our terrified impulse was to run—but we knew we could do as much damage as a motorcycle gang if we did.

Forcing ourselves to retreat slowly, considering every step with care, we finally reached the safety of the highway embankment. From there we could watch the dog and plan our strategy. Meanwhile, the birds settled down to rummage in the sand. The dog kept still under the bush.

We decided to let an expert solve our problem. My husband drove to the nearest phone and called the dogcatcher. No answer. With that possibility eliminated we discussed capturing the dog ourselves, but felt reluctant to stir up the birds again. All the while we watched the dog anxiously. It seemed to watch us just as anxiously. After about an hour's stalemate, as stealthily as a big black dog can do in the center of a 20-acre bird nest, the animal left the bush and headed south along the freeway. It disappeared from sight, still heading at a surreptitious canter toward Mexico.

Later in the summer, the chicks began hatching. They spent most of their time under the meager plants. Their brindle down blended with the surroundings, and again we could see that speeding motorcyclists might never suspect they were destroying numerous tiny lives.

One morning on our patrol we saw evidence of this destruction. A motorcycle tire had spun deeply into the loose sand, uprooting one of the spinachlike ice plants. We knelt to examine it more closely: crinkled leaves sparkling with "ice," stem beaded with clear blisters, and dehydrated roots. Then we noticed tiny feathers caught in the roots. Brushing the sand aside, we found others, and clinging to them a translucent bone hardly heavier than the feathers themselves. "The keelplate of a least tern chick," my husband said, shaking his head sadly. The sand told many other stories of danger—tracks of humans, dogs, cats, and dune buggies.

Sitting quietly at our lookout post (sometimes together, sometimes scattered for quicker action), we were astonished to see how many chicks moved about under the protective blossoms of the buttercups as the summer progressed. Parents worked ceaselessly to keep their young filled with tiny silver fishes. Even from the time they were fully fledged through the end of August when the colony left for Central America, the chicks were still largely dependent on their parents.

A member of the Cetacean Society estimated that about 75 young terns survived that summer. "There should have been more than twice that many," she added. But we felt heartened. From the reported zero population increase at the end of the previous summer, 75 was quite a leap upward.

Our family didn't actually see the terns leave, but on a September day when we visited the deserted nesting ground, we felt somewhat like parents who have done their best to equip their children to cope with the future, and have then proudly but sadly cut the apron strings. We each walked alone for a bit, then came back together. It seemed natural, as we stood there holding hands, to look up at the sky toward Central America. No words were needed: Just the thought that winging southward were 75 new least terns that we had a part in saving warmed our hearts as we turned to each other.

"Let's do it again next year!" our daughter said as we walked back to the car.

AILEEN KILGORE HENDERSON *has written for the* Christian Science Monitor, 50-Plus, *and the* Chicago Tribune.

MUIR HOMESTEAD FOR SALE

JOHN REINDL

IN 1849 YOUNG John Muir moved with his family from Dunbar, Scotland, to Marquette County, Wisc., where they settled at Fountain Lake (now Ennis Lake, about ten miles north of Portage) in the south-central part of the state. Part of that homestead is now for sale, and the John Muir Chapter of the Sierra Club is sponsoring a fundraiser to preserve it.

The project is special in several respects. Fountain Lake is where the Sierra Club's founder first lived in America. In his autobiography, *The Story of My Boyhood and Youth*, Muir wrote extensively of the land's beauty, diversity, and wildness, and he devoted more than half his book to a narration of life adjacent to the lake, including descriptions of the plants and animals.

The 27-acre site now up for sale includes land that Muir himself wanted to save. Lo-

cated on the north side of the lake, it covers about ten acres of high-quality wet mesic prairie and 15 acres of cropland. The southern border of the property comes to within about 50 feet of the lakeshore.

The John Muir Chapter has a unique opportunity to pay tribute to the memory of the Club's founder while participating in a public-service project with local and state government. If successful in raising the funds to buy this land, the chapter will deed it to Marquette County as part of the John Muir Memorial Park. The wet mesic prairie will be managed by the Bureau of Endangered Resources of the Wisconsin Department of Natural Resources as part of its Scientific Areas program.

The addition of this land will extend the boundaries of the park to adjacent roads, providing the lake and sensitive wetlands with a buffer to help preserve the habitat of native plants and animals, including that of a threatened species.

If the chapter does not succeed in buying the land, the owner will build several cottages to sell as recreational property with access to the lake and park.

The asking price is $32,000. But because the chapter has received a matching grant, it needs to raise just $16,000 to save the property. Contributors will thus be able to double the effectiveness of their donations. For example, a $25 donation will bring in a matching contribution of $25 and preserve more than 1,800 square feet, an area larger than the average home. Under an agreement with the landowner, the chapter must raise approximately $3,000 by July 1 and the remainder by the middle of 1986 to save the property.

