

High Country News

November 20, 1989

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A Paper for People who Care about the West

One dollar

THE WEST'S FOULED WATERS



PART 1:

Billions for quantity, but not a penny for quality

Dear friends,



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Faith in the future

Two subscribers thus far believe that *High Country News'* recent twentieth anniversary was no fluke. Al Oestreich of Cincinnati, Ohio, and Mr. and Mrs. Osborn Segerberg of Kinderhook, N.Y., have taken out 20-year subscriptions. The two-decade subscriptions cost \$400 and will relieve you of writing renewal checks through the year 2009.

Checks are in the mail

Development director Linda Bacigalupi reports that the 1989-1990 Research Fund appeal is running ahead of last year. For those new to *HCN*, the Research Fund provides 35 percent of the paper's annual income. Each year, approximately 20 percent of all subscribers make a tax-deductible Research

Fund contribution.

Thanks to the Research Fund, *HCN* is 16 pages of editorial matter rather than 16 pages of news sprinkled amidst 48 pages of advertising, bound and loose inserts, and advertising supplements. Thanks to the newspaper's tax status as a charity, our subscribers are our advertisers.

Congratulations

Congratulations to subscriber Paul Fritz of Boise on being voted Oregon's Conservationist of the Year by the Oregon Natural Resources Council. He received the award for his park studies of the Siskiyou Mountains and Hells Canyon/Wallowa Mountains areas in Oregon. Paul is the former superintendent of the Craters of the Moon National Monument in Idaho.

Congratulations also to Tom Wolf and Cynthia Hermes of Santa Fe on their recent nuptials. Tom is a Nature

Conservancy staff member and an occasional contributor to *HCN*. His December 1983 article on how the Bureau of Reclamation almost lost Glen Canyon Dam to the 1983 Colorado River floods was the most mentioned *HCN* article until he wrote an essay for us in fall 1988 titled, "Wyoming is dead — long live Wyoming."

Rockies and roll

The joke in the office is that *HCN*, which has long covered the Rockies now must begin covering the Rollies. The inspiration for this terrible pun is a page 21 mention of *High Country News* in the Nov. 30 issue of *Rolling Stone*. The brief article said, among other things, "... politicians, editors, reporters, the executive director of the Sierra Club and people who live nowhere near the Rocky Mountains subscribe."

—Ed Marston for the staff

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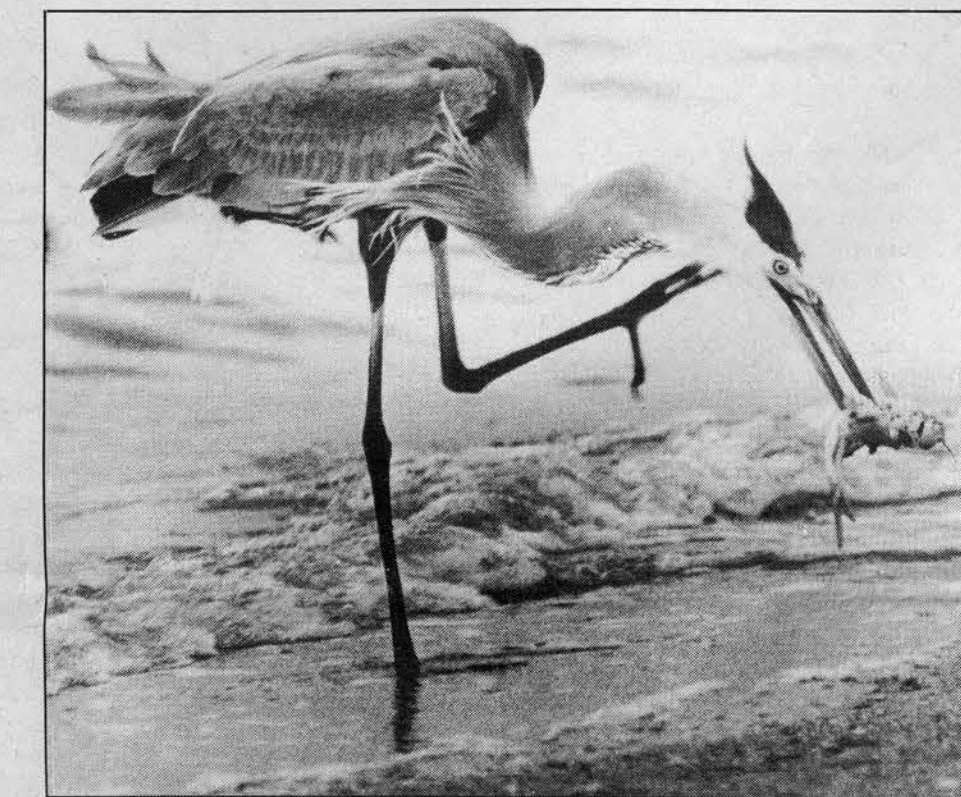
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WESTERN ROUNDUP

