

SIERRA

THE SIERRA CLUB BULLETIN

JULY/AUGUST 1978
\$1.00



The Growth of Urban Gardens
The Yellowstone River Controversy
A Look at Swedish Energy

Alaska Legislation Passes House—
Now on to the Senate

Priority - Update on Alaska

DURING MY last journey to Washington, D.C. to testify on the Alaska National Interest Lands Conservation Act before the Senate Energy and Natural Resources Committee, I witnessed a remarkable phenomenon—the largest and most intensive effort ever made for the protection of the American land. People from the Alaska Coalition organizations, people from all over the United States, and— notably —people from Alaska had come to Washington, D.C., to join in the battle for Alaska's National Interest Lands. They learned all about H.R. 39 (Representative Morris Udall, D-Arizona) as it moved through the House of Representatives, and they passed on their information. Their efforts were nonstop; their dedication was unswerving; their expertise, effectiveness and enthusiasm were unmatched in my experience. These people were, of course, the heart of the larger national effort for Alaska: joining with the dozens in Washington, there were thousands throughout the 50 states who were intent on saving the last and greatest wilderness left us.

That was in late April, and the groundswell of support for H.R. 39 was only partly under way. During the next few weeks, it peaked, and on May 19, in truly historic action, the House voted 277 to 31 to pass H.R. 39, the Alaska National Interest Lands bill. (A subsequent motion to recommit the bill to committee was crushed almost as resoundingly by a 242 to 67 vote.) This "incredible victory," as Representative Udall labelled it, was a tribute to the vision and determination of the people who worked so hard to gain it. It was equally a tribute to the enlightened leadership of the House members who cast their votes for this milestone legislation.

The House passage of H.R. 39 is a giant step toward the goal of preserving and protecting Alaska's uncommitted public lands. A bigger step, however, lies just ahead of us in the Senate. H.R. 39 as passed still needs strengthening; we must look to the Senate to restore important areas and protective provisions that were lost in the House. The Senate Committee on Energy and Natural Resources has held hearings on several similar bills to protect Alaska's lands, and the committee is marking up a bill to go before the full Senate. The Committee's chair, Senator Henry Jackson (D-Washington), has promised prompt action on the bill. But Alaska's Senators Ted Stevens and Mike Gravel have said that they will filibuster any Alaska National Interest Lands bill that is reported to the Senate floor. Furthermore, Senate Majority Leader Robert Byrd (D-West Virginia) has stated that he will honor the Alaskan Senators' position and will refuse to allow a vote on this Alaskan legislation.

Such a hold up of urgent national legislation is an anachronistic political device that, fortunately, is resorted to infrequently. It is based on "senatorial courtesy" and on the notion that every state is sovereign and that its concerns should take precedence over national concerns. This notion, which is particularly difficult to justify where federal lands are concerned, has in the past cost the nation dearly. Had it, in fact, been adhered to more often, it could have cost the country

Yosemite National Park, had California's Senators opposed it; it could have cost the country many of our national forests, and so on.

In the instance of Alaska's National Interest Lands, the intransigent stand of Alaska's Senators ignores the fact that the House vote on H.R. 39—which reflects the national will of the people—was a towering 9-to-1 majority statement. It ignores the many Alaskans who want full protection for Alaska's uncommitted public lands, as demonstrated by the fact that the majority of the testimony before the House Alaska Lands Subcommittee by Alaskans in Anchorage, Fairbanks and Juneau (the state's three population centers) favored passage of H.R. 39. It ignores the fact that the state of Alaska has already been granted 104,000,000 acres of federal land for its economic base (plus 40,000,000 acres of tidelands) and that Alaska's native peoples have received another 44,000,000 acres from the public domain for their private property. It ignores the fact, too, that Alaska is not, after all, a realm unto itself, but a part of the United States.

Alaska's National Interest Lands constitute the most important conservation issue of our day. These lands are not only our country's greatest wilderness treasure and the rightful heritage of every American, but they are also the last habitat for fellow creatures whose fate depends upon our actions. These lands present the greatest challenge to our wisdom—as stewards of this part of the earth which we call our own. We will not have such a chance again.

Senator Byrd must be made aware of these facts. Alaskans must inform him—all Americans must inform him. We must also inform our other Senators that it is of the utmost importance to act on the Alaska National Interest Lands legislation (at this writing, bill numbers have not been decided upon) currently in the Senate. Alaska's magnificent federal lands can now be saved only by Senate action, and it is imperative that action be taken. Write your senators today (Washington, D.C., 20510). It would be a tragedy, indeed, if having come this far toward saving Alaska's National Interest Lands, the country should lose them by default. The time is now. □

—Edgar Wayburn

H.R. 39 As Passed By The House Of Representatives

National Conservation Systems	Acres Transferred From Unreserved Public Land in Alaska
National Parks	42.0 million
National Wildlife Refuges	55.0 million
National Wild & Scenic Rivers	1.5 million
National Forests	3.0 million
Total Acreage	101.5 million

Founded in 1892, the Sierra Club works in the United States and other countries to restore the quality of the natural environment and to maintain the integrity of ecosystems. Educating the public to understand and support these objectives is a basic part of the Club's program. All are invited to participate in its activities, which include programs to "... study, explore, and enjoy wildlands."

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As part of our continuing coverage of Alaska, we present on pages 6 and 7 a photo essay on Alaska wildlife. On the cover is a mew, or short-billed, gull, which breeds over much of Alaska. For current news of our Alaska campaign, see the inside front cover. Photograph by Stephen J. Krasemann.

Two Requests

I am writing a book about the problems of fitting new architecture with old. I have been looking for examples of buildings (or additions to buildings) that fit sympathetically with their surroundings. Would *Sierra's* readers send me examples of buildings that respect and enhance their visual surroundings?

Brent Brodin
25 Washington Square North
New York, NY 10011

The Ohio State University Sierra Club is trying to establish a paper-recycling center for the university, but we are having difficulties getting the project started. We are appealing to anyone who has had experience with similar projects at other universities to send us helpful ideas or advice.

Martin Neal
411 Grant Avenue
Martins Ferry, OH 43935

Residential Energy Use

I fear that Eric Hirst ("Residential Energy Use," February/March 1978) is the prisoner of his computer. While Dr. Hirst may be a leading authority on energy conservation, his article sounds as though we should all relax—a little demography and inflation will take care of all our residential energy problems. Nothing important ever comes that easily. The reduced rate of energy use he forecasts won't just happen; it will result only from tough political decisions.

The useful political ammunition supplied by Hirst's article is that industry forecasts of energy needs in 2000, based as they are on historical use and projecting hundreds of new power plants, are false. But the tone of the article is too blandly optimistic—don't worry, folks, we won't need to alter our precious American Dream lifestyle. I believe tough choices will have to be made regardless of what the computer says, and, if we make the right ones, our lifestyle will change—for the better.

William Bennett Turner
San Francisco, California

I have great respect for Eric Hirst's abilities, but his article written with Linda Pearlstein on "Residential Energy Use" (February/March 1978) has one glaring omission: energy requirements created by home size. American homes are extravagantly large by any standards but our own, and the median size has increased at least 50% in the last twenty years. To my mind it is incredible when someone blithely says, "Oh, our home isn't large at all. It's only



2000 square feet." That is twice the size of the average home in Britain.

The Sierra Club might officially ponder the fact that doubling the size of a home exactly doubles its future energy needs and nearly doubles its use of lumber, copper, sand, gravel, and all other components. And each of these things has to be chopped down or dug up and requires energy to do so.

Excessive size—of homes, automobiles and other possessions—is conservation's single greatest enemy.

Robert H. Paschall
Sacramento, California

The concept of "Residential Energy Use" permits examination of only the tip of the iceberg. While saving heat and developing more efficient appliances are important, much greater savings are possible if new housing units are constructed closer together than has been the practice in the past.

Apartments and townhouses use less heating fuel per family than single-family dwellings. By housing a larger portion of our population in multiple units and by building single-family homes on smaller lots, we can realize enormous savings of energy and materials, reduce air pollution, and conserve agricultural, scenic and recreational land—all in one nice, neat package.

Here is how it works. A denser community occupies less land. Everything is closer to people's homes—jobs, schools, shopping and recreation. Less driving is required. The snowplow, garbage truck, street sweeper, police cruiser, fire truck, delivery vans and all other vehicles that support our residential areas travel fewer miles per person served. A reduction in driving, of course, reduces air pollution. Furthermore, greater density promotes mass transit and even greater fuel savings.

The scale of the opportunity must not be minimized. By the year 2000, now only 22

years away, one third of the housing units in the country will have been built since 1978—now.

The local planning commission is the place to start. Let us tell planning commissions we want zoning changed to allow greater housing density. Let us urge that specific developments be more dense in order to limit the conversion of valuable open land resources to urban use and to limit the waste of energy and materials.

Clan Crawford, Jr.
Ann Arbor, Michigan

On the Inner City

From the man-made canyons of the inner city, salted and slushy and darkling by winter, hazed by smog and pummeled by the sun in summer, welcome to the Sierra Club!

Our lead-poisoned pulses picked up upon reading your editorial in the February/March issue concerning "The Inner-City Frontier."

While our spelunkers are merely subway riders, our mountain climbers merely the cleaners of windows on highrise buildings, and our explorers merely folk who have learned to get around in downtowns that have all come to look pretty much alike, we feel a kindred spirit with you. You'll feel right at home with our efforts to keep human-scale buildings and green open spaces downtown.

Your efforts to encourage "rehabilitation and restoration of public and private buildings and neighborhoods of historic significance" will help stem the drain on the nation's energy and natural resources. So, welcome aboard! Hurry on! We need you!

Douglas P. Wheeler
Executive Vice President
National Trust for Historic Preservation

The Quality of Wilderness

Galen Rowell's "On Safety and Wilderness" (November/December 1977) raises a seemingly heretical point in regard to wilderness. He says, "... it is better to sacrifice some of the appearance of wilderness in order to regain self-sufficiency." The age of the twentieth-century wilderness has overtaken us, a fact that is becoming dramatically apparent in Alaska. People are debating about large tracts of land to be set aside as wilderness, yet the quality of the wilderness experience is not being examined. I would like to expand upon Rowell's heresy (particularly as it applies to Alaska) by stating that al-

though a fly-in camping trip may be a fine, rewarding experience, it is not a wilderness experience. The wilderness feeling must be earned; the experience is not in the place but in the effort and self-sufficiency needed to get there. One reason the proposed Alaskan wilderness areas are so huge is that the airplane has shrunk perceptions of distance in Alaska. Personally, I would rather see one drainage totally off limits to airplanes than an entire Gates of the Arctic Park cast in the twentieth-century wilderness mold. It is possible that such an area might become a bit more crowded, but fifteen people who walk in 30 miles can feel more alone and more in tune with the earth than two people who fly in. The *spirit* of a wilderness is defiled more by an airplane than by a footpath.

Rob Olshansky
Anchorage, Alaska

Which Philosopher-King?

As a philosophy and psychology major at California State University at Dominguez Hills, I was happy to read Gus Speth (*Sierra*, February/March 1978) citing Plato's *Republic* in light of our current environmental policies. I found his article incisive and a good attempt to bring Plato into perspective on today's issues.

Speth forgot one thing, though. Plato was waiting for a philosopher-king to come along to make the wisest choices. Today we have an overabundance of self-appointed or elected philosopher-kings, all of whom think they have the right answers. The famine of Plato's time has become the sludge of the 1970s.

Perhaps if we can weed out the crabgrass and find that one man . . . any suggestions out there?

Bruce Tennant
Long Beach, California

The Colby Family

Sierra's history articles have been very interesting. The letter from Don H. Sherwood, of Denver, Colorado, (*Sierra*, January 1978), is especially interesting to me. He apparently knew William E. Colby; he should also have known his wife, Rachel.

All women's movements pale compared to what the late Mrs. Colby did: she went around the world in 1898 with her youngest sister; graduated from law school with Mr. Colby; taught his classes at the University of California, Berkeley, when he was away on cases—some of these cases were in Nevada or Washington, D.C., and even before the Supreme Court. Mrs. Colby passed the bar and raised two

sons. She knew about social groups and formed chapters of Gamma Phi Beta at three universities. She studied auto mechanics and could care for her car as well as anyone today. She also played golf and bridge and went on outings.

In Mr. Colby's spare time from the law, the Sierra Club and fatherhood, he built six or seven homes—at Inverness and in the Big Sur area. He did the work himself until he was in his late 70s, then had helpers build his last home. He remained alert through all of his 89 years.

When I last saw him in 1964 he was disturbed by some things the Sierra Club was doing. He felt this "save every tree, leaf and grain of sand" philosophy was impractical and unrealistic. His fears have proved somewhat well-founded. Let's hope as we review the history we can regain the original philosophies of the Club and its loyal founders.

Oh yes—Mr. and Mrs. Colby were my grandparents.

Anne Colby Black
Concord, California

Stereotypes

I thought the article "for younger readers" in the February/March *Sierra* entitled "At Home in the Sea," by Joseph A. Connor, was generally good, although somewhat condescending and overly romanticized.

What concerned me most about it, however, was the comparison of whales gathering together when threatened by whalers to ". . . a wagon train under attack by Indians." The author and *Sierra* should have better sense than to perpetuate the vicious stereotype of Native Americans as blood-thirsty savages. In fact, of course, it was the white settlers who more closely resembled the cruel and greedy whalers described in the article.

Bob Lindsay
Kaweah, California

Corrections

The list of Sierra Club chapters in the June *Sierra* included two incorrect addresses. The correct addresses are:

- Los Padres Chapter, P.O. Box 30222, Santa Barbara, CA 93105
- Redwood Chapter, P.O. Box 466, Santa Rosa, CA 95402.

In the May *Sierra* article, "Alaska: Where the Sun Stays Up All Summer," the date Alaska became a U.S. territory was mistakenly given as 1816. It was actually October 18, 1867, that ownership of Alaska was transferred from Russia to the United States.

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Six Alaskan Families

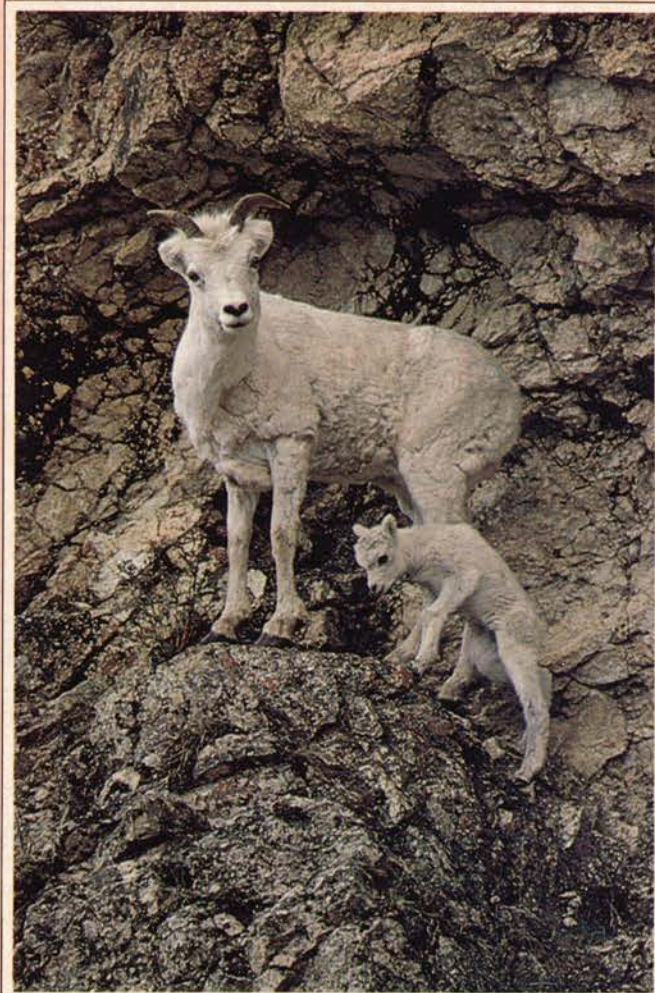
As the Alaska public lands legislation nears completion, it is important to remember what and who will be affected. Alaska has more of everything—wilderness, rivers, mountain ranges, petroleum, animals. The variety of wildlife is especially awesome. Here are a few young Alaskan families whose future may well be decided by our Senate.



Dr. E.R. Degginger, Bruce Coleman, Inc.

Above: Alaska moose are the largest deer in the world; this cow probably weighs 800–1200 pounds. Moose cows with new calves seek meadows like this one at Mount McKinley, where food is plentiful and escape routes easy to find. Moose calves also grow remarkably quickly—from 25–35 pounds at birth (most are born between May 24 and June 6) to 300–400 pounds only four months later.

Right: Alaska brown bears such as this sow and her cubs are the largest terrestrial carnivores in the world. Bigger than the grizzlies of Alaska's interior, though taxonomically the same, brown bears live on the coast and nearby islands, where the varied diet and abundant salmon enable them to grow as large as 1300 pounds.



Stephen J. Krusemann

Dall lambs grow quickly. Weighing only 5–6 pounds at birth in late May or early June, they grow to 60–70 pounds by the time winter comes. Their first winter is the most dangerous; only half the lambs survive. The others are usually victims of cold weather, not predators. Dall sheep are the only white wild sheep in the world and live only in North America.



Jeff Foot, Bruce Coleman, Inc.

A pair of whistling swans and their goslings stay in the open, where the parents can watch for predators. The goslings, of course, cannot fly yet, so the adults must fight off predators with powerful blows of their wings. Swans stay with the same mate for life. They winter in the lower 48 and spend their summers in northern Canada and western Alaska.