As a sweetener, all contributions are tax-deductible when made payable to the Sierra Club Foundation–Muir Park Fund and sent to the John Muir Chapter office, 111 King Street, Room 29, Madison, WI 53703. Sierra Club chapters, groups, and RCCs with Foundation accounts may simply ask the Foundation to transfer funds from their account to the Muir Park Fund. For further information contact John Reindl at the John Muir Chapter office.

JOHN REINDL *is membership chair of the John Muir Chapter and chair of the chapter's Muir Park fundraiser.*

ANNUAL DINNER

More than 400 activists gathered for an evening of camaraderie at the Sierra Club Annual Dinner in San Francisco on May 4.

Arizona Governor Bruce Babbitt, the keynote speaker, called for a "new wave of national reform" to combat the Reagan ad-

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Bequests Need Planning Too

While a simple bequest can strengthen the Sierra Club in the never ending effort to protect our environment from invasion and degradation, careful planning can often make your bequest even more satisfying and effective. Here are some elements that should be considered when you plan a bequest.

☐ Who receives the bequest: The Sierra Club,The Sierra Club Legal Defense Fund, or The Sierra Club Foundation? Each plays a different role in protecting our environment.
☐ Is there an area of personal interest where you would like your bequest used? Local Chapter? Education? Wild rivers? Litigation? Other?
☐ Do you want to honor someone by creating a living memorial?
☐ Would you like first to provide income to a spouse or other person for life, or for a child for a specified number of years?
☐ Have you considered whether a life income trust would be financially more desirable?

You can have a confidential consultation at no cost with the Sierra Club Planned Giving Office. Please contact Carleton Whitehead, Director of Planned Giving, 530 Bush Street, San Francisco, CA 94108, (415) 398-8158.

PLANNED GIVING PROGRAMS
The Sierra Club
The Sierra Club Legal Defense Fund
The Sierra Club Foundation

ministration's opposition to conservation legislation. Multiple use is no longer viable for public lands in the West, Babbitt noted; we need a "public use" concept that would give the public priority over private companies interested in mining, grazing, logging, and water development.

"The hard reality is that BLM wilderness has no friends in the Reagan administration," Babbitt said. "We must recognize that the highest and best, most productive use of western public land will usually be for public purposes—watershed, wildlife, and recreation."

The Annual Dinner is also the occasion for presenting Sierra Club awards. Denis Hayes was this year's recipient of the John Muir Award, the Club's highest honor for leadership in national conservation causes. Hayes, one of the founders of Earth Day and Environmental Action, is currently head of the Solar Lobby. The William E. Colby Award for service to the Club itself was presented to former Director Marlene Fluharty.

The Edgar Wayburn Award for contributions by a government official went to Sen. Alan Cranston (D-Calif.); the William O. Douglas Award for legal achievement was given to Brian Boru O'Neill; and Tupper Ansel Blake received the Ansel Adams Award for Conservation Photography. Leslie Reid received the Walter A. Starr Award for continuing work by a former Club Director, and the Francis P. Farquhar Award for Mountaineering went to Richard Hechtel. The Susan B. Miller council awards were given to Richard Watkins of the South Carolina Chapter, Ann Pogue of the San Diego Chapter, and Tom Brown of the Nebraska Chapter. The Potomac Chapter was the recipient of the Denny & Ida Wilcher Award.

Edward C. Fritz and George Russell received Special Achievement awards for their contributions to the Sierra Club. Governor Harry Hughes of Maryland and Rep. Les AuCoin (D-Ore.) were honored with Distinguished Service awards for their environmental work. Finally, the Oliver Kehrlein Award went to Vivian and Otto Spielbacher, and the Raymond J. Sherwin Award was given to Celia de Blohm.

NOMINATING COMMITTEE

The Sierra Club Nominating Committee is now soliciting suggestions for candidates to serve on the Board of Directors from 1986 to 1989.

Candidates must be Sierra Club members, have knowledge of and experience in several aspects of Club activity, and have demonstrated exceptional commitment to the Club's objectives. They must also be willing to devote substantial time to active participation in the Board's many demanding functions.

Sierra Club members may send suggestions for candidates to committee chair Calvin French, 1690 N. 2nd Avenue, Upland, CA 91786, before September 1, 1985.

NEW OFFICERS

The Sierra Club Board of Directors welcomed its new members and chose officers for the coming year at its organizational meeting May 4 and 5. President Michele Perrault was elected to serve another term, as were Vice-President Robert Howard and Treasurer Philip Hocker. Larry Downing is the new Secretary and Richard Cellarius is the new Fifth Officer.