Sleuths hunt tree-spikers at a university

"I'm absolutely certain that Ron Erickson had zero to do with any tree-spiking," says Tom Roy, who directs the University of Montana's environmental studies program. "He's being used as a scapegoat."

But Erickson, a long-time professor in Roy's program, was issued a federal grand jury subpoena Oct. 4 in connection with a tree-spiking incident in the Clearwater National Forest near Powell, Idaho. Seven other Missoulians and an Idaho man were also subpoenaed in the investigation that began last spring.

In mid-April, a letter to the Forest Service in Idaho said 500 pounds of 8-10 inch bridge spikes had been driven into trees to block a proposed timber sale along the Lochsa River in the Clearwater.

Agency officials quickly found that the trees had been spiked, and launched an investigation of environmental activists in the region. They focused on Missoula where the letter was postmarked.

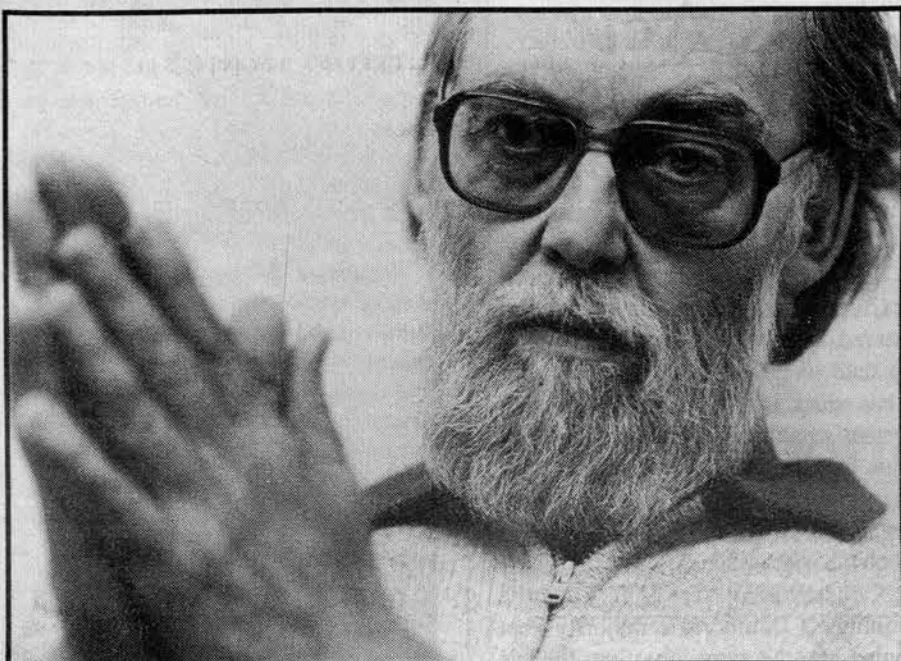
Erickson, who cites energy issues and air and water pollution as his main academic concerns, taught two classes on deforestation and environmental ethics last spring. The deforestation class dealt mainly with tropical forests, he says, and his ethics class only touched on tree-spiking following a satirical tree-spiking skit by students at a campus festival in April.

Tim Bechtold, another subpoenaed witness and a student in the environmental studies program, describes the skit as a "spoof," but he guesses that investigators may be viewing it as a promotion of tree-spiking activities.

Erickson says several investigators approached him in August, saying they wanted to question him, but never followed up. Then, in early October, one of Erickson's students apparently implicated him in the tree-spiking, prompting the subpoena.

"It has been a shocking experience," says Erickson. "I have paid very little attention to tree-spiking as an issue, so receiving the subpoena was surprising and disturbing." He adds that he didn't even know where the Clearwater was located until he asked a colleague last summer.