Stephen J. Krausemann



Jeff Foot, Bruce Coleman, Inc.

A bald eagle adds material to the nest, as both parents do year after year, until the nests become very large—as much as 20 feet deep and 9 feet across. The bald eagle lays two white eggs; the young, which are tended by both parents, have black plumage for four years before developing the characteristic markings of the species.



An Alaska red fox nurses her cubs on milk three times richer in butterfat than the milk of dairy cows. Red foxes that live in northern habitats (like the one pictured here) and at high elevations tend to have darker coats than their southern counterparts.

W.E. Ruth

How Sweden Saves So Much Energy

JAMES KEOUGH

EVER SINCE the 1973 oil embargo, Americans have been concerned about energy. But our response has been ambiguous. On the one hand, everyone agrees that we must conserve energy, that a barrel saved is much cheaper than a barrel produced. On the other hand, energy pundits—ranging from economists to oil company publicity experts—warn that declining supplies will mean a grimmer quality of life. If we do not develop ever-increasing supplies of certain kinds of energy, we will freeze in the dark. Must we sacrifice our current standard of living for energy conservation? A close look at the way Sweden deals with its own energy crisis indicates that our darkest fears are groundless.

Sweden enjoys a high standard of living—basically equal to that of the United States. True, our nation manufactures more consumer goods per capita, but Sweden produces more services—teachers, hospital beds, magazines and books, etc.—and more raw materials for export. Swedish households, on the average, have the same general goods—automobiles, refrigerators, televisions and the like—as their American counterparts. Sweden, however, uses only 60% as much energy per capita as the U.S. Not surprisingly, Swedish energy policies and their implementation suggest ways in which Americans could reduce their energy consumption and still maintain a healthy economy.

The export of goods accounts for 25% of Sweden's economy. Coupled with the high cost of energy, the need to keep total costs down has historically forced Sweden's industry to be extremely conscious of its energy consumption, even though the export of raw materials drives industrial energy costs down considerably. The 1973 oil embargo accentuated industry's need to be energy-efficient. Since the embargo, most plants have established committees to monitor energy use and to suggest means of conservation. The government, meanwhile, has subsidized industry attempts to develop and to implement energy-efficient processes. So far, \$50 million has been allocated for projects expected to save 200,000 tons of oil a year.



Renewable sources of energy, such as this wind-energy project, may eventually make Sweden nearly self-sufficient in energy.

W. Linder

Swedish industry is also exploring ways of using energy more efficiently by employing waste heat, either somewhere else in the industrial process to generate power, or as a source of home heating, delivered through a district heating system. Despite the need to save energy, however, industry must turn a profit to survive. Hence only energy-saving devices that are cost-efficient can be used. Even with this understandable restriction, Swedish industry cut its pre-embargo consumption by approximately 10%. As memories of the embargo dim, however, industry's energy use has slowly begun to increase. With the development of more energy-saving processes that are also economically feasible, the rate of consumption should once again decline.

Sweden uses two-thirds less energy for transportation than the U.S. Perhaps the most important factors in this are the high cost of fuel and automobile taxes. In 1971, the Swedish government placed a 50-cent-a-gallon tax on gasoline. Together with excise taxes and yearly fees in proportion to the size of the car, the gasoline tax is an incentive for Swedes to buy smaller, more efficient cars. Taxes on new cars also encourage owners to keep their older cars properly maintained.

While the automobile has steadily drawn Swedes away from public transportation (82% of all passenger miles are traveled by car—92% in the U.S.), they still rely more on other forms of transportation—mass transit, inter-city trains and buses, motor bikes and bicycles—than do we. The government encourages the use of mass transit through various subsidies and incentives. For instance, a monthly pass for unlimited rail and bus travel costs about \$16 (\$8 for senior citizens). Also, during the less crowded daytime hours, a round-trip ticket costs the same as a single fare. Finally, mass-transit lines radiate as far as 40 kilometers from the major city centers; this has led to housing development along route lines, in contrast to our own suburban sprawl.

Because Swedish winters are much longer and colder than those in the U.S., home and factory heating accounts for half of Sweden's energy consumption. Yet the average Swedish home uses less fuel for heating than its Northern California counterpart, despite the tremendous difference in climate. In 1977, building codes aimed at cutting heating costs even further went into effect for all new construction. Among other measures, these codes specify maximum heat-transfer values for walls and maximum allowable window area; the airtightness of the building; efficient heat-regulation systems (opening and closing windows is the prevailing means now); heat-recovery systems in multifamily dwellings with more than two stories; and preestablished maintenance plans.

These codes apply only to new construction. The Swedish government plans a combination of loans and mandatory restrictions to improve conservation in existing buildings. Surprisingly, government surveys indicate that expensive measures such as wall and roof insulation and triple-glass windows do not produce as dramatic energy savings as better-regulated heating systems, more efficiently adjusted boilers and lower room temperatures.

District heating is perhaps the most far-reaching means the Swedes have devised to conserve energy in industrial and home

heating. Briefly, district heating systems are composed of a central boiler plant that pumps hot water (248°F) through a closed network of underground pipes. The pipes run in a grid throughout the community; the size of the grid depends on the size of the district heating plants. Numerous decentralized plants can be hooked together as a community develops—the idea is to start small and work up.

The district system's hot water is tapped as a heat source by individual heating systems that cost approximately \$2.50 to \$7.50 per square meter, installed. The water is then returned to the central plant at approximately 176°F. This type of heating is more economical than conventional systems for apartments and single-family houses in cities because the central plant's one large boiler can operate far more efficiently than many small boilers; the central plant uses cheaper grades of fuel—and less of it. The system achieves maximum efficiency when it generates electricity as well as hot water for heat. It can also operate on waste heat from industry, and it helps improve local air quality: expensive filters become more economical, as do higher smokestacks.

One drawback to the district heating systems in Sweden is that heat is metered for entire buildings rather than by individual apartments. A building's heating costs are then divided equally among its tenants; frequently, the cost is simply "buried" in the rent. As a result, Swedish apartments use more heat than necessary (although comparatively less than those in the U.S.), and there is little incentive for renters to conserve heating energy. Currently about 20% of Sweden's homes are heated by the district system, and the number rises about 12% each year. While the government encourages the development of this system through rebates and compensation programs for conversion (and restrictions on direct electric space-heating), most systems are municipally owned and have developed in an essentially free market.

The development of similar heating systems in the U.S. has been discouraged by a number of factors: the existence of protective pricing for some domestic fuels, the abundance of cheap fuels (primarily natural gas), the lack of a government or citizen mandate for the promotion of district heating and, historically, the choice of steam rather than hot water as a transmission medium. However, the idea has begun to receive serious consideration in this country. A Swedish firm is currently conducting feasibility studies for a district heating system in Minneapolis, and in a recent pilot study in Sherbourne County, Min-

nesota, waste heat from a coal-burning electric power plant has been used to heat greenhouses that, so far, have produced 130,000 long-stemmed roses, 25,000 pounds of tomatoes, and 5000 green peppers. The plant generates enough waste heat to warm 1000 acres, certainly a thought-provoking figure after a devastating winter.

Since Sweden's fossil-fuel reserves are negligible, the 1973 oil embargo underscored the country's dependence on imported energy sources dramatically. Given the country's limited resources, however, this dependence cannot easily be eliminated, especially with the constraints placed on the development of hydroelectric and nuclear energy sources. According to Swedish energy experts, hydroelectric generation could be increased by 50%, but in the 1950s environmental groups, primarily the Swedish Nature Protection Association, gained parliamentary support to curtail further hydroelectric development in order to preserve what remained of Sweden's wild rivers. The present government reaffirms this policy, asking only that the current hydroelectric system be made more efficient. At the time of this ban, engineers and environmentalists alike agreed that nuclear fission would be the energy source of the future.

During the early 1970s, however, a substantial debate on nuclear energy raised serious questions about its safety. This debate culminated in nationwide participation in the formulation of an energy policy

that was accepted by the Swedish Parliament in May 1975. In September 1976, a three-party coalition gained control of the government after 44 years of Social Democrat rule. The Center Party, the largest of the three, is clearly antinuclear; the Conservatives and the Liberals, the other two members of the coalition, hold to the same cautious pronuclear position as the ousted Social Democrats. In March 1977, this new government passed a law similar to the California Fuel Cycle laws of May 1976.

The new law stipulates that before an operating license is issued for a new nuclear facility, the owner must present plans for the safe handling and disposal of high-level radioactive waste and spent fuel.

In 1975, Sweden had planned thirteen nuclear plants. The five already in operation are not affected by the new law. A sixth, which was just starting up at the time, was granted a conditional one-year operating permit. During that year plant management was to submit waste- and fuel-management plans for government approval. Another four plants in various stages of construction have not been adversely affected, although intense research and development programs have been established in an effort to meet government operating standards. Construction of two other plants has been slowed somewhat, and the thirteenth plant has not yet been ordered.

Except for its position on nuclear energy, the new Swedish government main-

Energy in Sweden

Sweden currently meets 70% of its energy needs with imported oil, at an annual cost of more than \$3 billion. But it need not continue to do so, according to *Sol Sverige (Solar Sweden)*, a study prepared by physicist Thomas Johansson and energy expert Peter Steen for the Swedish Secretariat for Future Studies. Sweden could be self-sufficient in energy, the report claims, using only renewable resources by the year 2015. Although Sweden is a comparatively cold country, it receives far more solar energy than most people believe—about 40% as much as North Africa. If Sweden were to rely on solar power, it need not become a low-energy society. *Solar Sweden* assumes a doubling of the production of goods and services by 2015, with the population remaining at about 8 million. Industrial energy consumption would be cut by

20%, however, as a result of energy conservation measures.

Most of the energy would come from a variety of solar sources, notably biomass energy—the conversion of organic materials into fuels. Biomass also solves the problem of storing solar energy from summer to winter. Solar cells, hydropower, windpower and solar heating would also be important energy sources. Transportation fuels would be supplied by gases derived from biomass or by methanol, also manufactured from biomass.

The report is summarized in *Ambio* (volume 7, page 70), the English-language magazine published by the Royal Swedish Academy (address: Dept. 1978-2, Journal Division, Universitetsforlaget, PO Box 7508, Skillebekk, Oslo 2, Norway).

How Sweden Plans to Dispose of Nuclear Waste

ELLEN WINCHESTER

tains the same policy toward energy consumption as its predecessor. Since Sweden cannot yet rely solely on its own resources for energy, encouraging conservation is the main element of government policy. Before the oil embargo, the overall demand for energy increased 4.5% a year, while the demand for electricity increased 7.5%. In the period from 1973 to 1985, the government is seeking to stabilize this overall increase in demand at 2% per year, with a 6% increase in demand for electricity. The long-term goal calls for no yearly increase in demand by 1990, but even the government admits this would entail a considerable reorientation of both the economy and the lifestyle of the nation.

Early in 1977, the new Swedish government established an Energy Commission to advise it on the formation of a long-range energy policy. A major policy statement must be prepared by the summer of 1978. In the meantime, the government continues to support extensive research and development in organic fuels (peat, oil shale, coal, biosystems), hydroelectric power and renewable sources of energy such as solar, wind, thermal and tidal energy. Two companies, each half-owned by the government, are prospecting for offshore oil in the Baltic Sea and in areas as far afield as Egypt. Some oil has been found in the Baltic, but not in significant amounts.

With the restrictions placed on the development of nuclear energy, Sweden's future energy sources remain unclear. As late as 1977, Swedish energy experts agreed that under present economic and political conditions, renewable sources could not possibly replace oil when the world's reserves of that fuel are exhausted. But a new study, *Solar Sweden*, claims that oil can be replaced by renewable resources and presents preliminary plans for doing so. It has received considerable attention in the Swedish press.

Important environmental criteria—clean air and water and wilderness preservation—have defined Sweden's use of nuclear and hydroelectric power. But the ultimate environmental factor in Sweden's impressively low energy use has been necessity. With no cheap energy sources to draw on, Sweden simply has no alternative to energy conservation. To be sure, the Swedish government regulates the nation's energy consumption through taxes and mandatory restrictions. But in the final analysis, the Swedish people realize it is in their best interest to use energy wisely and efficiently. In this sense, conservation is part of the Swedish frame of mind. □

SWEDEN IS THE first and, as yet, the only country that has legislated a moratorium on nuclear power development until a safe, permanent nuclear waste disposal system is available. It is also the only country that has a firm industry proposal for the permanent storage of reprocessed nuclear wastes. The proposal is currently being reviewed by the "scientific mediation" technique developed by two American scientists, Nancy Abrams and Stephen Berry. This mediation technique was published in the *Bulletin of the Atomic Scientists* in April 1977 and is now employed for the first time.

The waste disposal plan is called the KBS Report (for nuclear fuel safety in the final stage of the fuel cycle); it was submitted to the Swedish Energy Commission in December 1977. The \$10-million report was prepared by representatives of public and private electric power and nuclear industry organizations. Whether Sweden, with one of the world's largest commitments to nuclear power relative to total energy demand, accepts or rejects the plan, the Swedish decision will set an important international precedent.

Sweden does not have a national energy policy; nor does it employ the kind of hearing procedures common in the U.S. to examine state and federal actions with potential environmental impact. Instead, Sweden uses extensive review procedures, and the Berry-Abrams mediation technique fits easily into Swedish tradition. The KBS Report is now being evaluated by two nuclear chemists, Dr. John W. Winchester of Florida State University, who is admittedly skeptical about the plan, and Jan Rydberg of the University of Gothenburg, who supports it. They have coauthored a soon-to-be-released paper describing their findings. Where they do not agree, the mediation process provides for statements of dissent. Even if the dissent is total, the scheme will have succeeded because these serious issues will have received public scrutiny. The opinions of the two scientists and the KBS plan itself will then be extensively reviewed before the Swedish Energy Commission makes its recommendation to the Energy Minister, who will make the final decision.

If the plan survives the review process, it could revitalize the languishing nuclear industry. The U.S. Department of Energy is now planning to spend \$116.1 million on commercial nuclear disposal research in 1978, a jump from \$9.4 million in 1975 and \$9.5 million in 1976. The DOE is taking a vigorous interest in the KBS plan.

Although the KBS plan is designed to handle waste from only thirteen Swedish reactors operating for the next 30 years, its approval could lead to the expansion of the Swedish nuclear industry and the construction of similar repositories in other countries.

The KBS plan proposes storing spent fuel for ten years in a central storage facility, then shipping it to France for reprocessing and for removal of 99.5% of its plutonium. The French will vitrify the resulting high-level wastes that contain fission products and transuranics (such as Americium, curium and the remaining 0.5% of the plutonium). The vitrified wastes will then be placed in stainless steel containers each 0.4 meter in diameter and 1.5 meters high. Each container will store the waste from one ton of uranium. The containers will be shipped back to Sweden for 30 years of retrievable storage in an underground repository. Then each steel container will be clad in a thick layer of lead, placed in a titanium canister and fitted into holes bored in the floors of tunnels excavated from solid granite at a depth of 500 meters. Wet clay will be packed around each canister to act as an additional barrier to the escape of radioactivity, and the repository will be filled and sealed.

The plan's intent is to contain the wastes for the thousand years that the fission products are highly radioactive. After this period, the canisters can be expected to corrode and the glass to dissolve. By then, the principal emitters of high-level radiation will be the transuranics, and their radioactivity will be contained for several hundred thousand years by the geological barriers of clay and granite. In other words, the plan's engineers do not promise absolute containment of the waste through the long period of its radiation "life." They plan on a controlled leak that will let wastes ultimately migrate to the biosphere.

But the engineers hope that by the time the wastes enter aquifers, their radioactivity will be so weak that no contamination would exceed today's international drinking-water standards.

The major assumptions of the planners are now being examined by the reviewers. Swedish law requires that waste storage be permanent and safe, but the intermediate retrievable phase of this plan involves a total of 70 years before all waste from the thirteen reactors is put into final storage—with a total of 60 years between first-in and last-out for the vitrified wastes. During this period all of the hazards associated with accessible waste storage, including cooling requirements to keep the stainless steel containers from corroding, and providing a fault-free supply of power for the stored waste, will be the responsibility of the repository guardians, in peace or war, through the vicissitudes of changing government policy.

There are unanswered questions about what will happen to the titanium canisters after they are tamped into the granite. All rock appears to contain small amounts of water that percolate through tiny fissures. Under certain circumstances, the water tends to move toward heat sources. Heat plus water causes corrosion. Will the vitrified wastes crumble from internal heat and radiation stress before the 1000 years have passed?