Elected to the Board in April and now serving three-year terms are incumbents Phillip Berry and Brock Evans. Joining the Board after a short absence are Joe Fontaine and Denny Shaffer. Susan Merrow is serving her first term on the Board.

A third of the Board's 15 seats are up for election each year. □

IN MEMORIAM

With great sadness *Sierra* reports that Robert A. Irwin, author of The Observer column for the past ten years, passed away on June 1, 1985, after a brief illness. Bob was a gentle, unassuming man devoted to the Sierra Club and its principles. As the Observer he tackled the formidable task of finding out what the Club's many chapters and groups were doing, and then communicating that information to the members. He attended countless meetings and was probably the only Club member who read all the chapter newsletters. Even on vacation Bob made a point of stopping into a chapter office to find out what was happening, or visiting an activist for a profile. Out of those extra efforts came stories about everything from fundraising and membership techniques to local activity on the threat of nuclear war. But no matter what his subject—and this was his greatest contribution to the magazine—his focus was always on the people, who, like him, make the Club special.

Bob is survived by his wife Ethel and daughters Barbara, Susan, and Nancy. Memorial contributions can be made through the Sierra Club Foundation.

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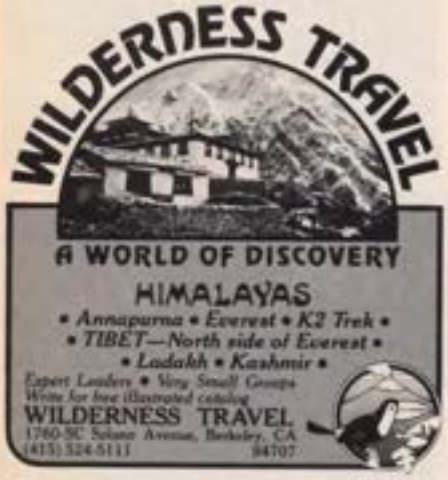

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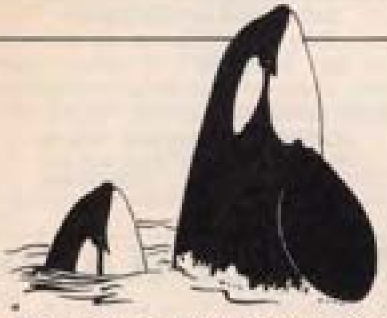

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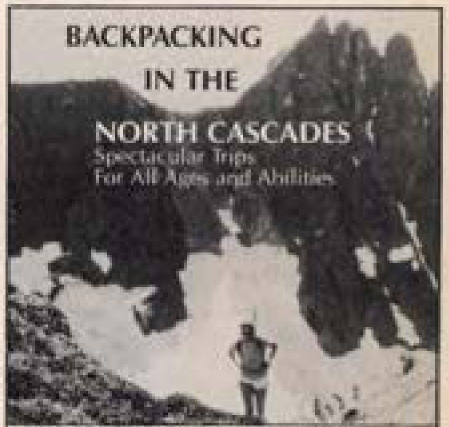

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PRODUCTS/SERVICES

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Q: I want to learn how to fish with a fly rod. Any suggestions on some good schools? (CARL BACON, SANTA FE, N.M.)

A: Fly fishing is truly an art form, involving much more than baiting a hook with a worm and lolling on a riverbank. It is the chess of fishing: complex, exacting, and intense. A recent surge in the sport's popularity has given birth to a plethora of quality schools to choose from.

A good place to begin your search is at a local equipment dealer, who will probably have a list of the better schools and may even sponsor fishing clinics. Many universities and colleges now offer courses in fly fishing. Or you may try perusing several magazines, such as *Fly Fisherman* (Box 8200, 2245 Kohn Rd., Harrisburg, PA 17105), that regularly mention and run advertisements from good fishing schools.

One final and very reliable source is equipment manufacturers. Many of them sponsor clinics in various locations around the country, and a few offer instruction on some of the blue-ribbon trout streams in North America. Several that deserve mention are Orvis (Manchester, VT 05254), Fenwick (14799 Chestnut St., Westminster, CA 92683), and Sage Schools (c/o Bill Marts, 13110 N.E. 177th Place, Suite 205, Woodinville, WA 98072).

Q: So many of the older, larger national parks are jammed with people in the summer. Can you provide a list of some parks where I can commune with nature without taking a number? (JIM ANDERSON, WASHINGTON, D.C.)

A: The National Park Service has embarked on a multimillion-dollar program to make some of America's least-known parks more attractive and accessible to vacationers. By adding and updating headquarters and information centers, roads, lodges, campsites, and other facilities, the Park Service hopes to relieve overcrowding at popular parks.