Other people subpoenaed say they don't know what evidence implicated them. Four are in the University of



Kurt Wilson

University of Montana professor Ron Erickson

Montana's environmental studies program, and all are active in environmental circles. Several have been involved in Earth First!, an environmental group usually associated with "monkey-wrench" environmental tactics such as tree-spiking.

John Lilburn, one of the subpoenaed witnesses whose house was searched last April, has been active in Missoula Earth First! for two years. "The feds are fishing," he says. "As far as I know, none of the eight people subpoenaed were involved in the Clearwater tree-spiking."

University officials say they are puzzled and disturbed by the subpoenas, and are trying to offer what support they can. Joan Newman, the university's legal counsel, says her main concern is that the issuing of the subpoenas "implicates things said in the classroom, challenging the classroom as a free marketplace of ideas." The frustrating aspect of the subpoenas, she adds, is that because they are investigatory in nature it is hard to know what to do.

Maureen Curnow, the chair of the faculty senate, says she is organizing a forum to discuss issues of academic freedom. The executive committee of the faculty senate has already passed a resolution stating its support for Erickson and the environmental studies program, she says, and the group formally opposed any intimidation of academic freedom. The resolution also urges the university to give Erickson legal support.

Environmental studies director Tom Roy has already established a "Constitutional Defense Fund" to help Erickson and the subpoenaed students defray legal costs. Roy is at 541 Evans, Missoula, MT 59801 (406/243-6273).

All of those subpoenaed have submitted the requisite fingerprints, and hair and writing samples to federal offices in Missoula and Boise.

Lilburn says the writing samples included such phrases as "Ed Abbey Lives," "Idaho Earth First!" and the word "stump." He speculates that these are probably in reference to the April letter.

The grand jury will analyze the evidence to determine if it can make any convictions in the case. Under grand jury restrictions, none of the investigators were able to comment.

Erickson says he expects they could either proceed quickly or "take their own sweet time." He adds that it will be "interesting to see how it all unfolds."

— Kate Gunness

BARBS

The Wall Street Journal tells it like it is.

In reporting on a Forest Service decision not to replace a wooden Smokey Bear ruler given to school children with a plastic model, David Wessel of *The Wall Street Journal* says, "In an agency that exists to promote the use of trees, plastic simply wouldn't do."

BARBS

Get lost ... really.

After mobilizing a helicopter search for a hunter who was actually safely back in town, rescue officials are asking hunters "to be a little more careful in getting lost," reports the *Hungry Horse News* in Montana.

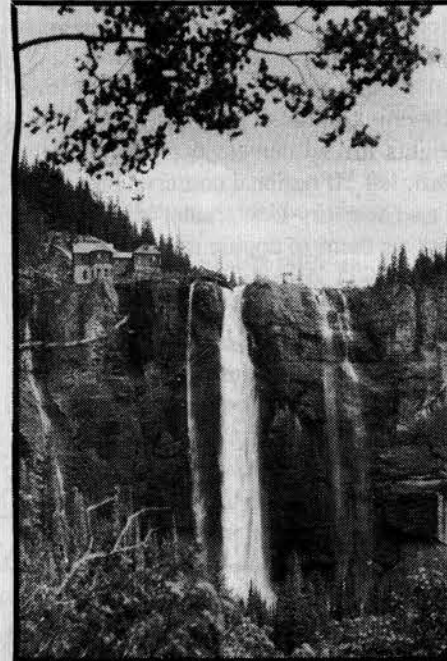
HOTLINE



Just say no

States suffering from federal pressure to store radioactive waste from the Rocky Flats weapons plant can now find relief in a "Fend Off the Feds Survival Kit." An environmental coalition presented the kits, complete with slings for twisted arms, to the governors of Tennessee, South Carolina, New Mexico, Idaho, Nevada, Washington and Colorado on Nov. 2. A letter accompanying Colorado Gov. Roy Romer's kit urged him and the other governors to encourage President George Bush and Secretary of Energy James Watkins to "declare an immediate moratorium on weapons production at Rocky Flats, while allowing cleanup efforts to continue." Along with the sling, kits included enlarged plastic lips so federal officials can clearly see the governors saying "no" to radioactive waste, a red pen to write "reject" on federal proposals for waste storage and an envelope for sending the rejected proposals back to Washington. Among the groups that sponsored the kits and letters were the Colorado-based Rocky Mountain Peace Center, Citizen Alert in Nevada, the Environmental Policy Institute/Friends of the Earth and Greenpeace USA in Washington, D.C., and the Snake River Alliance in Idaho.