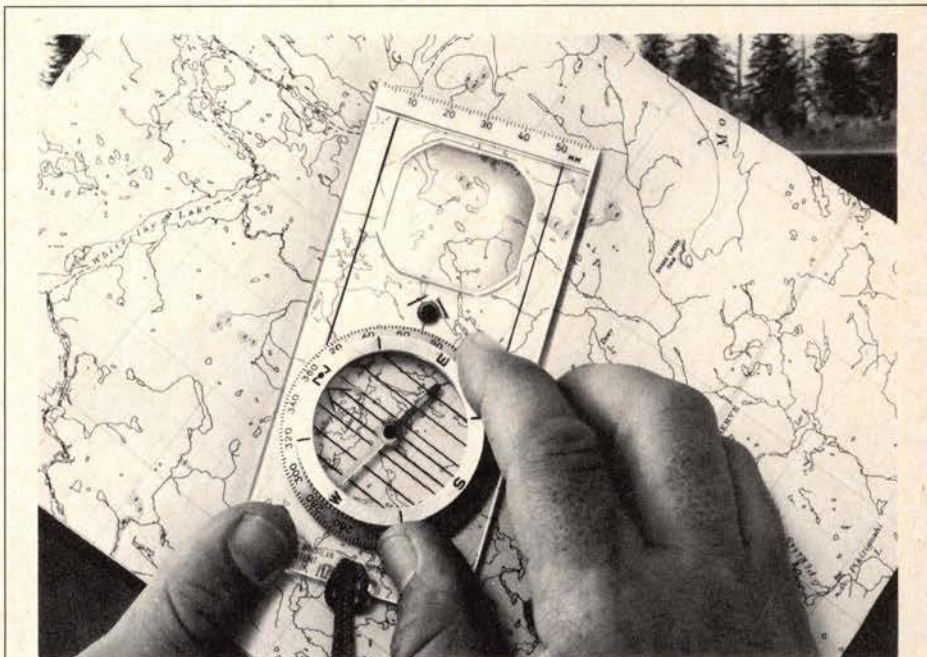
If the engineered containment proposed by the KBS plan is breached for any reason, we do not know whether the transuranics can be sufficiently slowed by the clay and granite to keep them out of harm's way until they lose their radioactivity through natural decay. Much of the chemistry of plutonium and other transuranics under varying geologic conditions has not been studied. The KBS planners believe ion exchange with the rock surrounding the radioactive materials will prevent their transport by groundwater. As of this writing, no one has disproved the possibility that fissile materials in the anticipated 9000 canisters could migrate to form a critical mass. A chain reaction could suddenly and drastically increase the radioactivity of the waste. (Under certain conditions, less than one kilogram of plutonium—the amount contained in one or two canisters—would be sufficient for a critical mass.)

The KBS plan averages out the ultimate release of radiation over the aquifers, for example, of the entire Baltic region. This supposition does not anticipate the possibility of a local concentration caused by a hidden fault or other unexpected breach of containment. Furthermore, the amount of

radiation currently considered safe for human and other life may someday be found to be much too high, thus making the plan's "safe" level a dangerously academic choice. Two years ago the U.S. National Council on Radiation Protection and Measurements and the International Commission on Radiological Protection decided that the standards for permissible whole-body exposure to radiation were too high, and they were reduced from 0.5 rems per year to 0.175 rems—close to the 0.1 rems of normal background radiation received by all living things. In fact, permissible whole-body exposure levels for radi-

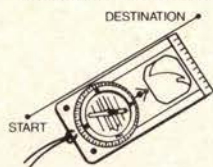
ation workers have been reduced 600-fold since 1925.

Whether the reviews of the KBS Report will extend the Swedish nuclear licensing moratorium depends as much on the political stability of the coalition backing the Center Party now in power as it does on the nature of the facts brought forth in the review process. The Social Democratic Party, formerly in the majority for almost a half century, waits in the wings. Its members are strongly critical of the moratorium. As happens elsewhere, the interpretation of scientific facts depends upon political realities. □



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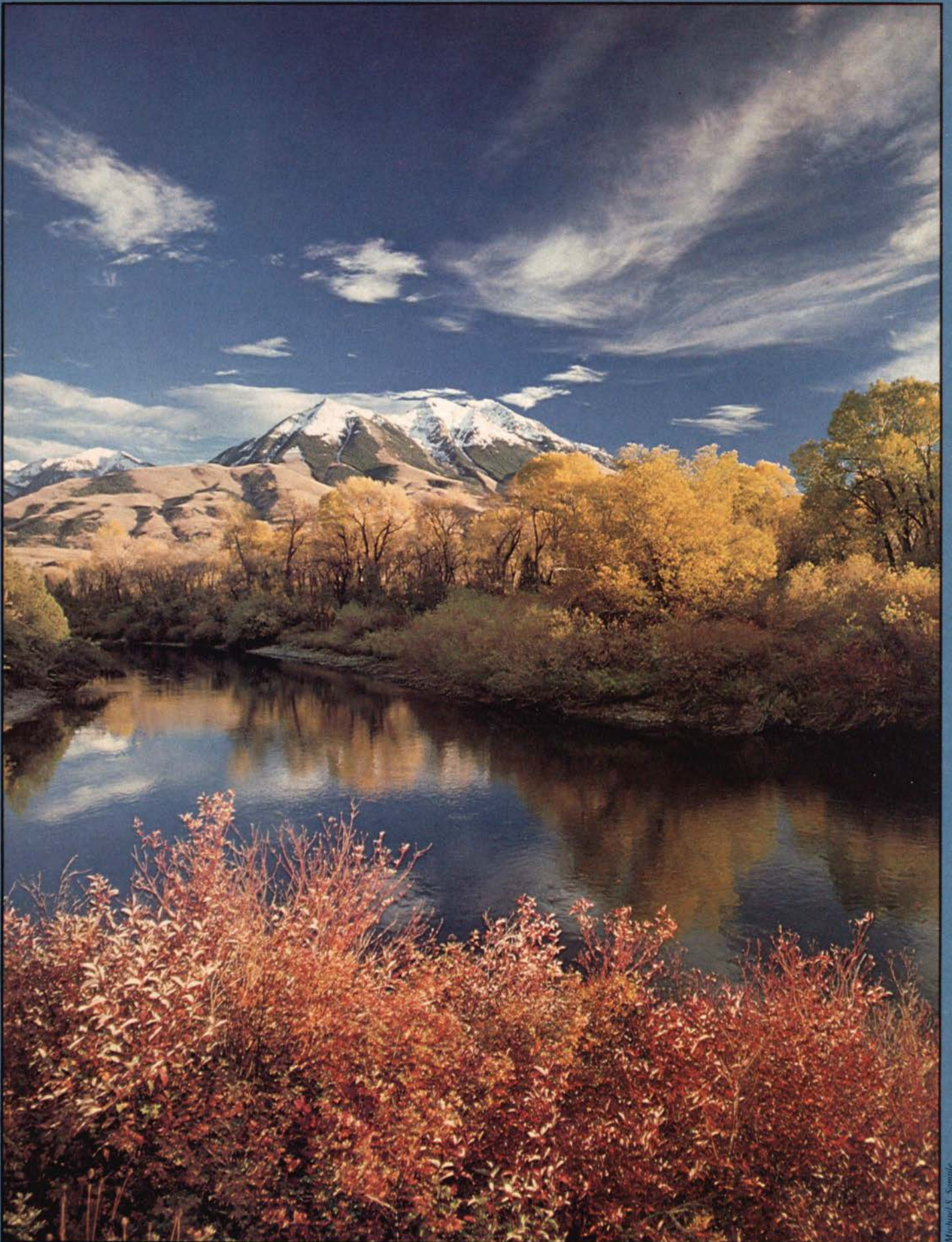
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Montana's Yellowstone River

Who Gets the Water?

HANK FISCHER

As Montana officials prepare to "divvy up" the water of the Yellowstone River, the specter of Major John Wesley Powell looms large over the Big Sky landscape. It was 100 years ago this April that Major Powell, the steadfast one-armed soldier who explored the Colorado River, finished a book that set the ground rules for the development of the West.

Called "the most prophetic book ever written about America" by the eminent critic and western historian Bernard DeVoto, Powell's *Report on the Arid Region of the United States* hammered home a singular thesis: water is the real wealth of this dry country, and the person who controls the water also controls the destiny of the land.

Right now the destiny of nearly one third of Montana and much of northern Wyoming is in question as agricultural, industrial, municipal and environmental interests compete for the water of the Yellowstone River and its tributaries. The outcome will determine not only the economic future of the area (agriculture vs. energy development), but also the fate of much of the region's fish and wildlife.

Also hanging in the balance is the question of whether the Yellowstone River will remain in its natural, undammed state. There are proposals to drain it dry or to turn it into a series of dam impoundments. This river, made famous by Lewis and Clark, now flows free and clean for its full 670 miles. By default, it has become the nation's longest free-flowing river outside Alaska.

Under Montana state law, all of the remaining water in the Yellowstone River (about 20% of the average annual flow is used by agriculture) will be allocated in 1978. The problem? Unless dams are constructed, the Yellowstone doesn't have enough water year-round to meet all the projected demands; this is very dry country, where water levels fluctuate a great deal from season to season and from year to year.

Montana's Department of Fish and Game (DFG) has asked for virtually all the water in the Yellowstone that hasn't already been allocated. The agency wants the water left in the stream to protect not only fish and wildlife, but also recreation and water quality. The DFG claims that grave changes in the river ecosystem will take place if further depletion is allowed. "These deci-

sions about to be made will have an impact second only to the basic geologic events that actually shaped this land," said one DFG spokesman.

It's difficult to understand the immensity and importance of the DFG water request without knowing something about the river itself. The Yellowstone originates high in the mountains of Wyoming and Montana and flows for about 100 miles through Yellowstone National Park, forming such landmarks as Yellowstone Lake and the Grand Canyon of the Yellowstone.

Montana's claims on the Yellowstone's water begin where the river enters the Treasure State, near the town of Gardiner. Here starts the 103-mile "mountain" section of the river—a blue-ribbon trout stream. The fishery ranks among the best in the country; adult trout concentrations as high as 500 fish per 1000 feet of stream can be found as the river is characterized by cold, clear water and cobbled bottoms. It's shaded by the sawtoothed Absaroka Mountains to the east and the Gallatin Range to the west, which residents claim casts shadows that are as big as many eastern states. Canada geese nest on the river bottomlands, golden and bald eagles patrol the skies, and deer are bountiful in the willow thickets and aspen stands.

This section of the river flows due north from the park until it reaches the town of Livingston, where it turns 90 degrees to the east at the point Lewis and Clark called "the Great Bend." Livingston lies near the proposed site of the hotly debated Allenspur Dam, which would flood Paradise Valley to form a reservoir some 31 miles long. Advocates of the dam say it would supply downstream agricultural and industrial users with steady flows of water. The proposal has been soundly rejected by Montana citizens (the legislature even passed a resolution opposing it) on several occasions, and it is now on the Bureau of Reclamation's back burners. But it still looms as a major threat to the upper river.

Between Big Timber and the river's confluence with the Bighorn River (below Billings) runs the 160-mile "transition" section of the Yellowstone. The river changes from a mountain stream to a prairie river, and the water gets warmer. The river valley opens up as yellowish bluffs (the river's namesakes) and rocky outcroppings flank the stream. On one such outcropping, one can find "William Clark, 1806" scrawled on a rock. Clark named the formation Pompey's Pillar, in honor of the infant son of the party's guide, Sacajawea.

Much of this section of the river runs in a braided channel, as free-flowing rivers typically do. Peak flows in the spring create islands, bars, backwaters and the type of riparian diversity that makes ideal wildlife habitat. Indeed, this is excellent beaver country, as the stories of the early fur trappers attest. Other fur bearers such as mink, otter and muskrat also lurk in the

The "mountain" section of the Yellowstone River; in the background is Emigrant Peak, Montana.

cottonwood-willow bottoms that border the river. Geese and ducks raise their young on the islands, and great blue heron rookeries can be found along the isolated portions of the river. Whistling swans and sandhill cranes also use the river heavily during migration times.

The "prairie" section of the river flows for about 300 miles below the mouth of the Bighorn River before reaching North Dakota and the Missouri. The Yellowstone conflict is most apparent on this lower section of the river. Visible along the banks of the Yellowstone—as well as along tributaries like the Tongue and Powder rivers—are thick, black-banded layers of coal.

Lewis and Clark observed these "straters of coal," as did an 1876 journalist by the name of Finerty. He remarked, "Some-day, I think, when the Sioux are all in the happy hunting grounds, this valley will rival the Lehigh of Pennsylvania."

As the river carves through the impressive breaks and intricate badlands of its lower reaches, the dryness of the surrounding lands is inescapably apparent. For most of the lower river, the average precipitation is only six to ten inches per year.

Despite the aridity of the lower Yellowstone country, it probably contains a greater diversity and abundance of wildlife than any other section of the river. The river itself supports 45 species of fish, including two ancient rarities (the paddlefish and the shovel-nosed sturgeon) and a freshwater cod (the burbot). The arid lower river also sustains some unexpected avian species, including white pelicans, eared grebes and double-crested cormorants. Bighorn sheep and pronghorn antelope also range nearby.

Except for the absence of wolves, grizzlies and buffalo, much of the Yellowstone is essentially the same as when Lewis and Clark and the Corps of Discovery explored it. Modern-day adventurers can easily paddle the river (with the possible exception of a short section of whitewater in the upper river) for its entire 550-mile length in Montana, a trip that can't be matched anywhere else in the country.

To understand why the Yellowstone has escaped the fate of America's other big rivers, one must understand a little bit about Montana. Though Montana is the fourth-largest state in the Union, it has a mere 758,000 inhabitants, only a few more than Indianapolis, Indiana. People know their neighbors. The tallest building rises only fourteen stories, and the average annual income for Montanans is only about \$5700. Agriculture is still the major industry. Cultural events range from big-city symphonies to community river float trips to cow chip throwing contests. Finally, Montana can claim Glacier National Park, shares Yellowstone National Park with Wyoming, has ten designated wilderness areas and boasts thousands of miles of high-quality trout streams.

In short, most people live in Montana because of the unique natural and social environments. Further, they seem willing to accept a standard of living somewhat lower than other parts of the country in exchange for clean, wide-open spaces.

While ranchers and farmers—as well as fish and wildlife—have been the traditional users of the Yellowstone, the big river's day of reckoning has now arrived. Others want the water.

Changes began in the late 1960s, when stripmining began to boom in eastern Montana. (The Yellowstone River flows through an area estimated by geologists to contain more than a trillion tons of coal.) Along with the stripmining came some mind-boggling energy development plans. Most famous was the *North Central Power Study* of 1971, which predicted 21 gargan-

tuan coal-fired power plants and massive population increases for rural eastern Montana.

"With some of the plans that have been made, the Northern Great Plains could become one of the biggest industrial areas in the world, rivaling those of Japan and Germany," says Rob Anderson, energy planner for the state of Montana. A local observer put it in western terms. "Those coal companies have swooped down on our land like so-many hen hawks on a settin' grouse."

Montanans have become leery of those who want to come in and take advantage of the state's bountiful resources. History shows why: the resources of Montana have typically been raided and removed, with little benefit to the citizens of the state. First came the fur trappers and buffalo hunters, who skinned off the hides and left only carcasses. Then came the miners, who often devastated the land in search of gold, silver, copper and other valuable minerals. Next the grass was stripped by out-of-state cattle empires, and much of the timber went to cut-and-run lumber companies.

By 1974, when it had become clear that a Northern Plains boom could lead to heavy demands for Yellowstone River water (power plants and gasification complexes require huge amounts of water), the state legislature passed a bill that placed a three-year moratorium on granting any large-scale water-use permits. If the legislature had not acted, flows in the Yellowstone could have become critically low, increasing the need for a dam (like Allenspur) to control the amount of water in the mainstem of the river.

"The moratorium gave us time to get our act together," said state natural-resources lawyer Ted Doney. "This will be the most profound resource decision the state of Montana has ever made."

During the three-year respite, state agencies studied how much water was needed for future irrigation and to maintain water quality, the impact of depletion on fish and wildlife, and a wide variety of other complex issues. Once the agencies determined what flows were needed to protect the resources they are responsible for, they filed applications to obtain the water. You'd think what the state needed it would get, right? Well, this is where water law comes in.

In Montana, as in other western states, water rights are generally based on who applies for the water first. Recent Montana

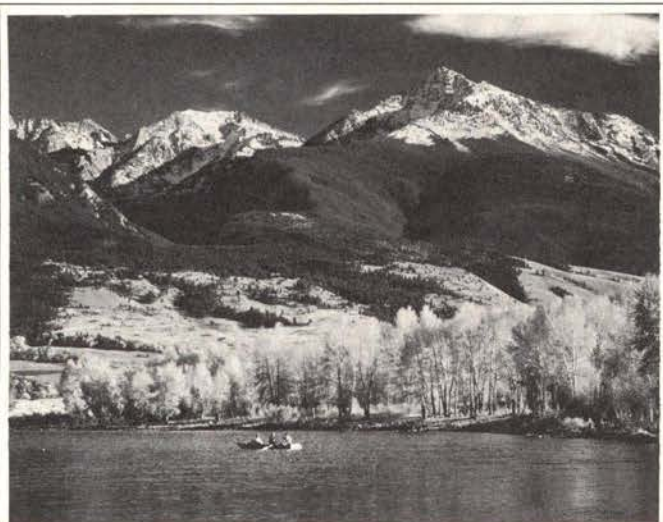


Farther down the Yellowstone, near Greycliff, Montana, the "transitional" section of the river is wider and warmer than the mountain section.

Michael S. Sample

law, however, gives priority to state agencies, local governments and irrigation districts because they deal with public values such as clean water, wildlife conservation, municipal water supplies and water for agriculture.

Anyone who applies for water in Montana must prove that it will be put to a "beneficial use." It has always been assumed that agriculture and industry automatically qualify, but the use of water to maintain wildlife has been a point of legal conten-



This part of the Yellowstone, near the Absaroka Mountains and the Montana/Wyoming border, is characterized by cold, clear water and a cobbled bottom—and plenty of trout.

Michael S. Sample

tion. Fortunately, Montana is among the handful of western states that recognize the importance of water to wildlife. Only a small number of western states consider wildlife conservation a "beneficial use" of water, and only a very few *guarantee* water for wildlife. Oregon has been the leader in this department, owing to state wildlife officials' attempts to protect the magnificent steelhead and salmon fishery. A few other states have base-flow regulations, but they often aren't enough to do much more than keep the streambed wet. Montana has no laws guaranteeing water for wildlife, so the Department of Fish and Game must reserve water like everyone else.