Among those being spruced up and highly recommended by NPS officials are Lake Clark in Alaska, roughly the size of Connecticut and offering the visitor a glimpse of active volcanoes, gorgeous lakes, and a diversity of wildlife; Grant-Kohrs Ranch in Montana, where you can visit a huge "spread" evoking memories of the heyday of the Wild West; Big Cypress National Preserve in Florida, a subtropical zone of marshes and forests bursting with flora and fauna; Washington's North Cascades, laced with glaciers and waterfalls; and Guadalupe Mountains, Texas, home of the El Capitan Reef, once part of an inland sea.

Other interesting but lesser-known parks are Haleakala, Hawaii; Isle Royale, Mich.; Craters of the Moon, Idaho; Voyageurs Park, Minn.; and Arches, Canyonlands, and Capitol Reef parks, Utah.

Q: I've been reading about all the chemicals in the meat and dairy products we consume, and I'm shocked. I thought I was successfully avoiding this problem by buying fresh, unprocessed food. Is there a group working on this issue? (BRENDAN LEE, PITTSBURG, CALIF.)

A: Since the early 1950s farmers have been feeding hormones, steroids, and antibiotics to chickens, pigs, lamb, and cattle, mainly to promote rapid growth. This widespread practice may be connected to problems with human health.

The first study to show a clear connection between human disease and the use of antibiotics in animal feed was completed last year. Sponsored by the Center for Disease Control (CDC), the study found that 18 people with salmonella infections had ingested bacteria resistant to antibiotics by eating beef from calves that had been fed chlortetracycline. As more strains of antiobiotic-resistant bacteria develop over time, so-called "wonder drugs" become less effective in fighting human diseases.

The Food and Drug Administration has yet to respond to the CDC study, although a number of consumer groups have petitioned the agency for a ban on the use of penicillin and tetracycline in animal feed. Confronted by what appears to be FDA foot-dragging, these groups are hoping to persuade Congress to institute the ban. According to the Natural Resources Defense Council, each year's delay in implementing the ban will cause between 100 and 300 deaths, while more than 250,000 people may suffer from intestinal infections caused by antibiotic-resistant bacteria.

Q: I used to be a regular participant on Sierra Club outings, but stopped going when I started to feel that group sizes were becoming too large. Will the numbers decrease in the future? (LYNNE PECK, PHOENIX, ARIZ.)

A: According to Jim Watters, Vice-Chair of the Club's National Outing Committee, group sizes have actually declined in recent years. "In the early 1970s, Outings came under considerable scrutiny and criticism from within the Club," he says. "Members concurred that any trip with more than 25 people was out of the question."

The Outing Department now tries to keep most trips in the range of 15 or fewer people. Many parks also enforce strict limits of their own. Yosemite National Park, for example, has a 25-person maximum, with an eight-or-fewer limit on backcountry trips, including leaders, cooks, and any support personnel.

"Trips of 50 or more in size are history," adds Watters. "Large groups earlier in the century didn't cause the environmental problems they would today, with the current amount of use. But the Club's outings have become about as small as they can be, given the expenses and insurance costs per trip."

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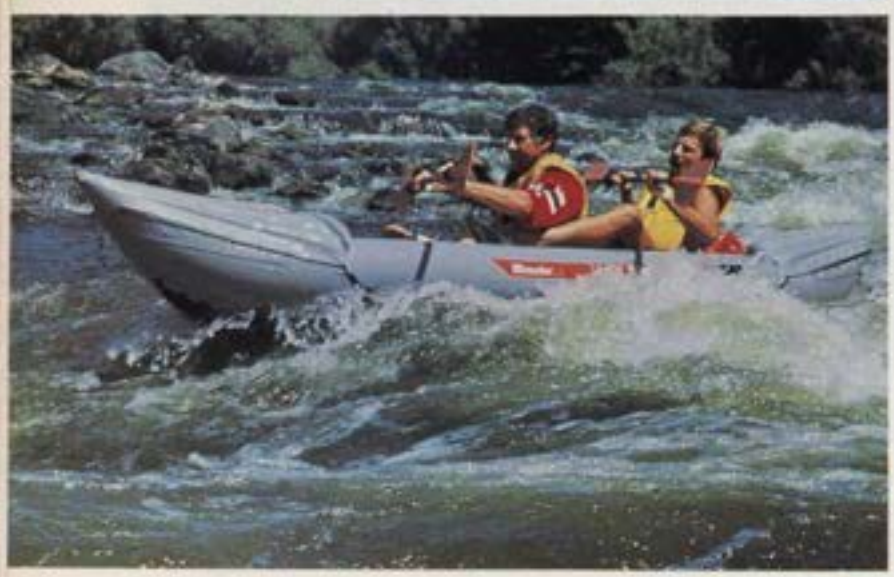

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