Ingrid Lundahl



Bridal Veil Falls, Telluride, Colo.

Camping in a ski town

About 40 residents of a western Colorado ski town will be sleeping in the park this winter. For \$70 a month, Telluride area employees can rent one-half a site in the town park campground, set up their tent, camper, VW bus or shanty, and settle in for a long, cold winter in the 8,500-foot-high resort town. Town councilman Steve Smith said the new arrangement will only scratch the surface of a housing crunch so severe it may affect more than 200 ski-area employees. "Putting them in the park is not very civilized, but it's a way for some of these people to be able to stay here," he says. "A lot of these people have been in Telluride for more than a year and can't find a place to live that they can afford." Campground residents will have running water in the bathrooms, and an on-demand hot water heater has been installed for showers. Smith said the average fare for a one-bedroom apartment in the ski town is more than \$350 a month.

HOTLINE

Hopi priest helps FBI

An 82-year-old Hopi priest recently helped FBI agents raid a New York City antique show by identifying a mask stolen from his Arizona reservation earlier this year. Herman Lewis, priest of the First Mesa Kachina Society, had only left the reservation twice in his lifetime before he ventured to New York to identify the 140-year-old Wupoma mask. Regarded as a living deity by Kachina Society members, the mask is part of ceremonies initiating Hopi children into adulthood. Not having the mask, said Gary Kimble of the New York-based Association on American Indian Affairs, prevented the tribe from conducting its rite-of-passage ceremony. Kimble said the stolen mask was apparently sold to a Santa Fe art dealer for \$34,000, then

resold to a Connecticut collector for \$75,000. Kimble, who helped coordinate recovery efforts between his organization, the Hopi Tribe and the FBI, said that Lewis loved seeing high-rise New York and was "enthralled by the subways." The mask will be held in Phoenix, Ariz., until the thief is identified and the investigation is complete.

Unsafe and neglected dams

Thirty-one of 54 dams on Indian reservations pose a "serious threat to human life and property should failure occur," concludes a recent audit by the Interior Department's inspector general. The Bureau of Indian Affairs has jurisdiction over the dams, but has not given their safety "sufficiently high priority," the 34-page audit concludes. Moreover, BIA officials "routinely ignored" maintenance needs identified by engineers

and "could not accurately account for funds used." The inspector general reports that BIA officials "generally agreed" with his office's 10 recommendations and are now working on a formal response, which the Bureau of Reclamation will evaluate in November. BIA dams were last audited five years ago. For a copy of the report, No. 89-108, called *Audit Report: Dam Safety Program, Bureau of Indian Affairs*, call the Office of the Inspector General at 202/343-4356.

Critics say McClure's bill would gut Wilderness Act

A controversial Idaho wilderness bill called the Idaho Forest Management Act has cleared a Senate committee and could pass the full Senate early next year.

It is moving due to skillful maneuvering by one sponsor, Idaho Sen. Jim McClure, R, and skillful silence from the other, Idaho Gov. Cecil Andrus, D.

S371, the McClure-Andrus bill, is not typical wilderness legislation. It would designate 1.5 million acres of wilderness and release five times that amount. But most of the bill's text is "special management" prescriptions for released areas as well as for current and any future Idaho wilderness. It is those provisions that concern conservationists.

The bill was approved 15-3 by the Senate Energy Committee Oct. 4, after a few changes. Its most controversial provisions — a mandated timber harvest level on the Idaho Panhandle National Forest — was removed at the insistence of Sen. Dale Bumpers, D-Ark. In return, Sen. McClure pulled Long Canyon, a popular proposed wilderness on the Panhandle, from the bill. Language making grazing within Idaho wilderness "a right" and not a privilege was also stricken.

But a labyrinthine compromise on another issue — definition and identification of roads — is the new focus of controversy (see accompanying story).

That roads provision, and one barring Congress from providing water rights for wilderness designated by the bill, led 10 national conservation groups to write every U.S. senator in November, asking them to oppose the bill.