Fortunately, Montana's DFG assumed a role as the state's resource defender. The department's ace-in-the-hole is that it is a "priority" user, and nonpriority users such as the energy companies must wait until a decision is made on the DFG application before they can obtain any rights of their own. The catch, of course, is that there may not be any water available by the time industry gets its turn. The river only has so much to give.

That limit is precisely the crux of the issue. The average annual flow of the Yellowstone River, measured near Sydney, where the river leaves the state, is estimated at 8.8 million acre-feet (maf; an acre-foot is the amount of water it takes to flood an acre of land to a depth of one foot). The DFG application stated that 8.2 maf was the minimum annual amount needed to maintain the fish and wildlife resources of the Yellowstone River in their current condition.

Average flows, however, can be deceiving. We've all heard of the statistician who drowned in a stream that averaged only six inches deep. During certain months, or in wet years, the DFG reservation would still leave abundant supplies for new users. During dry months or droughts, however, it would leave little or no excess water. Since nearly all energy development schemes call for steady supplies of water, the DFG application allows

little room for industrial growth. Similarly, future agricultural expansion could be severely limited, at least in certain parts of the river system.

When the DFG application was made public, some people accused the wildlife agency of trying to stop any kind of growth in the Yellowstone basin. DFG Director Robert Wambach replied to critics, "I hope you don't want a director who says to hell with the fish and wildlife in the Yellowstone." DFG environmental chief James Posewitz was equally blunt: "Our application puts the question of whether or not we're serious about protecting fish and wildlife values clearly in front of the public. The bullet's at least available for biting."

The controversy increased further when another state agency, the Department of Health and Environmental Sciences (DHES), announced it wanted to keep at least 6.5 maf of the 8.8 maf in the river. DHES officials contend that 6.5 maf is the minimum average amount needed to maintain the water-quality standards adopted by the Montana legislature in 1969.

The water-quality problems forecast for the lower portion of the river are not caused by churning steel mills or dirty paper plants. The problems arise from the abnormal amounts of salts that leach into the river when dry lands are irrigated. While the river's flow is currently large enough to dilute the salt influx adequately, health officials say further depletion could change this. Rivers with high levels of dissolved salts are not only poor for wildlife, but they are also bad for irrigation and for municipal purposes. This same problem of excessive salinity has plagued other heavily irrigated areas such as the Colorado River basin and the Imperial Valley of California.

Other state and local government agencies applied for smaller quantities of water; cities and towns along the river also made modest requests. Billings, on the other hand, asked for a large amount, explaining that it projected a population of 600,000 (quite a jump from its present 65,000) by the year 2000. Local irrigation and conservation districts applied for a little less than one million acre-feet of water.

The fireworks finally started to pop when the legal hearings over the government applications got under way last August. Industries were not allowed to file applications, but they were allowed to object to applications and to cross-examine witnesses. Question and object they did, for the entire two months of the hearings, in an attempt to make sure some water was left over. As DFG leader Posewitz remarked, "They questioned everything but our parentage."

Most prominent were lawyers from Utah International, a San Francisco-based energy and minerals company, and Intake Water Co., Inc., a Texas-based subsidiary of Tenneco, Inc. Utah International has plans for a \$3-billion energy development, including two coal gasification plants. Intake wants to construct a \$70-million dam on one of the Yellowstone's tributaries, the Powder River, and sell the water to energy developers.

The industry attorneys wasted no time in establishing themselves as the dominating force of the hearings. Dapper in appearance, precise in language and bristling with competence, they quickly won the disdain and grudging admiration of most of the onlookers. As one rancher phrased it, "Those fellows could talk a cow right out of her calf."

Industry lawyers objected to many of the government applications, but they reserved special contempt for the DFG application, calling it "inadequately documented," "self-serving" and supported by "blatant propaganda." They not only attacked the notion of wildlife conservation as a "beneficial use" of Mon-

tana water but also accused the DFG of trumping up its studies to fit preconceived numbers. They also accused Montana's wildlife agency of colluding with the Department of Health to tie up all the water and of failing to address the question of economics. They summed up their objections by asking that the DFG application be thrown out.

Despite the industry barrage, the DFG remained steadfast. "We picked numbers we could defend," said Posewitz. "All our figures are based on actual biological needs, documented by scientific studies. It's not like some whiplash lawsuit where you ask for a great deal with the intention of settling for less." As for the economics, Posewitz replied, "I can't remember where any of our conservation laws instruct us to protect wildlife only if it's economically feasible. We've admitted from the start there would be some economic losses, as well as some gains."

Given a river as diverse and complex as the Yellowstone, it's an immense task to determine the flow requirements for all its species. Yet that's exactly what DFG researchers attempted to do in arriving at the requested reservation. For instance, they quantified how much water Canada geese need to nest safe from predators on the islands of the river; how much water paddlefish need to travel upstream to spawn; how much water beavers need to avoid getting frozen out in winter; how much water is needed to sustain the aquatic insects that support the fisheries. In addition, researchers determined how much water could be lost without sacrificing the recreational potential of the river.

While DFG water requests for virtually all sections of the river drew fire, the instream flow requests for the Powder River, the easternmost tributary of the Yellowstone, caused the greatest consternation. The Powder is a turbid, meandering stream, low on aquatic life and often low on water. Its unglamorous nature earned it the nickname "the ugly duckling" during the course of the hearings.

The Powder River, though not classically beautiful, is still desirable. It is the planned site of a multitude of energy developments, including projects of Utah International and Intake.

Industry spokesmen tried to downgrade the importance of the Powder to fish and wildlife, but the DFG testified to its important role as a spawning area for channel catfish, sauger and shovel-nosed sturgeon. At one point, after listening to a DFG biologist testify in detail to the merits of the Powder River, the lawyer from Utah International inquired sarcastically, "You aren't trying to make the inference that this is a blue-ribbon stream in disguise, are you?" Referring to the development already taking place, the DFG biologist replied, "It's starting to look like a black-and-blue-ribbon stream."

Agricultural interests also raised strong objections to the DFG application, saying it would crimp future agriculture and harm an already crippled industry. But DFG's Posewitz says any notion that his department is the enemy of agriculture because it is trying to keep water instream for wildlife is "patently false." He added, "In the past, the land and water accommodated both agriculture and wildlife. . . . If the Yellowstone River is going to accommodate those uses in the future, it must be protected from further depletions." While Posewitz admits the DFG application may not benefit future irrigators, he says it will protect the rights of present users by maintaining water quality and availability.

Not only could increased irrigation endanger the water quality by adding more salts to the water, many engineers don't think irrigation is economically feasible. Most of the arable lands near the river are already irrigated, and projects located farther away would require costly pumping systems. Nevertheless, the con-

servation and irrigation districts along the river strongly dispute the contention that agriculture has already reached its peak.

Although this disagreement between the DFG and agriculture was evident throughout the hearings, the major conflict concerned whether minimum flows should be established to protect fish and wildlife. Prodevelopment interests often spoke against the wildlife needs, citing instead the energy needs of our country and the economic needs of Montana. Public testimony, however, ran strongly in favor of the instream requests.

W.H. Hornby, executive editor and vice-president of the *Denver Post*, spoke directly to these conflicts in a *Yellowstone* editorial: "We must beware of flag-wavers who would drain us dry. Many Americans out there believe that reasonable preservation of these last great open spaces comes closer to being a fulfillment of the American dream than heating one more office building"

K. Ross Toole, well-known Montana historian, echoed the sentiments of many Montana conservationists when he testified, "There is no incompatibility between a clean environment and a healthy economy. Americans seek as they never have sought before what Montana has in the greatest abundance of almost any state in the Union: open space, clear, cool water, a big, clean sky. Once distance, space and remoteness were our economic curse. So few of us today seem to realize the *economic* fact of it: what was then our economic curse is now our economic blessing."

Who gets the water will be decided by the five-person Board of Natural Resources sometime this year, mid-July at the earliest. Board chairman Cecil Weeding says, "It's going to be the toughest decision the board has ever made." He says it's hard to know whether protecting natural values or creating more jobs will benefit the public more. How will he decide? "I listen to the people—always have."

Is there a middle ground in which industry, agriculture, water quality and wildlife can be accommodated? DFG environmental chief Posewitz says, "It's a very difficult concept to defend. For some of these wildlife species, once you go below a certain flow, there is no compromise—you've lost them. And once the resource is compromised, where do you stop?"

Without a doubt, sentiments for protecting resources such as free-flowing rivers and wildlife have increased in proportion to the speed with which they have been destroyed. Thanks to the tireless efforts of Montana's Fish and Game Department, Montana now has the chance to do what no other state has been able to do: limit its industrial growth in deference to outstanding natural values. The rest of the nation will be watching—and hoping. □

Where to Write

Support is needed to protect the Yellowstone River, especially since it was not included in Representative Phillip Burton's (D-California) Omnibus Rivers Bill, despite the Carter Administration's recommendation. Montana Congressmen Max Baucus and Ron Marlenee opposed wild and scenic river status for the Yellowstone; the omnibus river bill includes only uncontested rivers. Letters supporting the instream flow reservations sought by the Montana Department of Fish and Game should be addressed to the Montana Board of Natural Resources, 32 South Ewing, Helena, MT 59601.

Hank Fischer is a Montana field representative for Defenders of Wildlife. He has written extensively for conservation magazines and is now at work on a book on Montana rivers.

The Urban Garden: A Growing Trend

BRUCE STOKES

HIGH PRICES and hard tomatoes have encouraged American consumers to begin producing more of their own food. This spring, at least one person in seven started a vegetable garden. Federal, state and local governments are spending several million dollars to encourage small-scale, local food production. By fall, individual gardeners will have saved an average \$400 on their food bills, while enjoying the personal satisfaction of nurturing lettuce or zucchini from the seed to the dinner table.

Vegetable gardening now ranks as one of America's most popular leisure activities, surpassing even golf, tennis and skiing. According to a recent Gallup poll, an estimated 32 million households—approximately two out of five families—raised fruits and vegetables in 1977 in backyards or in city lots. Another six million homes did not have formal vegetable gardens but grew a few tomatoes or green peppers along flower beds or in improvised containers on apartment balconies. Interest in gardening is so great that an additional seven million people would garden if the government provided land.

As gardening has risen in popularity, it has become more than a casual hobby. Backyard farmers grew \$14 billion worth of produce last year. Their gardens are expanding, too, and now average 770 square feet. A good gardener can produce a pound of vegetables per square foot, so today's average garden can yield enough to meet the annual vegetable needs of two people. Those who garden intensively—with the continuous planting and harvesting of complementary vegetables on the same piece of land—can triple that yield.



Organic gardening methods are also becoming more widespread, as people find ways to link their environmental concerns with their self-interest. This summer Bronx Frontiers, a New York City gardening group, began to compost 500 cubic yards of vegetable matter a week for use on city plots. A national poll by Gardens for All, a Vermont-based gardening advocacy group, found that last year 30% of the gardeners they questioned avoided using synthetic chemicals whenever possible.

Backyard gardening has long been popular with nutrition-minded Americans interested in some light exercise and pleasant recreation. In the 1960s, changes in the food industry and the economy led many people to abandon efforts to grow some of their own food. When food prices began to rise sharply in the mid-1970s, however, interest in gardening revived. By 1975, 35 million households had vegetable gardens. While the number of people gardening on their own property has slipped somewhat

since then, the proportion of people gardening on community plots continues to grow.

Last summer there were an estimated three million gardeners on more than 30,000 city- and state-owned plots. Pennsylvania makes 125 acres available to the public on the grounds of 25 state hospitals, where 6000 people raise vegetables. The state has arranged for the gardeners to buy seeds at a discount and encourages counties to make more land available to local groups. The Pennsylvania program required no new legislation or new budget appropriations. Participants provide their own materials or depend on donations from local merchants. This reliance on local initiative could occur elsewhere.

Cities have also launched their own urban gardening projects. For the last three years, Los Angeles has run a Neighborhood Gardens and Farms program involving more than 2000 families who annually produce a million dollars worth of fresh vegetables. The city allocates excess land around airports and under power lines to the program and provides a staff of five gardening organizers/educators for one of the largest and most successful organized efforts in the nation.

Boston, Chicago, Detroit and New York all have extensive urban gardening programs, many run by local groups interested in gardening as part of community development projects. Weeding and hoeing side by side brings many neighbors together for the first time. They develop a spirit of cooperation and community pride that carries over into other activities. Al Harris, program leader of the New York City Gardening Program, sums up the attitude of many community garden or-

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In May, 1977, apartment dwellers in Sacramento, California, worked on state-loaned vacant lots.

Tom Myers

ganizers: "We not only grow vegetables, we grow hope."

To support and improve such efforts, the federal government allocated \$1.5 million in 1976 to pilot gardening programs in six cities. This was expanded to sixteen cities with a \$3-million budget for 1978. The program is run by the United States Department of Agriculture (USDA) and is coordinated by land-grant universities and county agricultural extension agents. The cities involved have little influence on the program, a point of friction in some cases. For example, in New York City, which got \$500,000 in federal money last year, 1461 garden plots were started under the program, and 18,000 people attended gardening workshops. But as with many government projects, community activists decried this high cost per participant and criticized the high proportion of funds spent on administration. The law specifically prohibits money being used for renting land, for preparing the soil for planting, for installing watering systems, fencing, for composting, or for the other accessories necessary for a successful gardening program. While it can be argued that individuals should provide these items themselves, the inflexibility of the federal program has been a vexing issue for many urban gardeners.

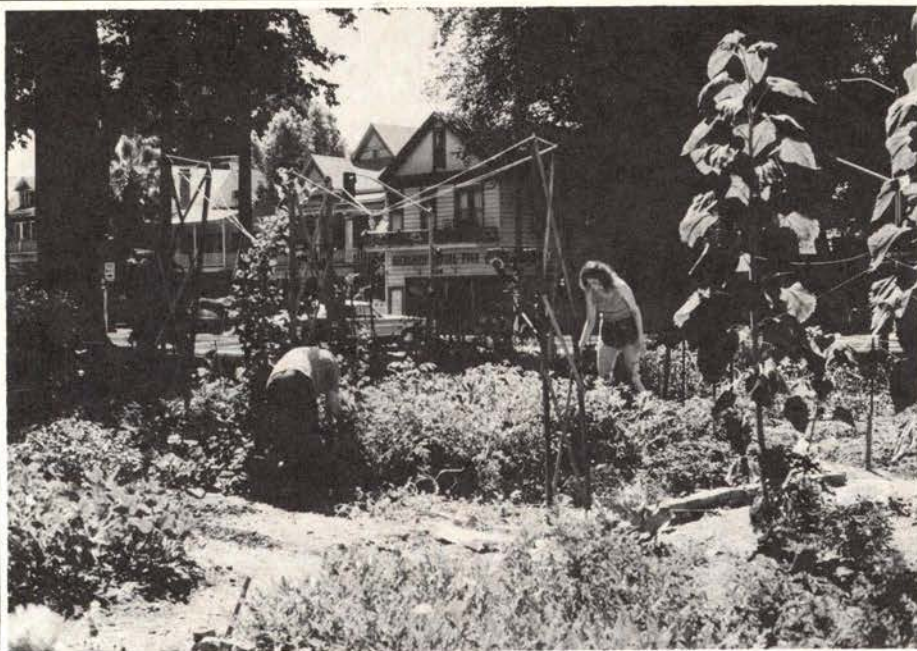
A more serious problem has been what one congressional staffer calls a lack of dedication to the program at the USDA, where urban gardening is dwarfed by other food policy responsibilities. Community-gardening advocates echo this concern; they feel that USDA officials are not convinced gardening is anything more than a

passing fad. Yet Congress has mandated the program, and the nutritional, economic and social benefits of gardening have been documented.

In Los Angeles, where the city's program is well developed, many of the problems of coordinating federal and local efforts have emerged. Mark Casady, director of the Los Angeles Gardens and Farms Program, argues that the Federal Agricultural Extension Service, which is responsible for providing technical support to community gardeners, is out of touch with their problems. "They gotta get some Black folks and Brown folks on their staffs and get down from the ivy towers and into the streets," Casady comments.

Miranda Smith, an urban gardening practitioner with the National Center for Appropriate Technology in Butte, Montana, adds, "Too many of the extension agents have degrees in agriculture, with no background in gardening. The federal program is too orthodox in its approach, stresses chemical instead of organic gardening, and lives by the letter rather than by the spirit of the legislation that gave it life."

After only one year of operation, it is too early to judge the effectiveness of federal support for urban gardening. The program has broadened the availability of gardening education and technical support services. Federal money has not reached as far down into the grass roots as many gardeners would like. But even a small commitment symbolizes government support for greater individual and community self-reliance for food production, for dietary improvements and for efforts to put a



By August, hard work and hot weather made the lush community garden a success.

Tom Myers

dampener on inflation in the family food budget.

"To avoid some of the problems experienced last year," says Catherine Lerza of the Washington, D.C., Public Resource Center, "it should be made clear to those who run the federal program that they have to work with and not supersede existing groups. If not, the gardening program will go the way of urban renewal and will not reach the people it was meant to help."

But the problems of urban gardening run deeper than finding a proper role for the government: they are in the soil and in the air. Evidence is mounting of high levels of lead, cadmium and other heavy metals in vegetables grown in polluted urban areas. The source of most lead in urban areas is the residue from leaded gasoline used in automobiles, along with metal in the soil from lead pipes and flaked lead-based paint. Cadmium and other unwanted metals are often found in the sludge many urban gardeners use to cover barren urban lots. Leafy vegetables—collards, lettuce and cabbage—tend to take up these substances, especially when the soil pH level is low. Scientists don't yet know how heavy metals get into plants, whether from the air or the soil. More important, the science of setting human health standards for heavy metals is in its infancy.

To get more accurate information, the Air Resources Board of California, working with UCLA, will spend \$45,000 in 1978 to collect data in Los Angeles. Cornell University recently completed a comprehensive study in New York City—including vegetable and soil tests and experiments with guinea pigs fed on urban

vegetables. Their results suggest most people should not be overly concerned about the problem.

A 1977 study by the New York Council on the Environment and Dr. Granville Sewell of Columbia University identified pregnant women and children as the groups most highly susceptible to polluted urban food. It also concluded that people with a natural calcium deficiency take up more lead, while those deficient in zinc take up more cadmium.

However, these conclusions should not be blown out of proportion. Many of the groups—especially children, who may pick up a good deal of lead on their hands as they play—are exposed to a variety of toxic chemicals every day. Pollution from autos and industry is the real problem, not leafy greens on the dinner table. Store-bought vegetables can also contain disturbing levels of heavy metals, as well as pesticides. Americans probably ingest less lead now than they did during the 1940s. But no one should be exposed to unnecessary health hazards. As James Ridgeway has pointed out in *The Elements*, urban gardening has been a progressive political force in many communities, but its success may ultimately rest on efforts to reduce air and soil pollution.

Until there is conclusive evidence about contamination of vegetables by metals, the prospective urban gardener should not panic. There is no reason why nutritious, healthy vegetables cannot be grown in almost any area if gardeners take a few simple precautions:

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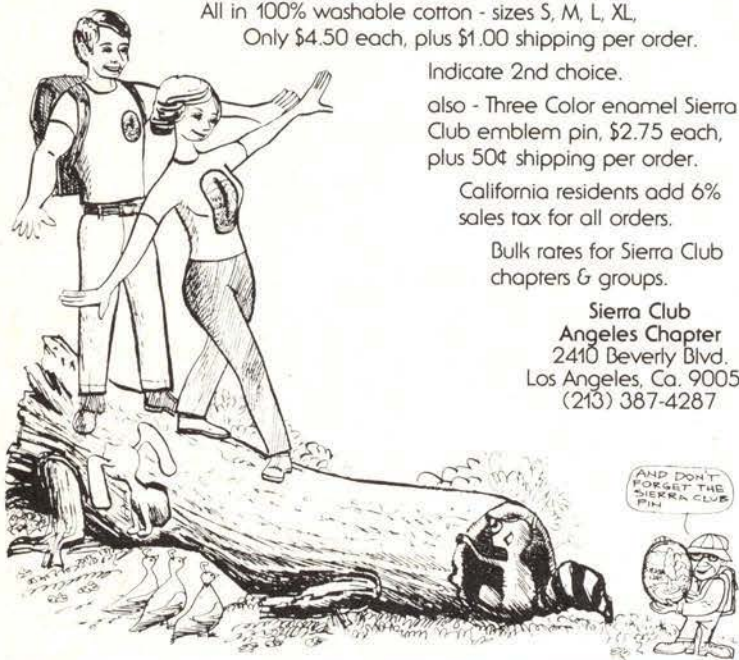
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- Have soil tested by the local agricultural extension agent. If it is too acidic, lime it; if the soil is particularly poor, consider bringing in fresh topsoil or sludge free of heavy metals.

- In order to build up the fertility of the soil, start a compost heap.

- Before eating, even if pesticides have not been used, wash all vegetables thoroughly (washing can reduce lead levels on lettuce leaves by nearly 40%).

- Extend environmental concern beyond raising vegetables, become active in trying to stop pollution before it stops vegetable gardening.

Despite concern over pollution, the number of community and backyard gardeners is unlikely to diminish. Most people garden for the fun of it. They like to stretch their limbs and get dirt under their fingernails. An average family can save 10% on its food bill by gardening, an advantage that is spurring more poor people to garden. These organized efforts need to be strengthened. A California Council for Community Gardening was formed this spring to act as a grass-roots lobby for state and national urban gardening assistance.

There are millions of backyard and city gardeners testifying to the ability of people to do a great deal for themselves with a little help. Much can be accomplished with minimal capital investment if local groups are relied upon to organize and coordinate gardening projects. The state of Washington has developed a master gardener program to train people interested in advanced horticulture. These persons then act as unpaid community resources, advising on simple gardening problems and educating backyard gardeners in better techniques. Similar programs have now been started in several other states.

Government assistance is needed by many gardeners to obtain land, to ensure tenure and to test the soil. Others need information on how and what to grow. Such help should be channeled through community organizations to reach as many people as possible. In this way, gardeners not only improve their diets, but gain the skills and confidence to tackle some of the broader environmental and economic problems in their communities. □

Bruce Stokes is a researcher with the Worldwatch Institute in Washington, D.C. He is the author of the recent Worldwatch paper, Local Responses to Global Problems: A Key to Meeting Basic Human Needs.



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Update: RARE II

JOHN McCOMB and DOUGLAS SCOTT

RARE II gives wilderness supporters a vital opportunity to preserve millions of acres of important, long-neglected wilderness in national forests. Our success will depend on the strength of widespread support for wilderness. RARE II is supposed to be a balanced program based on consensus. Areas where general agreement cannot be reached among competing interest groups should be subjected to further planning. Primarily as a result of pressure from the timber industry, the RARE II program seems to be moving off track. Only a concentrated effort by wilderness conservationists can bring the program back into balance. The number of individuals speaking up for particular areas and for wilderness in general will be the decisive factor; we urge every Sierra Club member to get involved and to respond before October 1.

THE U.S. Forest Service is in the midst of a massive review and decision-making program that will affect the future of every roadless area in every national forest and national grassland. RARE II—the Roadless Area Review and Evaluation—was begun in the spring of 1977 by Assistant Secretary of Agriculture Rupert Cutler (See *Sierra*, October 1977 and November/December 1977). The basic purpose of RARE II is to decide which roadless areas in national forests should be preserved as wilderness and which should be available for development.

The RARE II program will conclude in January 1979 when the Administration will allocate each roadless area to one of

three categories: 1) areas recommended to Congress for immediate wilderness designation; 2) areas that will receive no further consideration for wilderness designation; 3) areas requiring more planning before a final decision can be made. The crucial decision-making phase of RARE II is now approaching. To date, the following phases have been completed:

INVENTORY: The first step of RARE II was an inventory of roadless, undeveloped national forest lands—including grasslands administered by the Forest Service. A total of 67 million acres in more than 1900 areas was inventoried.

EVALUATION: A broad range of data about each area has been assembled, including the wilderness quality, the value of any natural resources found there and the social and economic impacts of either wilderness designation or resource development. The Forest Service used a computer to compile and analyze this data in order to formulate and display various management alternatives and their impacts.

ENVIRONMENTAL IMPACT STATEMENT: A draft EIS summarizes all this data and the results of the evaluation. The EIS presents a range of alternatives to help the public understand the overall impact of possible decisions made under RARE II. It is important to understand that the final decisions will be made on an area-by-area basis. Thus, the final recommendations may not look exactly like any of the alternatives. This also means that what individuals say and do about specific areas is of particular importance in determining whether or not wilderness will be pro-

tected. In other words, if no one says that a specific area should be designated as wilderness, the chances are poor that the area will be protected.

HOW YOU CAN HELP

1. Get a copy of the draft EIS on RARE II from any Forest Service office. The document has two parts: a nationwide overview of RARE II, and state (or regional) supplements that contain detailed information of specific areas. The Forest Service expects that most people will want only the supplement that deals with areas near them.

2. Review the coverage of the roadless areas in your region.

3. Prepare your own letter commenting on the draft EIS. The most effective responses will be those that speak up for specific areas, although general support for the expansion of the wilderness system is also important.

The deadline for receipt of these letters is October 1, 1978. Send them to Chief, U.S. Forest Service, P.O. Box 2617, Washington, D.C. 20013.

Your part in the RARE II effort will be more effective if you contact your local Sierra Club group or chapter or other local wilderness group. Individuals will be pooling information and preparing comprehensive group responses. For more information about RARE II, write Sierra Club Information Services, 530 Bush, San Francisco, CA 94108. □

John McComb is a representative in the Club's Washington, D.C. office. Douglas Scott is the Club's Northwest representative.



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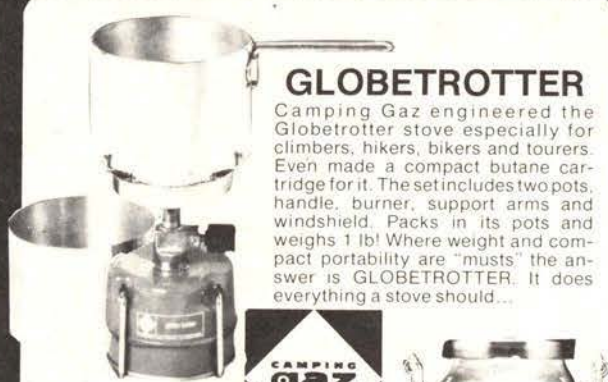
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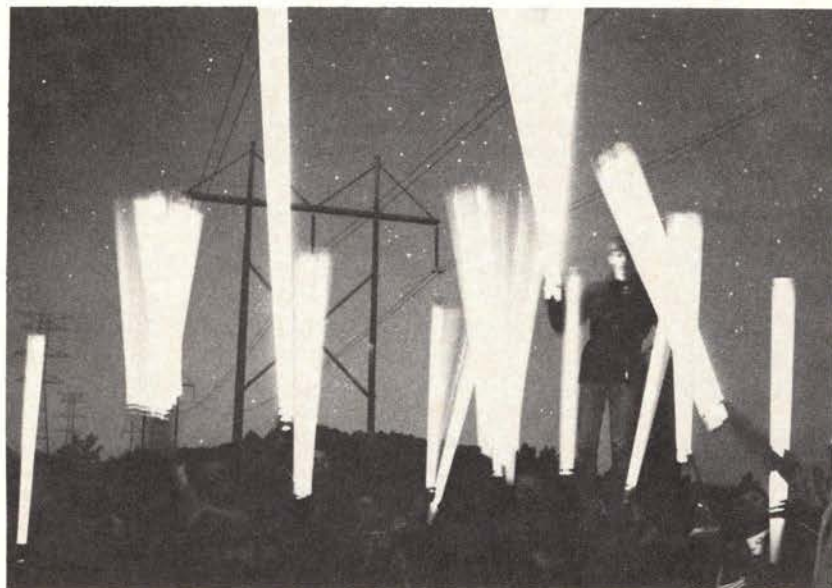
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Health and High Voltage

KELLY DAVIS



David Timney/The Binghamton Evening Press

These protesters, from Citizens for Safe Electrical Transmission, demonstrate the intense electrical field beneath 345kV lines in upstate New York. The fluorescent tubes they are waving are not plugged in. Utilities are planning lines that will carry twice as much voltage.

EXTRA-HIGH-VOLTAGE (EHV) transmission lines are on the march across North America; 1400 miles of lines are already in operation in the Midwest and 2500 miles in Quebec. There is an extra-high-voltage DC line running from Oregon to Los Angeles. More EHV lines are planned; five lines will crisscross New York, connecting with others in the Northeast. Electricity from coal-burning plants in Wyoming, Montana and North and South Dakota will be carried by massive lines and steel towers to the cities of the Northwest.

A transmission line is simply a pipeline for electricity. In the case of a water pipeline, more water will flow through the pipe as water pressure increases. The same is true of electricity. It is transmitted more economically at high voltages; the more power carried, the less current lost along the lines.

We've come a long way from the early low-voltage lines strung on telephone poles. The newest transmission lines carry 765,000 volts (765 kilovolts, or kV) of electricity from power plant to transformer, and they represent only a modest advance in transmission technology. Plans are under way to build lines that will carry 1.2 million and 1.5 million volts. But as

voltages have increased, the utility companies' understanding of the effects of these new transmission lines hasn't advanced much from the days when they still used wooden poles. The lines are designed under the assumption that they will not affect the people who work or live near them. Evidence is accumulating, however, that extra-high-voltage lines increase biological stress capable of causing hypertension, ulcers and abnormal growths. The electric fields are a danger to wild animals, migratory birds and livestock pastured near the right-of-way. The lines are noisy, especially when damp from rain, snow or fog. Crops growing near them have shown abnormal growth patterns. Uninsulated wires, carrying thousands of volts of electricity as low as 48 feet overhead, can cause potentially harmful shocks.

Robert Becker, a physician and director of the Orthopedic-Biophysics Laboratory at the Syracuse, New York, Veterans Administration Hospital-Upstate Medical Center, has been researching the effects of low-frequency electric fields (60 Hz) for fifteen years. Testifying at health and safety hearings for proposed lines in New York, he said that exposure to the fields can produce physiological and functional changes in humans—anything from in-

creased irritability and fatigue to raised cholesterol levels, hypertension and ulcers. Studies of rats exposed to low-level electric fields showed tumor growths and abnormalities in development. Dr. Becker believes we are performing unauthorized medical experiments by exposing people to the electromagnetic fields surrounding the transmission lines.

American utility companies do not take the health hazards of extra-high-voltage lines seriously, but the Russians do. Soviet investigators studied the health of 45 people who had worked in 400kV and 500kV switchyards for about four years. Of the 45 subjects, all but four had some type of disorder. The workers complained of headaches, unusual fatigue, sluggishness and reduced sexual potency. These symptoms occurred during and shortly after field exposure and subsided after the workers stayed away from the lines for a while.

The Russians have instituted strict rules for workers on their lines. Workers must be protected by shields or other devices while working. Workers may spend only limited periods of time near the lines. Conditions the Russians consider dangerous extend beyond the limits of the right-of-way, and use of this area is forbidden.

In contrast, American utility companies promote use of the right-of-way for farming and recreation.

An American power company representative has claimed that there have been no "outstanding complaints" against lines currently in operation in this country—although many citizens have, in fact, complained. But even the absence of such complaints, according to Dr. Andrew Marino, a biophysicist working with Dr. Becker, would not prove that electric fields are not dangerous. If very dramatic things happened, says Dr. Marino, such as people falling down from shocks, then the effects of the lines would be more obvious and complaints more frequent. But the public might not yet know about subtle effects of extra-high-voltage lines—effects that they might not even associate with the power lines.

In view of the Russian findings and his own studies, Dr. Marino called for a public research program comparable to the Russians' to investigate the specific effects of transmission lines. In view of the vast environmental impact of proposed new lines, Marino thinks it is difficult to justify doing anything less.

The power companies have put only a minuscule amount of money into research. The Electric Power Research Institute is conducting a study of the effect of electrical fields on workers, but it has not produced any finished reports on transmission lines and the people living near them. One EPRI report relied solely upon the unsubstantiated opinion of an examining physician that individuals examined were normal. No data were cited, nor were any controls employed. Yet this study is used by American power companies as evidence of the absence of harmful effects of transmission lines.

The power companies concede that it is possible for the lines to cause electric shocks by inducing currents in metal objects such as wire fences, but they insist that such shocks are little more than nuisances, like the static charges one experiences after walking across certain carpets. Farmers who live and work near the lines in Ohio think differently. "It's like being zapped by 110-volt household current," said one. He stated that even 400 to 500 feet from the line, the shocks can be quite severe. "I wouldn't send my boys [sixteen and eighteen years old] to work under the lines alone," he added.

The power companies can ground all

stationary objects such as metal buildings, roofs and fences that they think may be a shock hazard; the companies also suggest the use of grounding chains for vehicles that regularly use the right-of-way. But farmers have found that the grounding methods do not always succeed in warding off strong shocks. Farmers must take care in getting off farm machinery near the lines. School buses have to be warned not to pick up or discharge children near them. People using pacemakers must be warned that the lines can interfere with their operation.

The most hazardous shocks, those that can do physical harm, are the ones that rise above the "let-go" threshold, the point at which a person loses voluntary muscle control. The threshold is about 9 milliamperes (mA, a standard measure of volts against resistance) for men, 6mA for women and 4.5 mA for children. With lines operating at 800kV (lines operate within 5% of stated capacity) and a 48-foot clearance, a tractor-trailer would be subjected to 6.5mA and a school bus to 4.2mA under the lines. The Russians have recommended a maximum exposure of 4.0. To meet this requirement, clearances of about 70 feet would be needed.

To minimize the environmental impact of all transmission lines, siting guidelines have been set by the Department of the Interior, the Department of Agriculture, the Federal Power Commission and others. Transmission routes, they say, should avoid scenic, historic and recreational areas, prime farm and timber lands, population centers and areas of valuable natural resources. Where, then, to put the towers? The power companies naturally want the cheapest route, and farmlands are flat, relatively bare and offer easy access for construction vehicles. Since it is cheaper to keep the lines as straight as possible, the power companies will buy an easement through a farm rather than move the towers to the edge of a property.

It is estimated that 30 miles of lines with a right-of-way 250 feet wide require 1000 acres—and the 765kV lines need a right-of-way at least 500 feet wide to operate safely.

The towers supporting the 765kV lines are 135 to 200 feet tall, four or more to a mile, with a "wingspread" of 100 feet. Each tower leg is four feet in diameter, set in five-foot-wide concrete bases.

The construction vehicles and access roads of the utility companies compact the earth. It can take from four to six years to restore the damaged land to its original

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productivity. Drainage patterns may change because of construction and maintenance crew activity.