"S371 directly attacks the integrity of the Wilderness Act," the groups wrote. "It contains dangerous precedents for future wilderness legislation."

Those groups and their Idaho adherents are trying to persuade enough senators to postpone or prevent a full Senate vote on the bill. McClure says he expects that vote in January. When it

occurs, floor amendments will likely be offered as well on behalf of the timber industry by Idaho's Sen. Steve Symms, R, and on behalf of conservationists by a few Democrats.

Earlier this year, it appeared McClure's insistence on no federal reserved water rights for wilderness, in any state, would stall his Idaho bill. But he has struck an implicit deal with other Western senators: You accept my water rights formula in my state bill, and I'll accept yours. In committee, only Sen. Tim Wirth, D-Colo., fought McClure's bill on the water issue.

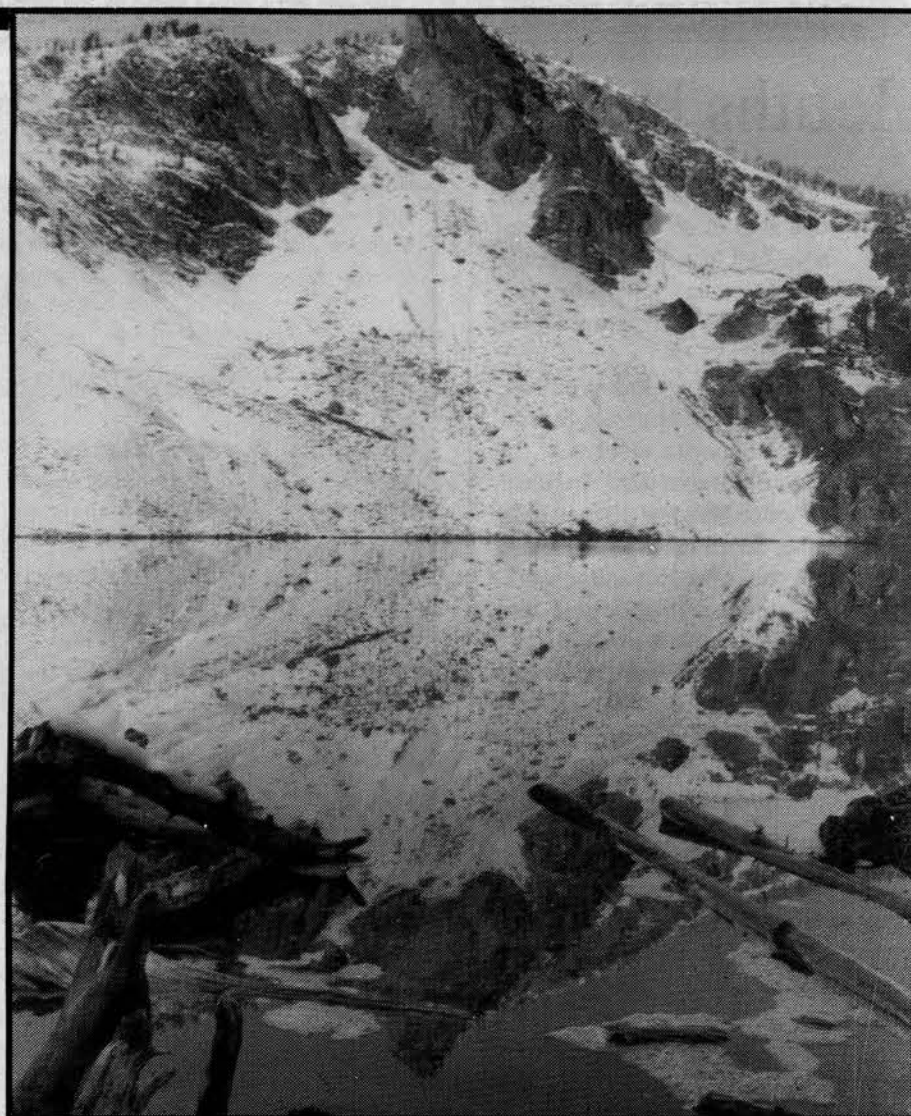
Conservationists lobbying the committee's Democratic majority kept running into the same question: "If this bill is so bad, why is Cecil Andrus supporting it?"