Farmers have noted changes in corn planted under the lines; the height of the stalks is not affected, but the ears do not mature. Cattle pastured under the lines lose as many as half their calves. The egg-laying capacity of hens also has been significantly altered. As one farmer put it, "What are they going to do when our farms die, eat electricity?"

Power lines produce a continuous humming and crackling sound that turns into a loud roar when they get wet. The noise 400 feet away from the line sounds like a small waterfall. Power companies have said that one of the key factors in assessing public acceptability of the lines will be the noise. Company figures show 53dB(A) (decibels as perceived by human hearing) at the edge of a 250-foot right-of-way, but others say it is nearer 70dB(A). At 60dB(A), one must shout in order to be heard.

A nationally known expert on noise from Stanford University, Dr. Karl Kryter, says that sleep disturbances will occur in some people when the level reaches only 34dB(A). Long-term effects of exposure to the noise from extra-high-voltage transmission lines is not known. Americans are exposed to twice as much noise today as twenty years ago. Clinical evidence shows that excessive exposure to noise constricts the arteries, increases the heartbeat and dilates the pupils of the eye.

Building heavier lines with more cables per bundle would reduce noise as well as radio and TV interference but would be more costly. Cables for 765kV transmission are made of aluminum reinforced with steel. They consist of a bundle of four conductors, each about 1.3 inches in diameter, approximately 18 inches apart; each circuit is composed of three parallel conductor bundles.

The utilities will build the lightest lines acceptable. In some cases, power companies have come to the agencies for permits only after spending large sums of money on equipment. Faced with a *fait accompli*, power commissions rarely demand costly changes in design.

What are the alternatives to a nationwide grid of potentially dangerous, environmentally unsound, land-gulping power lines? Should we delay certification of all proposed extra-high-voltage lines until an adequate research program has resolved questions of their safety?

Transmission lines are used to carry

electricity from generating source to consumer. Locating the two closer together, as energy experts such as Amory Lovins have suggested, would eliminate the need for many of the lines. Advocates of decentralized energy call for more smaller local plants and less reliance on energy generated in one region and consumed in another. One problem is that it is cheaper to burn coal at a mine and transport electricity on expensive lines than to ship the coal to plants nearer cities, where compliance with clean-air laws may be more difficult. But should cities be allowed to escape the consequences of their energy consumption in this way?

Extra-high-voltage lines are also well suited to transmitting the high outputs of electricity from nuclear power plants and, in fact, may be designed with that use in mind.

Utilities will argue that increasing the "inerties" among their power systems reduces the need for extra capacity within individual systems thus requiring fewer power plants; the inerties permit moving energy from places with excess capacity to areas where power is short because of heavy peak demands or equipment failure.

Where transmission of electricity cannot be avoided, better planning would create a safer and more efficient system. More research and investment is necessary to develop national safety standards. Superconductors (metals that carry power without heat or energy loss) could make present 345kV lines more effective, and eliminate the need for higher-voltage lines; towers can be designed to be more attractive; noise and shock hazards can be reduced.

But the ultimate answer to more and potentially dangerous lines is the conservation of energy. Power companies have a vested interest in expanding their business. The more power they sell, the more profit they make, since state regulations fix profit margins for utility companies at a percentage of total investment.

Forecasts of electricity demand should be made by independent agencies. We should insist that incentives for conservation of energy be built into rate systems. We should support the decentralization of power systems, the development of alternative—and safer—sources of energy closer to the people who will eventually use the energy. In these ways we can resist the degradation of the land by higher-voltage power lines. □

Kelly Davis chairs the Atlantic Chapter's Iroquois Group.

Extra-High Voltage

The use of 138,000-volt (138kV) transmission lines began in 1916. There are now more than 200,000 miles of lines rated at 138kV or above. Until 1953, 138kV and 230kV transmission lines were the limits of the technology. In that year, 345kV transmission lines, the first extra-high-voltage (EHV) lines, were energized. In 1969, 765kV lines were put into service. Research is currently under way on ultra-high voltage—1 million-1.5 million-volt transmission lines.

The amount of power that can be transmitted by a higher-voltage line increases geometrically as the size of the line increases. For instance, industry representatives say that a 765kV transmission line can carry more than 30 times as much power as a 138kV line and more than four times as much as a 345kV line.

As an example of the amount of power that can be carried by a 765kV transmission line, the one under construction in New York by the state power authority will be operated at 4000 megawatts, but has a design capacity of 8000 megawatts. If operated at only the 4000-megawatt level, it could carry the power generated by three or four nuclear power plants, which currently are designed to produce as much as 1000 to 1300 megawatts of power each.

High Tension

In New York state, where a 155-mile, 765kV line is being built from the Canadian border to Utica, dozens of citizen groups have formed to oppose construction of the line. Farmers, who would be affected most by the line, form the backbone of the group, but people from all walks of life are very active in the fight. The line passes, at one point, close to the St. Regis Mohawk Indian Reservation, and several Indians from the reservation have joined the struggle against the transmission line. A number of farmers, Indians and a minister have been jailed as a result of protests. The Club's Atlantic Chapter is active in a petition drive against 765kV lines.

Elsewhere in New York state, the county legislatures of Franklin and Dutchess counties have adopted resolutions opposing the construction of 765kV lines. Franklin County has also stipulated that any 765kV lines eventually constructed must have a right-of-way a half-mile wide.

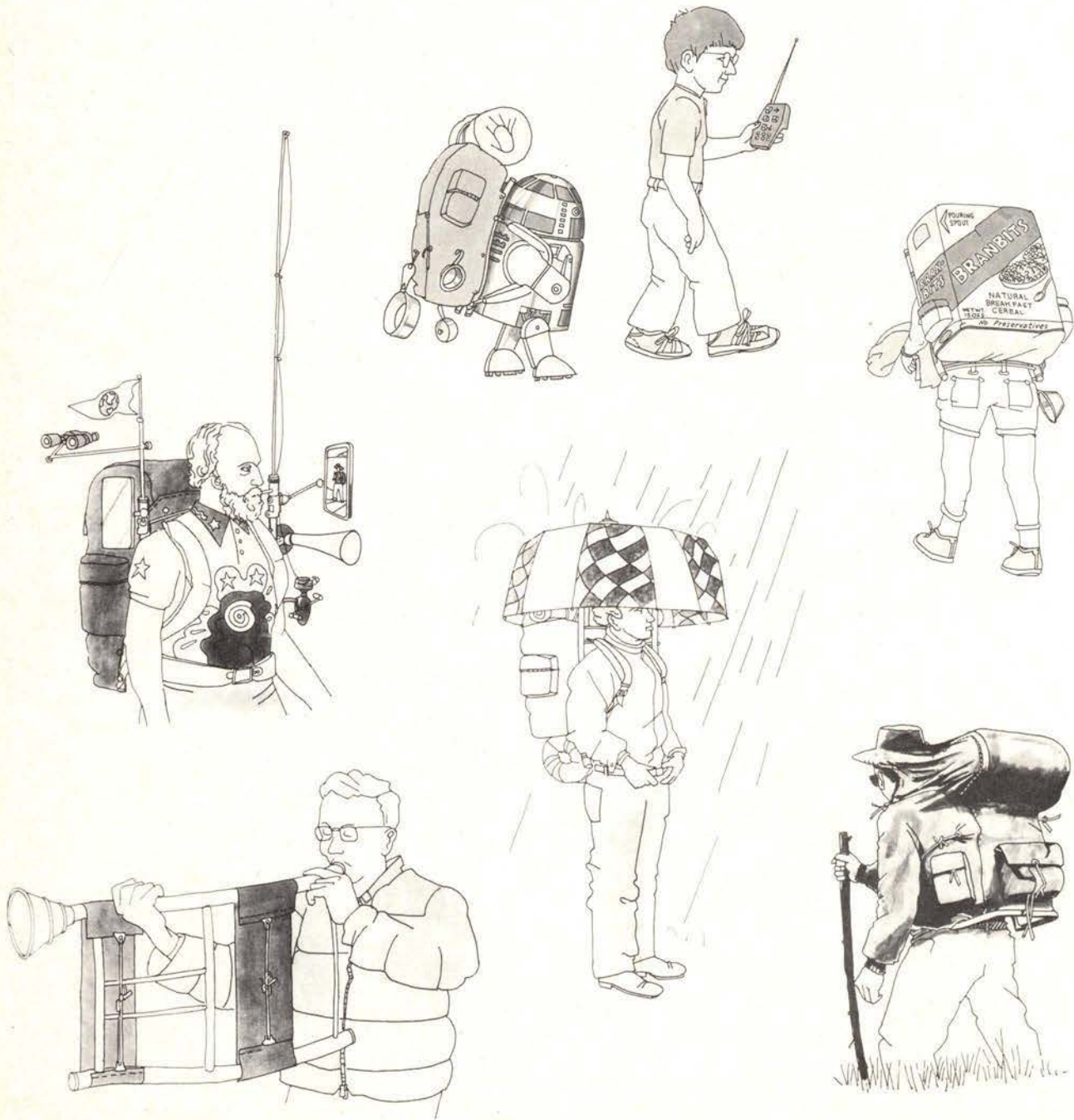
In Minnesota, where construction has begun on 410 miles of 800kV lines, more than 1000 farmers have joined in protests against the line.

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Will the National Interest Lands Legislation Lock Up Alaska's Resources?

Alaska's Minerals

BENJAMIN A. SHAINÉ

CONSIDERING THE mood of the country today, the outcome of the congressional debate on Alaskan d(2) lands is in doubt. Our experience with energy constraints is making us more concerned about future supplies of all commodities. And it is making our representatives in Congress more wary of all land withdrawals. Development interests, pointing to the probability that minerals, gas and oil lie under some of the most important wilderness areas in Alaska, seek to delete these areas from the legislation.

Can we, in fact, afford to set aside whole natural landscapes in Alaska? Or will the proposed national-interest lands designations prevent needed mineral development, jeopardize the economy, cost jobs and affect the national security? We have not located every mineral deposit in Alaska, or in the other states for that matter. But Alaska's mineral resources have been widely studied by the U.S. Geological Survey, the U.S. Bureau of Mines and the State of Alaska. We do know enough from a number of such studies to predict the overall impact of the (d)2 decisions on mineral supplies.

Does H.R. 39—the d(2) lands bill supported by environmental groups—prevent the development of important mineral resources?

H.R. 39, as originally introduced by Representative Morris Udall, has been substantially changed to exclude most of Alaska's more promising mineral lands. Most areas where industry is focusing exploration dollars and making new finds, such as the Ambler district in the Brooks Range, are outside the boundaries.

According to the state's computerized resource inventory, between one sixth and one fourth of Alaska's most promising mineralized areas are on federal lands within H.R. 39, as passed by the House Alaska Lands Subcommittee. This acreage represents approximately 4% to 5% of the nation's mineralized zones. More than 75% of Alaska's mineral lands are outside the boundaries specified in H.R. 39.

Half of the mineral-bearing lands within H.R. 39 are in nonwilderness portions of national preserves and refuges. The legislation includes provisions for the Administration and Congress to open these areas for mining in cases of true national need.

Since this article was written, the House of Representatives passed and sent to the Senate a version of H.R. 39 that closes all lands protected in the bill (approximately 101 million acres) to hard-rock mineral entry—except for valid existing claims. However, the House-passed version calls for continuing minerals assessment of the protected lands and calls on the President to report the results of the assessment to Congress by 1981. The mining industry will press for a process by which applications could be accepted for prospecting and mining in all parks, refuges, and wild and scenic rivers in Alaska—including wilderness areas. Conservationists can expect a continuation and renewal of the controversy over Alaskan minerals by 1981.—The Editor.

Even on geologically promising lands, high mining costs make Alaska a low-priority area for mining metallic ores. It is no accident that Alaska has had no real mining industry for 40 years. According to the Bureau of Mines, mining costs in Alaska are 1.5 to 2.75 times higher than in other states. Given these costs, most Alaska minerals will not be mined for decades, if ever. John E. Tilton, professor of mineral economics at Pennsylvania State University, concludes in a new Brookings Institution publication, *The Future of Nonfuel Minerals*, (1977): "Given its remoteness and harsh climate, a great deal of new mineral development would probably not occur in much of this region, even in the absence of land withdrawals." Dr. Tilton thinks the cumulative nationwide effect of federal park, refuge and wilderness withdrawals on mining will be minimal, observing that "the impact on mineral investment has been exaggerated," and "there are deposits elsewhere to which mineral producers can turn for exploration and development." *Why not defer a decision on the use of lands within H.R. 39 which do have mineral potential?*

Some potentially mineralized areas remain within H.R. 39 because of their high ecological, recreational and scenic values. Some suggest that we defer a decision on these lands while special mineral studies are made. But such a deferment would focus our limited exploration dollars on the

lands of highest surface values. We would thus maximize our chances of creating irreconcilable conflicts between economic development and environmental preservation. Neither industry nor government can afford to explore all promising mineral lands. The proposed park, refuge and wilderness lands should be the last explored, not the first.

Are minerals on H.R. 39 lands strategically important? Will we face cartels for hard-rock minerals as we do for oil?

Unlike petroleum, most nonfuel minerals are not likely to be affected by cartels. Reporting to Congress as required by the Mining and Minerals Policy Act, the Secretary of the Interior concluded that substitution possibilities, world resource distribution patterns and the urgent need of exporting countries for foreign-exchange income are among the reasons that mineral cartels are not a threat to the United States.

According to studies by the Interior Department of the Congressional Office of Technology Assessment of minerals found in Alaska, only metals in the chromium and platinum group may be subject to embargoes or cartels. Most of the nation's identified deposits of these metals are located in other states. And most Alaskan deposits of these ores are outside the boundaries set by H.R. 39. Costs of mining these metals in Alaska would be very high, and most Alaskan chromium deposits are small. Even in an emergency, only a small fraction of the nation's demand for chromium and platinum could be met from Alaskan mines. It makes more sense to stockpile supplies of these minerals against possible embargo.

Would H.R. 39 block access to potential mines on nonfederal lands?

The boundaries of H.R. 39 lands are drawn so that in almost all cases the parks, refuges and wilderness areas do not block routes to potential mining districts. And access is allowed across wild and scenic rivers. Maps of transportation corridors that have been proposed from time to time by federal and state agencies to serve mining development reveal surprisingly little conflict with the national interest lands.

Where there may be conflict, alternative routes around H.R. 39 areas can be found. We do not know, for example, the best access route to the Ambler mineral district



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in northwestern Alaska. We do not know when the area will be developed; nor is it clear whether it would be cheaper to transport ore to a port on the west coast of Alaska or to connect the area with the state transportation system at Fairbanks, to the east. Both routes would severely disrupt villages on the remote Kobuk River as well as the caribou herd on which the villagers depend. There may be ways to ship the ore out without following the Kobuk River, crossing caribou migration routes or crossing d(2) lands. It is therefore too soon to establish a particular corridor or to delete parklands to accommodate mining access.

Should routes be needed through H.R. 39 areas in the future, the proposed legislation includes provisions for creating them. Upon the recommendation of the President and joint resolution of Congress, transportation corridors can be established anywhere on federal lands. This process is patterned after the procedure used successfully to choose the route of the proposed Alaska gas pipeline. Congress has shown by its actions on both the Alaska oil and gas pipelines that it will move quickly when it perceives a national need for resource development.

Would H.R. 39 restrict the economy of the state of Alaska?

Alaska will derive billions of dollars of revenues from oil royalties and taxes—at least a billion dollars per year, perhaps \$4 billion per year by 1990. The state university's Institute of Social and Economic Research projects sensational growth for the state because of these revenues. A Land Use Planning Commission study concludes, "neither the State's fiscal viability, nor more generally, the State's broad economic well-being is dependent upon availability of resources on the d(2) lands."

The state and the Native corporations are selecting most of the commercially valuable federal lands in Alaska. The state will be given public lands equal in size to California—the most generous state land selection in the history of our country. These lands, and the Native lands as well, are being chosen primarily for economic potential and community expansion. An Alaska Department of Natural Resources analysis shows that lands selected or identified for selection by the state cover between one fourth to three fourths of the most valuable areas in the state in all categories evaluated—agriculture, forestry, land development, oil and gas, coal, hard-rock minerals, wildlife habitat and fisheries.

Would H.R. 39 restrict national energy supplies?

In order of their importance, according to the Land Use Planning Commission economist, Alaska's energy resources include oil and gas, coal, uranium and geothermal formations.

The U.S. Geological Survey has mapped the areas of the state that have favorable or high potential for oil and gas. These total 38.4 million acres of onshore lands. Of the total, 1.9 million acres—about 4%—are within H.R. 39. Furthermore, most of Alaska's oil and gas is presumed to be located in offshore deposits, and therefore not affected by H.R. 39.

Virtually all of the land with possible petroleum deposits in H.R. 39 is within the existing Arctic Wildlife Range, in areas of high potential. President Carter personally made the decision to recommend wilderness status for the range because of its supreme environmental values. The oil lands lie within the calving area of the Porcupine caribou herd and are part of the most diverse and most extensive wilderness environment we can preserve in Alaska.

A study by the Office of Technology Assessment concludes that coal resources on the national interest lands are of marginal significance. The Land Use Planning Commission economist states that "economic considerations, as well as emerging ownership patterns, suggest that either State or Native coal resources will come into production well before coal on Federal Lands." According to the state's computerized inventory, 47% of the most important coal lands will be in Native corporation ownership, 24% has been selected by the state and only 5% is included within H.R. 39.