Andrus co-wrote the bill almost two years ago and has let McClure lead on it since. In September and October he remained silent in Idaho, while his reputation as the last good Interior Secretary helped push the bill along. No one knows if he made any private calls to key Democrats, or if he participated in McClure's bargaining.

Idaho conservationists say Andrus' support is hurting them; many are angry, but there is little sign they have any effective counter-strategy in mind or in operation.

Should the bill pass the Senate, the pivotal congressman in any House action next year will be Bruce Vento, D-Minn., chairman of the House Public Lands Subcommittee. A competing Idaho bill is already in Vento's subcommittee. It is the Idaho Wilderness Act, H2213, introduced by Rep. Peter Kostmayer, D-Penn., with 26 co-sponsors. That bill, written by Idaho conservationists in 1983 and introduced in each Congress since, designates four million acres of wilderness, releases five million, and has no special management provisions.

Vento could choose either H2213 or S371 as the vehicle for House action. If he selects Kostmayer's bill, the focus will be what areas to designate



Lyne Stone

Baker Lake in the proposed Idaho Smoky Mountain wilderness

wilderness; with McClure-Andrus the question is special management provisions.

"It would be tragic to choose S371 as the basis for making the most important wilderness decision left in the 48 states," says Mike Medberry of the Idaho Conservation League. Conservationists hope that Vento's proven personal interest in the Wilderness System's integrity will lead him to agree.

Three other congressmen will have key roles. Idaho Republican Larry Craig, whose district includes nearly all the areas where Idaho's timber industry and conservationists are squared off, is strongly anti-wilderness and a member of Vento's subcommittee.

In September, Craig sent a letter to every House member, attacking HR2213 and claiming that wilderness means "no grazing, mining ... hunting and fishing as most people of Idaho know it, and, in

many cases, no employment." Craig opposed the McClure/Andrus bill last year, but now calls it a place to start.

Kostmayer is also on the subcommittee and has, after a visit to Idaho this summer, a renewed commitment to the issue. In late September, Kostmayer sent a "dear colleague" letter of his own, correcting the facts in Craig's letter and attaching an editorial blasting it from the most respected paper in Craig's district. It is thanks to Kostmayer that HR2213 has 26 co-sponsors.

Idaho's other congressman, Richard Stallings, is the only Democrat in its delegation and thus has a political claim to influence Vento's decisions, especially in an election year. He opposes HR2213 — he said it created too much wilderness — and has stayed more or less neutral on the McClure/Andrus bill.

— Pat Ford

Idaho wildlands bill would set off a lengthy process

If the McClure-Andrus bill becomes law, the boundaries of any wilderness it designates will be flexible.

S371 defines road as "any clearly definable, well-established route of travel which received significant regular or seasonal use prior to February 1989 and which is capable of being traveled by a four-wheel drive vehicle." In two pages of bill text and four pages of accompanying report language, a three-level, seven-year process is established to identify any such "roads" in areas designated wilderness, and redraw the boundaries around them.

First, 80 miles of "road" within the bill's wilderness — as identified on maps the Forest Service is at this writing hurriedly preparing for McClure — are excluded immediately from the wilderness. The Forest Service must then decide within two years whether they meet the above definition and should stay excluded.

Second, 50 miles of potential "road" within the bill's wilderness — again as identified on maps now being drawn — will be included in wilderness, but must be reviewed within one year to

determine if they should be excluded. During that review, the "roads" will be open, though most are apparently not open now.

Third, any other potential "roads" within the wilderness must be identified and reviewed for inclusion or exclusion within two years. These will generally be closed during the review.

Once these decisions are made and publicized locally, each is open to appeal for five years, during which the "road" will be open or closed as initially decided. When the appeal period ends, the Forest Service will formally redraw wilderness boundaries as needed, excluding "roads" and 50 feet each way from centerline.

S371 entered committee with essentially the same definition of road but without all the process structure. That language was written by Senate Energy Committee staff, based on an oral compromise between McClure and other senators when they voted out S371 Oct. 4.

"Just thinking about attempting to write it sends chills down our backs," a Republican staffer said five days after

the vote. It took three weeks to write.

Conservationists hardly know where to begin in denouncing the result. "The byzantine process is the icing on a foolish and dangerous cake," says the Idaho Conservation League's Mike Medberry. "It's a direct attack on the wilderness system. In 109 wilderness bills over 25 years, roads have been defined as they should be — with active public involvement, before the wilderness was designated. The Wilderness Act says only Congress and the President can change wilderness boundaries once established. This directly violates that."