Uranium resources are difficult to estimate. Perhaps a quarter of Alaska's hypothetical and speculative deposits are under sedimentary basins within H.R. 39 refuges. The planning commission economist concludes that "barring national policies that directly or indirectly subsidize uranium exploration and production, it appears unlikely that Alaska uranium resources will be of real significance in the near future." Summarizing geothermal potential, the same analysis concludes, "The use of major subsurface geothermal resources for electric power generation is probably well in the future of Alaska. Technological problems, and the economics of competing sources are some primary factors." □

Benjamin A. Shaine is a consulting environmental planner in Anchorage, Alaska.



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Benjamin A. Shaine is a consulting environmental planner in Anchorage, Alaska.

Sierra's Other Cover

Finding beautiful photographs for Sierra covers is never a problem, but this month we were especially lucky. We found quite a number of outstanding shots and narrowed the selection to two—but then we couldn't eliminate either one. So this month we've decided to share with our readers both our "first" choices. This is a willow ptarmigan, Alaska's state bird, in its summer coat—it turns white in winter.



A Blockbuster Classic

DENNIS L. MEADOWS

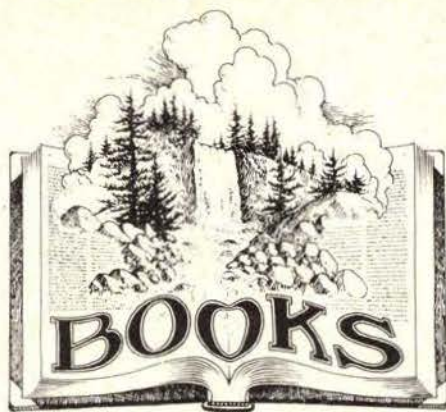
Ecoscience: Population, Resources, Environment, by Paul R. Ehrlich, Anne H. Ehrlich and John P. Holdren; W. H. Freeman and Company, San Francisco, 1977. Cloth, \$39.95; paper, \$19.95.

IN THE EARLY 1970s, when I began to teach courses designed to convey the basic tenets of the *Limits to Growth*, I chose *Population, Resources, and the Environment* by Anne and Paul Ehrlich and John Holdren as the most useful complementary text. It addressed in one volume the problems engendered by expanding population, economic activity and resource use. That book still stands prominently on my shelf, and I consult it frequently.

But much has happened since *Population, Resources, and the Environment* was first published in 1970. Resource scarcity is no longer an abstract worry for academics; it is tangibly manifested in the inflation, stagnation, and political pressures resulting from oil depletion. The global population has expanded by 500 million people. Massive amounts of information have accumulated as a result of the vigorous environmental movement of this decade. To feed this growing awareness of the potentials and problems inherent in the relationships of humans with the natural world, the same three authors have produced a greatly expanded and updated version of their original text.

Ecoscience is more an encyclopedia than a text book. Its 1050 pages, 370-plus illustrations and more than 1000 references contain the stuff of several books. Indeed several of the chapters—for example, the 125-page treatise on energy—are far more useful and substantive than many recent books on their respective topics. The authors use inserts to handle material so technical or specific that it is not likely to be of interest to the casual reader. In addition, at the end of each chapter there is a list of key references recommended for further reading, along with a list of many references, nearly 400 in one chapter, providing the factual basis for their analysis.

The text follows the general conceptual structure of its predecessor, but each section has been revised and enlarged, often significantly. The brief introductory chapter provides an overview of the predicament of humanity addicted to material expansion on a finite planet. It develops the



conceptual framework for each of the following sections. Section One includes three chapters on the physical and biological systems of the earth. Section Two covers population and renewable resources. Section Three describes energy and materials, and benefits from Holdren's involvement in virtually every phase of the current nationwide energy debate. Section Four deals with environment disruption—i.e., pollution and warfare—and the book concludes with five chapters on social, political and economic change and population stabilization policies. This section includes both analysis and the fine and necessary art of speculation about the future and the possibility for designing a sustainable society.

Although the prose is a pleasure to read, crisp and focused on hard data and historical experience, the text is understandably uneven in detail. The product of any small group will naturally reflect those individuals' professional interests. As a consequence, the sections on energy (Holdren) and population ecology (Ehrlichs) are particularly strong.

What is amazing, however, is the scope and detail across the enormous range of topics for a wide variety of readers. Even those areas in which I have focused my own professional activities are covered with material that I found comprehensive, up-to-date and thought-provoking. For example, the sections on economic growth and computer modeling of complex systems manage to convey in a few pages the frontiers of current work, the key issues and the principal actors.

This volume distinguishes itself significantly from the many that have appeared on human-environment interactions in the 1970s. Too many authors leave their readers incapable of constructive response to the problems they treat. Either the analysis of the ecological system excludes humans and their institutions, or the authors give little attention to the concrete policy options available for ameliorating

the problems. *Ecoscience* avoids both pitfalls. The Ehrlichs and Holdren have themselves participated in the basic research activities that provide improved bases for decisions, as well as in the policy studies and debates required to apply research to actions. Thus no other text I know of does a better job combining basic facts, case studies and analyses of policy options and priorities. □

Dennis L. Meadows is a co-author of *Limits to Growth* (Universe, New York, 1972) and co-editor of *Toward Global Equilibrium* (Wright-Allen Press, Cambridge, MA, 1973). He teaches engineering and business at Dartmouth College.

Does Information Follow Policy?

JOHN S. ROSENBERG

The Zapping of America: Microwaves, Their Deadly Risk, and the Cover-Up, by Paul Brodeur; W.W. Norton, New York, 1977. \$11.95.

"One of the prevalent myths of our time," George Wald, Nobel-prize-winning biologist, once wrote of nuclear power, "is that Government policy is based on the best obtainable information—that if the Government knows which policy will most promote the public welfare it will adopt that policy." But he found, "almost the opposite is true. A policy having been decided on—usually for economic or political reasons—the information is sought that will support it. That is, information follows policy, rather than the other way around." Even in universities, supposedly disinterested research is conducted "in a heavily biased context," because government provides the funds.

Those advocating nuclear power, for example, find that their activities "enlist large political and financial support, and are greeted with official approval, eager acceptance and wide publicity." Critics find that an "opposition viewpoint offers no reward but its own conviction. It has no client, unless society at large becomes its client." Given the intellectual difficulty of recognizing and understanding the unknown, these pressures discourage the discovery of the dangerous effects of new technologies.

Precisely this story is told, again, in Paul Brodeur's furious new book, *The Zapping of America*. Microwave radiation represents more than the possibility of a major new environmental hazard. The real question raised by yet another exposé is whether our scientific and social institutions are keeping up with technological innovations.

Microwaves seem useful and harmless: they cook food, broadcast news, carry telephone calls, detect aircraft. Brodeur reports that in the past 30 years, the number of nonmilitary transmitters authorized by the Federal Communications Commission has increased from 50,000 to 7 million.

It has long been known that microwave irradiation creates intense heat and can accidentally cook human eyes to opacity. But because microwaves do not rupture cells and traumatize tissue the way ionizing radiation, X-rays and gamma rays do, the U.S. has presumed that, except for possible thermal effects, they are harmless. The American standard for exposure, ten milliwatts per square centimeter of body surface, is a thousand times the level permitted in the Soviet Union; it is based on theoretical, not empirical research. And it does not reflect awareness of alarming symptoms experienced by those exposed to low-level radiation over a long time.

Brodeur combs the literature to present evidence that the government is ignoring classic warning signs among the occupational groups exposed to microwaves more frequently than is the public at large: unique cataracts and rare pancreatic cancers occurring with more than coincidental frequencies; blood-cell irregularities, heart attacks and broken chromosomes detected among the American Embassy staff irradiated in Moscow; crude correlations between fathers' exposure and increased mongolism and abnormal proportions of females among their offspring.

The pattern of abuse repeats that established by X-rays, asbestos (the subject of Brodeur's *Expendable Americans*) and other damaging agents: workers, brought into close contact with the technology, serve as experimental "subjects." Based on their reactions, perhaps decades too late, arbitrary "standards" are made more stringent, but without any ultimate confidence that safety is thus assured. Much of *Zapping* contains reports of the first casualties from the front lines, the victims of microwave irradiation.

Brodeur establishes that the "information follows policy" syndrome described by Wald is again appearing. The scientists who discover malign effects are suddenly without research funds, and a climate has

been created "in which, over nearly a decade, a number of leading microwave scientists have received government research money to investigate the biological effects of low-level microwave radiation even though during this entire period they have publicly disparaged the possibility that such effects might exist."

The government's advisory groups and standard-setting panels exhibit what in business are called "interlocking directorates"—the same people serve on every committee, and they dismiss suggestions that there are hazards and postpone effective regulation. Of the American National Standards Institute subcommittee on non-ionizing radiation Brodeur notes, "At least thirty-five of its sixty-eight members represent the Army, the Navy, the Air Force, NASA, the microwave-oven industry, the Association of Home Appliance Manufacturers, the electronics industry, and the aerospace industry, or have conducted research on the biological effects of microwaves for one or more of these organizations."

As is the case with atomic energy, private industrial use of microwaves is tied to its military applications. The Department of Defense dominates research into the effects of its own microwave projects and classifies its findings as secret more often than it releases them to the public. Not surprisingly, the Pentagon's research goals are self-serving. Brodeur cites one document, on electromagnetic radiation (EMR): "The principal objective of the EMR research program is to maximize personnel safety while minimizing operational constraints." This is interpreted by the study directors to mean that the existing radiation standard must be defended against new evidence, for "Unless the Services develop and support a coordinated EMR bio-effects research program, the DOD will be confronted with continuing pressure from other Federal Agencies to insure more restrictive EMR occupational and environmental protection standards."

There is another, more disturbing implication of Brodeur's work, beyond the apparent inability of microwave-using agencies to police themselves—other government agencies cannot regulate the

Pentagon, either. It is easier for the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) to find out about and to change the use of vinyl chloride in industry than to regulate factories building electromagnetic pulse equipment for the Pentagon. When "national security" is invoked, the regulatory agencies defer to the expertise and resources of the military. The FCC, FAA and EPA are no better off; all depend on the military for monitoring equipment, manpower and basic research.

We know about microwaves, then, neither from scientists outside government nor from agencies within. We lack neutral, objective institutions that can provide us with information, that can help us assess the benefits of a new technology and temper or accept its adverse consequences. Agencies promoting a technology cannot be expected to perform this work; nor do rival regulatory agencies seem able to; nor are there impartial facilities for such research and evaluation in the academic community. So, "for the first time in evolutionary history, we have begun to subject ourselves to levels of microwave and radio-frequency radiation that are millions of times as high as those occurring naturally in the biosphere . . . entirely without any idea of how such radiation may affect us, let alone of how it may affect future generations."

At issue is not the application of government regulation to this pesticide or that source of radiation. Brodeur thinks that our mechanisms of choice—as consumers, as voters—are being subverted or rendered obsolete. "It is entirely possible," he concludes, "that, regardless of how bad the situation may turn out to be, microwave radiation might pose a hazard people will choose to tolerate and continue to live with."

In other words, the future of human evolution depends more upon social innovation than upon technology. Just now, the mechanisms we have for knowing about and controlling our effects on the environment seem dangerously antiquated. □

John Rosenberg's writing has been published in Environmental Action, The New York Times and The Washington Post.

Answers to puzzles from pages 34 and 35:

Beaks and Feet

Hairy Woodpecker 3,
Common Snipe 5,
Blue-winged Teal 1,
Canada Warbler 2,
Sharp-shinned Hawk 4.

Beetlemania

5 and 9—Tiger Beetles
(Cicindelidae);
3 and 12—Ground Beetles
(Carabidae);
2 and 10—Stag Beetles

(Lucanidae);
1 and 11—Scarab Beetles
(Scarabaeidae);
6 and 7—Leaf Beetles
(Chrysomelidae);
4 and 8—Snout Beetles or
Weevils; (Curculionidae).

NEWS

■ Carter Calls for More Logging

In his anti-inflation message in April, President Carter directed an immediate 30-day study of ways to increase logging on federal, state and private forests, suggesting that more cutting will "help ease housing prices." Brock Evans, director of the Sierra Club's Washington office, responded: "All the studies and data now available, even from the U.S. Forest Service itself, indicate that the national forests are being overcut, and the trees just aren't there." He said that if increases in the wood supply are desirable to fight inflation, they are better obtained by stemming the tide of log exports and by adopting more efficient methods of logging and milling existing supplies. The Club is hoping to demonstrate to the Administration that any more logging in the public forests will have drastic environmental impacts.

■ Redwood National Park Bill Signed

Efforts by environmentalists to expand and protect the Redwood National Park have finally been rewarded. On March 27, President Carter signed a bill to expand and protect the boundaries of the park. Doubling the park's existing size by adding 48,000 acres of land and hailed as a landmark case of cooperation between environmentalists and labor, the bill contains strong worker protection provisions. The President said, "This Act will permit more people to visit the magnificent groves along Redwood Creek that contain the world's tallest trees and will ensure that those trees are adequately protected." The President also acknowledged Representative Phillip Burton, (D-California), and Senators Alan Cranston (D-California), James Abourezk (D-South Dakota) and Clifford Hansen (D-Wyoming) for their contributions to the legislation's passage.

■ Tippah River Lawsuit Victory

A U.S. District judge has ordered the Soil Conservation Service to halt its plans to dredge the Tippah River in northern Mississippi. The project would have cost taxpayers \$500,000 to \$700,000 and would have had a serious adverse impact on fish and wildlife. In the precedent-setting opinion, the judge ruled that the Soil Conservation Service decision to try to fund the project using emergency funds was legally incorrect. The suit was brought by the Sierra Club. Chris Jacob, Conservation Chairperson of the Club's Central Mississippi Group, said that this victory "will serve notice to conservationists and sportsmen that the effort to fight stream channelization and to preserve natural streams is gathering steam."

■ Wilderness Review of Public Lands: Club Programs Under Way

The Bureau of Land Management has begun a major effort to review the public lands under its jurisdiction in order to identify areas for possible wilderness designation. The BLM's review of its 446 million acres, chiefly in the western states, is scheduled to be completed by October 1991. Many Club members are participating in this process, and the first in a series of fact sheets designed to promote citizen involvement is available from the Club's Information Services Office in San Francisco.

The Forest Service is continuing to work on its Roadless Area Review and Evaluation Program (better known as "RARE II"). A new Club fact sheet about citizen participation in this program to identify potential wilderness areas in the national forests is also available from the Information Services Office (Ask for RARE-II Bulletin #4).

■ Nuclear Wastes in New Mexico

The U.S. Department of Energy (DOE) is advancing a proposal for a nuclear "waste isolation pilot plant" near Carlsbad, New Mexico. Environmentalists in New Mexico are concerned that DOE has been less than candid with them about the ultimate size and scope of the facility and is moving ahead too quickly.

The proposed facility was originally described as experimental and designed only for low- to middle-level military wastes. However, environmentalists have obtained documents indicating that the facility is, in fact intended for use as a repository for high-level wastes, including some from commercial nuclear plants.

New Mexico environmentalists are concerned about the long-term geologic integrity of the salt beds where the wastes are to be stored, and they question whether the storage containers will be recoverable if the system doesn't work.

DOE is moving to obtain a license for the facility, but public opinion polls show New Mexicans opposed 2 to 1 to waste storage in their state. The state legislature is considering a proposal to ban the shipment of nuclear waste materials to New Mexico from other states. One Santa Fe resident recently expressed the view of many state environmentalists when he said, "We are already giving our water away to other states, and we pollute our air so they can run their hair dryers in Los Angeles. Why should we be the nuclear dump for the whole country?"

News

■ Honeycreeper Files Suit

The palila, an endemic Hawaiian bird living on the slopes of Mauna Kea, has sued the Hawaii Department of Land and Natural Resources for its life. The Sierra Club, the National Audubon Society and the Hawaii Audubon Society are coplaintiffs in the suit, which was filed in Honolulu federal court.

The palila, *Psittirostra bailleui*, a member of the Hawaiian honeycreeper family, is an endangered species whose known remaining population exists at elevations between 7000 and 10,000 feet on Mauna Kea. The land is state-owned and administered by the Department of Land & Natural Resources.

The bird and its coplaintiffs allege that the department is purposefully maintaining populations of nonnative feral goats and sheep within the palila's habitat for sport-hunting purposes and that these game animals are destroying the palila's remaining habitat. The suit also charges that the department's maintenance program and refusal to remove the goats and sheep from the palila's critical habitat area violate the federal Endangered Species Conservation Act. The palila is asking the court to order the department to permanently remove the goats and sheep.

■ Absaroka-Beartooth Wilderness

President Carter has signed a bill to designate an Absaroka-Beartooth Wilderness area in Montana. The 904,500-acre wilderness adjoins the northern boundary of Yellowstone National Park. The bill had the enthusiastic support of the late Senator Lee Metcalf, who was instrumental in its passage.

■ FTC Insulation Hearings

In response to public complaints about insulation ripoffs, the Federal Trade Commission (FTC) has drafted regulations calling on manufacturers to disclose the "R-values" of insulation materials. The FTC says it is the R-value — resistance value, a measure of insulating ability — not the thickness of materials that is important. Club testimony on the proposed regulations was presented by Dr. David Reister, a member of the Club's National Energy Policy Committee. "Our position is that the proposed rule is not enough," Reister said. "It's a useful first step, but there are other things that are just as, if not more, important." Reister suggested, among other things, requiring disclosure of all significant insulation factors, such as settling, flammability and corrosion in addition to R-values — and an improved definition of the R-value itself.