The two map sets referenced in the bill are not yet finished and thus not public. They are based on raw maps assembled for Sen. McClure, just before the committee vote, by local and regional Forest Service offices. Reportedly, 12 of 13 wilderness areas designated in S371 are affected.

One of those raw sets — the 80 mile set — was made public in mid-October. It reveals both hurried work and a mix of on-the-ground situations. Some of its "roads" simply don't exist.

Others are mining roads, now gated and closed to everyone but the miner. Others were roads that for various resource-based reasons were closed and removed from the given forest's official road system. Others are four-wheel-drive tracks, created illegally and "maintained" by regular illegal use. A few are legitimate roads that should probably not be in wilderness.

Idaho Forest Service people, on whom both the hurried mapping and the administration of this seven-year process falls, are privately appalled. Publicly, a regional Forest Service official in Ogden says the agency would prefer that Congress make the boundary decisions, as it has since 1964.

One last point can be drawn here, though it has yet to be drawn in Idaho. By asking the Forest Service to decide if and where there are roads in their wilderness proposals, McClure and Andrus seem to concede they don't know the areas involved too well.

— Pat Ford

HOTLINE

Bridger-Teton plan is "born"

The Forest Service is proud of its newly released, 12-pound management plan and environmental impact statement for the Bridger-Teton National Forest in northwestern Wyoming. According to forest supervisor Brian Stout, the plan includes innovations in mapping, limiting clearcuts, calculating the costs of road-building and evaluating recreation uses (HCN, 10/9/89). But the plan will still allow oil and gas development on about 94 percent of non-wilderness land in the forest, according to George Wuerthner, new communications director for the Greater Yellowstone Coalition. And though the plan calls for only 12 million board-feet of timber to be harvested in a year — a 29 percent reduction from current allowable levels — critics say that much of that cutting will be focused on the southern end of the forest, away from public scrutiny. The planning process, which began more than 10 years ago, has cost the forest \$700,000 this year and drawn 8,500 public comments. Because of the intense public interest, there will be an unusual 45-day "review period" that ends late in December. While not a public comment period, the Forest Service says it will accept new information or concerns about the plan. To request a summary or a complete copy of the plan, or to comment, write to Bridger-Teton National Forest, P.O. Box 1888, Jackson, WY 83001 (307/733-2752).

Westwater Canyon: Scenic or wild?

Westwater Canyon could be the first section of river in Utah to enter the Wild and Scenic Rivers System. Sen. Jake Garn and Rep. Howard Nielson, both Utah Republicans, have sponsored a bill to designate the 12-mile stretch of the Colorado River in eastern Utah as "scenic." Used by 18 rafting outfitters, Westwater is a valuable economic resource for the local, regional and state economy, says Garn. Scenic designation, however, is not the most stringent protection possible under the 1968 Wild and Scenic Rivers Act and may threaten the river running business. The Act protects rivers in three categories: wild, scenic and recreational. A wild river is protected from all development; a scenic designation recognizes a river as "largely primitive" but allows for development of access roads and mining claims; a recreational river is open to significant development. Although Utah and federal officials, environmental groups and river users say it is a major step forward to consider protecting Westwater Canyon, many fear that scenic protection is inadequate. Merv Lawton, a Grand County commissioner, says, "It's a pity they didn't go the whole hog. If anything is wild, it's that section of the river." The canyon, part of the Westwater Wilderness Study Area, was nominated for Wild and Scenic study in 1973, and an environmental impact statement completed in 1979 concluded it qualified for "wild" designation. But Garn's bill says the river canyon is "technically scenic" because of an access road at its mouth. Lawton speculates that Garn might also want to leave a door open for mineral exploration. The bill is awaiting hearings in House and Senate subcommittees on public lands. For more information or to send comments, write Sen. Jake Garn, U.S. Senate, 505 Dirksen Building, Washington, D.C. 20510 (202/224-5444).