■ Nuclear Licensing "Speed-Up" Bill

President Carter has sent to Congress a "Nuclear Siting and Licensing Act," that, according to a leading environmental group, "represents an open and blatant departure from the fundamental principles of due process that have been the backbone of every environmental issue." The bill would reduce the mandatory safety level of reactors, drastically cut planning and hearings processes, and allow interim operating licenses in cases of "urgent public need or emergency," with no requirement of site-specific health and safety findings. In addition, the legislation would limit the ability of citizen groups to bring lawsuits.

■ Peripheral Canal Votes

In the recent annual election, the Sierra Club membership voted to oppose the Peripheral Canal proposed for northern California but also voted that the full membership should not decide the Club position on the canal. The board of directors' interpretation of the ballot resulted in a two-part resolution: 1) that the members had affirmed the Club's traditional opposition to large water-development projects and interbasin transfers, and 2) that the members reaffirmed the Club's policy of making regional decisions at the regional level. The board referred the Peripheral Canal issue back to the northern and southern California regional conservation committees for continuing review and consideration.

■ Club Organizes Clean Air Workshops

The Sierra Club has received a grant from the Environmental Protection Agency to conduct a series of citizen workshops on the implementation of the 1977 Clean Air Act Amendments. The grant gives the Club lead responsibility for organizing 25 workshops to be held west of the Mississippi. The program will provide a good opportunity for Club members to continue their efforts to prevent air pollution. Contact the "Clean Air Project" in the Club's San Francisco office if you are interested in participating in one of the workshops.

■ Club Book For Young People Wins Award

The View from the Oak: The Private Worlds of Other Creatures by Judith and Herbert Kohl has won the National Book Award in Children's Literature. The book is one of the first titles in a new publishing program for young readers by Sierra Club Books and Scribner's.

Beetlemania



Can you match the pairs?

Beetles come in many shapes and sizes, but when you closely observe them you will find that they may be grouped into families. The twelve beetles shown here, for example, may be grouped in pairs representing six different families. Can you group them correctly? A hint: look at each body part carefully and pay more atten-

tion to the shapes of the beetles than to their colours. When you think you've got your beetles paired, check the following features to see if you have done it correctly. (Answers on page 31.)

Look at the *antennae*. These highly sensitive organs that grow from the head come in many forms: long and thin,

short and stubby, irregular and even in shape. The two beetles in each of your pairs should have matching types of antennae.

Look at the *tarsi* or feet. The tarsi also come in various shapes and the tarsi of your pairs of beetles should match. Match the front tarsi of one

beetle to the front tarsi of another, then the second and back tarsi in the same way.

The process you have just gone through will give you a good idea of how, through detailed study, the animal world is classified into various groups.

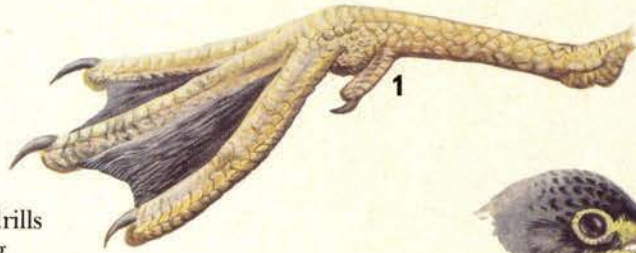
Beaks & Feet

Here are beaks and feet belonging to five different birds. These beaks and feet are specially formed to help the birds feed.

Can you guess which belong together? The clues below will help. The answers are on page 31.



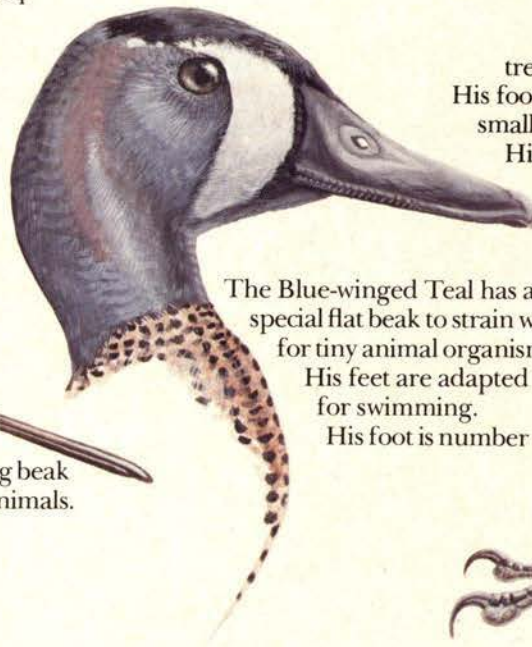
The Hairy Woodpecker drills holes into tree trunks looking for insects, so he has a powerful chisel-like beak. His foot is designed to help him brace himself on the tree trunk. His foot is number .



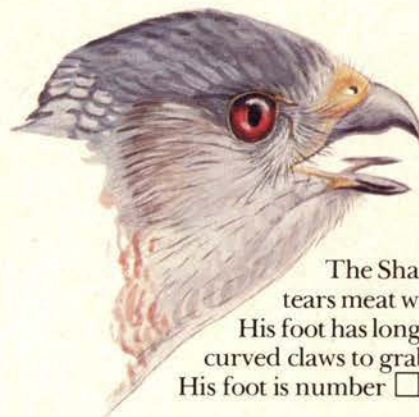
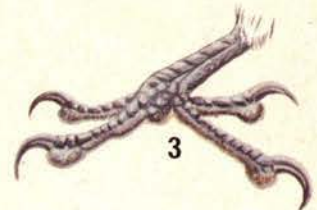
The Canada Warbler lives in trees and catches insects. His foot is shaped to clutch small branches. His foot is number .



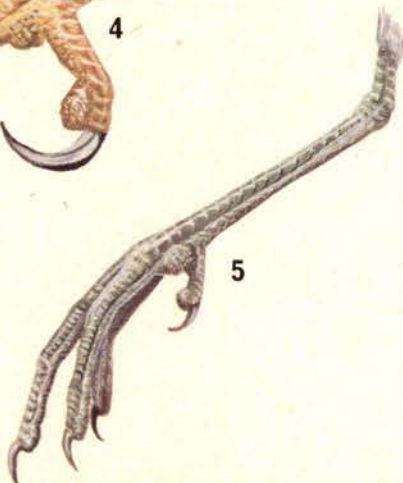
The Common Snipe wades in shallow water where he uses his long beak to probe the mud for small animals. His "leg" is long and he has long toes to help him balance. His foot is number .



The Blue-winged Teal has a special flat beak to strain water for tiny animal organisms. His feet are adapted for swimming. His foot is number .



The Sharp-shinned Hawk tears meat with his beak. His foot has long, sharp, curved claws to grab prey. His foot is number .



Citizens' Mining

IN WORKING TOWARD the setting aside of the rugged 68,000-acre Scotchman's Peak area straddling the northern Idaho-Montana border, members of the nearby Northern Rockies Chapter and of other environmental groups concluded that the mining interests had the upper hand. They were faced with two options: sit back and wait for the inevitable, or act. They acted—they decided to go into the mining business.

Early in 1975 they formed a grassroots advocacy organization called Northwest Citizens for Wilderness. Then they quietly set about filing selected mining claims over what was believed to be one of the most promising areas for mineral deposits. In the meantime, they waited for a U.S. Geological Survey report on the area; the completed report confirmed their fears. Indeed, there were potentially significant deposits of stratabound copper and silver at Scotchman's Peak. The Citizens' "prospectors"—a team of eight to ten people—then began to round out their claims, especially where the richest ore bodies were indicated. The whole purpose of their efforts was to set up a viable mining venture that would use appropriate technology for extracting minerals in a fragile wilderness. Theirs would be a "pick and shovel" operation. Early in 1977 they incorporated their enterprise as the Northwest Citizens for Wilderness Mining Company, Inc.

None of the weekend prospectors or others associated with the venture had anything beyond a nodding acquaintance with mineralogy or mining law. They learned fast, however. Before any claims could be filed, of course, the time-consuming, tedious job of searching county records had to be completed. In so doing they found that a key area was already claimed by an affiliate of American Smelting and Refining Company (ASARCO), but further research also revealed that annual assessment work had not been maintained, an omission which invalidated the company's right of possession. In addition to ground exploratory work and filing their way through the jungle of mining law, the environmentalists also had to keep a tight rein on expenses. The cost of filing just one twenty-acre mining claim is \$9—not much to ASARCO, perhaps, but plenty to Citizens Mining. Only days after Citizens filed its 22 claims on the invalidated area, ASARCO "blanket" claimed 2080 acres (8140 claims) in the same region. But because the eco-miners had incorporated and established valid mining claims, they were on an equal footing with the industry. Thus



ROBERT A. IRWIN

they were able to instigate an administrative hearing and later win a decision that invalidated ASARCO's "adverse interest."

ASARCO had staked "blanket" claims by helicopter in late 1976 (while eco-mining prospectors were exploring on the ground) by dropping orange-striped, perforated PVC sewer pipe as "discovery monuments." Shortly after, Mike Comola, coordinator for Northwest Citizens for Wilderness, wrote to ASARCO protesting the littering of the area with plastic pipe and asking that the debris be removed. He noted that Citizens Mining was proud of its operations, which would always be "absolutely compatible with both the pristine quality of this scenic area, local social economic structure and imminent wilderness designation."

Citizens Mining has completed its assessment work—surveys and environmental studies—but it still faces a challenge from ASARCO. According to Citizens President Cesar Hernandez, ASARCO has jumped a number of claims in what he sees as a deliberate attempt to exhaust the eco-miners' resources in legal battles. The embattled pick-and-shovel miners need help. Get in touch with Northwest Citizens for Wilderness Mining Company, Noxon, Montana 59853.

Local Color

The Ohio Chapter's Miami Group, centered in Cincinnati, held the tenth annual session of its nationally known Canoe College last spring. Designed to teach water safety, canoeing skills and river lore to members and nonmembers alike, the group's college has been graduating capacity classes of 200 canoeists a year since its founding in 1968.

The college holds its sessions at a

YMCA camp nearby in Indiana on the Whitewater River, a moderately rapid stream with a six-foot-per-mile gradient that offers some interesting fast-water stretches, according to Allan Sawtelle, editor of the group's newsletter, *Miami Happenings*.

A weekend starts with an early-morning Saturday classroom session of demonstrations, slides and movies of paddling techniques and river reading—these are developed by the local volunteer staff. By 10:30 the classes move to the river. There, groups of ten students each are dispersed along ten miles of river. Each group has three volunteer Sierra Club instructors, all previous graduates who have taken special instructors' training. After a short river-bank indoctrination, the groups take to the water to work on ferrying tactics, eddy turns, and peeloffs—and, occasionally, some unscheduled canoe retrieval and righting techniques. Lunch on the river makes possible several hours of uninterrupted river experience before the return to "campus."

After a boaters' banquet, Saturday evening is spent square dancing and viewing slides and movies of Sierra Club canoe and kayak outings. The Sunday session, too, gets off to an early morning start with another classroom session, followed by a river trip for more practice of newly acquired skills. Back at the camp, the students take a written quiz, after which each one is presented with a Doctor of Downriver degree.

The fee for the weekend is a modest \$30, which covers lodging, all meals and tuition. By conservative estimate, Sawtelle says, at least 1000 hours of volunteer labor are contributed to each session. Because of this, the Miami Group's net profit of from \$1000 to \$1500—which figures out to a slave-labor rate of less than a dollar an hour—gets soft-pedaled. Nevertheless, Sawtelle comments, it does provide a major boost to the group's budget. Beyond the financial plus, the Canoe College gives canoeists a strenuous and exciting learning experience—with the result that many ask to repeat the course.

\$1000 Reward

\$1000 will be donated by an anonymous donor to the Sierra Club Wildlife Committee if any member can describe two personal sightings of wild, free-roaming mountain lions. If possible, verification or photos would help; also, date, time, place and circumstance. Send information to Bob Hughes, Wildlife Committee, Box 2471, Trenton, NJ 08607.

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Staff Honors

Some of our staff leaders are also leaders in the environmental community at large. Michael McCloskey, Sierra Club executive director, chairs a committee of the International Union for the Conservation of Nature. The IUCN is the only federation comprising worldwide conservation groups and governmental agencies. It does its work through six major commissions. McCloskey vice-chairs the Commission on Environmental Law, Policy and Administration and, within that commission, chairs the Committee on Environmental Policy.

Brock Evans, director of the Club's Washington, D.C., office, chairs the Natural Resources Council of America this year. The NRCA is an affiliation of most of the conservation and natural-resource groups in the country. It's a distinct honor for the Club that McCloskey and Evans have attained these positions.

A Reading Bibliography of Muir

SCHOLARS OF John Muir's writings, please note: William P. Wreden, of Palo Alto, California, has recently published *John Muir, A Reading Bibliography*, by William F. Kimes and Maymie B. Kimes. A complete and beautifully annotated bibliography of Muir's writing, this handsome volume is also an example of bookmaking at its finest. The Club library has a copy for visiting scholars.

In Memoriam

Marshall H. Kuhn, who founded the Club's History Committee and chaired it for eight years, died in May. He had been given a Special Achievement Award for his efforts to preserve the Club's history, at the recent annual banquet. Marshall Kuhn was well known in San Francisco as an active environmentalist and as a leader of the Jewish community. He is sadly missed.

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The Tragedy of One-Shot Forestry

LEON S. MINCKLER

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THE DEVELOPING pattern of forest management in the 50 eastern national forests is like a personal tragedy to me. I am puzzled and dismayed by the five new management plans I have seen for national forests from Vermont to South Carolina. They call for clearcutting and even-aged management for most of the mixed hardwood types of forest area close to heavily populated areas. The plans show a relative insensitivity to nontimber values and propose an almost exploitative, primitive silviculture, with the objectives of short-term financial returns to the timber operator and ease of administration and future management by the Forest Service. Where will the public forester use the professional science and skills he was taught in college? When will he get a chance to manipulate forest vegetation for the integrated values of timber, wildlife, recreation, watershed and aesthetics? How will the small private owners, who own most of the commercial forests, react to this example by government? How can this course of action be considered the wise use of a great natural resource? This is my personal and professional tragedy and, I believe, a tragedy for the American people. After a lifetime of research, actual forest management and teaching in the complex field of silviculture, all I have learned has been cast aside. Our bureaucrats will designate a boundary of timber, and the operator will simply harvest all the trees, large and small, regardless of quality or species, and the next clearcut will be 80-120 years hence.

How can this be? The Forest Management Act of 1976 has noble and true words about the importance of environmental values, about the relative unimportance of dollar values alone, and says in so many words that clearcutting shall not be used unless it is the "optimum" method. But there is a catch. The discretion and the judgment are left to the professionals in the Forest Service. This seems just and logical, and I had high hopes that the management plans would concede the need for balancing social needs and an understanding of the ecological underpinnings of the art of silviculture. However, in the five new plans I have seen, neither requirement has been met. The "discretion" has been exercised all in one direction—cheap timber production on the bulk of the forests. How can any professional agency prescribe *one* silvicultural system for the vast diversity of types, topography and climates that constitute eastern United States forests? Unless the Forest Service does a better job of interpreting the intent of Congress, as expressed by the Act of 1976, there may well be endless lawsuits to implement the law, or Congress will pass a new law. The relatively small amount of clearcutting done prior to the Monongahela decision was, as it

turned out, illegal. But now the Forest Service seems to believe it has a legal basis for almost universal clearcutting, and it is acting accordingly. Herein also lies a tragedy for the forestry profession. It is ironic, indeed, that widespread clearcutting should be initiated just when the environmental movement has captured the imagination of the American people.

What are the consequences of large-scale block clearcutting of eastern hardwoods? And what are the alternatives? The consequences (compared to the alternatives) are greater waste of timber, lower environmental values and greater danger of damage to soil, site and water. Let me explain. Most of the individual trees in eastern hardwood forests are now below mature saw-timber size. But clearcutting harvests these smaller trees, just when they are growing fastest. This is a waste. Management plans estimate 100 years or more to harvest an entire national forest by this method, which means that the early cuts, during the next 20-40 years, will be made in the immature stands. Cuts made during the last part of the period, 70-100 years from now, will be made in overmature stands. That, too, is a waste and the 100-year period of regulation is completely unrealistic where conditions change so rapidly. Clearcutting closes management options for a very long time.

The alternative of group selection combined with improvement cutting (or thinning) and small-patch clearcutting would harvest only the mature, low-quality and cull trees, and the forest could be entirely treated and greatly improved in about a third of the time. It would cost more and take more professional skill than clearcutting; it would be classical intensive forestry.

Block clearcutting provides diversity only by large blocks, and there would be no full diversity of age classes until the first 100 years had passed. Group selection provides a mosaic of diversity in small areas from an eighth- to a half-acre in size or sometimes larger. There would be dispersion of age classes throughout the forest, diverse areas would be close together and would provide maximum edge effect for wildlife. Both the on-site aspects and the visual effects from afar would be pleasing. There would always be a natural, diversified forest.

The crisis in forestry has been caused by failure to reconcile and balance the values of the timber as a commodity, the forest as an environment, and the integrity of the forest-site-soil-water ecosystem. Such a balance cannot be achieved by the one-shot system of clearcutting and even-aged management now being proposed for the eastern national forests. But it can be done by professionally intensive and somewhat more costly methods of ecologically based and socially aware silviculture. The small woodland owners may not clearcut, but neither will they practice much forestry until they feel secure about the nontimber values they cherish. They need help. If the Forest Service will not or cannot reconcile and balance forest values, then Congress or the courts will have to act again. □



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