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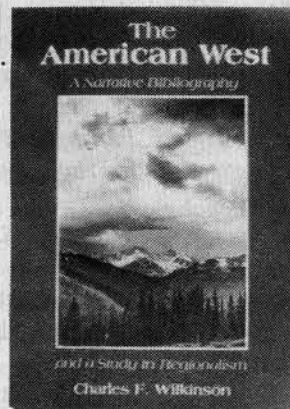
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6-High Country News — November 20, 1989

The West's right

The West's refusal to confront the issue of water quality will haunt the region

by Ed Marston

In their rhetoric, the West's leaders always speak of water as the region's most precious resource. But in action, the West treats water as if it were in infinite supply and without intrinsic worth.

This contradiction is most apparent in water quality. For well over a century, Western water developers have pretended there is no such thing as a quality question; the myth has been that all of the West's water is pure, cold and sparkling. Because quality was never an issue, water could be diverted endlessly, without worrying about contaminants the water might be carrying, or the effect of the diversions on the water left in the stream.

Despite the pervasiveness of the myth, the West has always had water quality problems, as the first settlers to drink so-called "alkali" water discovered. And today, after almost a century of all-out dam and irrigation-project building, mining, logging and urbanization, the West's water quality problems have been greatly magnified.

This is the first of two special editions of *High Country News* on the quality of water, and therefore on the quality of life, in the West. After a century, this water quality-quantity issue has come onto the public agenda because it is interfering with what the traditional West thinks of as its most important privilege: the right to divert water until streams literally run dry.

Dams for the future

The West's water developers always said they were building not for themselves, but for the future. Those who opposed dams and irrigation projects saw those claims as self-serving rhetoric. But the dam-builders were speaking the truth — they often did not know what to do with the water they dammed and diverted. Their claim to be building for the future helped to justify the construction of marginal or useless or destructive projects.

Thanks to the dam builders' enormous energy and political power, large chunks of the West's water presently sit in enormous reservoirs, awaiting a 100-year drought to justify so much damaged landscape, destroyed habitat, sunk capital and ugliness.

While it waits, the impounded water generates electricity that is "sold" at prices so low the kilowatt-hours are almost outright gifts. Or enormously expensive projects are used to raise low-value crops such as alfalfa, or subsidized crops like cotton.

Urban areas, following this same imperative, use water in the most extravagant ways possible. The Sunbelt cities are known for their pools, lush lawns and water-loving vegetation, and fountains and lakes that grace residential subdivisions and office parks.

The architect of Denver's water policies over the last several decades, attorney Glenn Saunders, bemoans the new talk of conservation in a city that until recently saw lavish use of water as a way to lay claim to water that Los Angeles would otherwise take. Few water developers are as frank as Saunders, but all used waste, uneconomic uses and extravagant uses as key elements in water development strategies.

Some water projects could be justified economically and socially. But much of the West was dammed, plumbed and drained as a sort of labor and capital-intensive busy work. There was no plan beyond the desire to put man's hand on every stream, lake and marsh within the million-square-mile region.

The end of water development

The era of water development was, speaking historically, only yesterday. It ended sometime between the fierce, almost crazed reaction to President Jimmy Carter's 1977 water projects Hit List and the first year of the Reagan era.

It is difficult to explain why water development died in the late 1970s, rather than in the 1950s, or why it didn't hang on into the 21st century. Perhaps its collapse cannot be understood from



THE WEST'S FOULED WATERS Part 1: Billions for quantity, but not a penny for quality

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to pollute shall never be denied

inside the West, or even from Washington, D.C. It may be best understood by looking at the Soviet bloc nations, where a similar highly-centralized, authoritarian and bureaucratic system is also collapsing.

The Soviet bloc's system and the West's approach to water may have caved in for the same reason: inflexibility, inefficiency, environmental callousness, and a need for subsidies that only a thriving, controlling central government can collect and redistribute.

These highly-centralized regimes have declined for a variety of reasons, but an important one is the advance of technology. Many have observed that computers, copying machines and modern telecommunications are incompatible with a totalitarian state because police cannot control the production and exchange of information. The Soviet bloc, observers said, could either maintain control of a backward economy, or lose control by letting the economy develop along modern lines.

The United States does not jail its political heretics, but control of information here plays much the same role it plays in the Soviet nations. To take an environmental example, a key weapon against Denver's proposed Two Forks Dam was the ability of the Environmental Caucus to create — on desktop computers — a program that modelled the operation of the Denver water system. With it, the critics of Two Forks could critique the Denver Water Board's projections and come up with their own. Without that technical ability, all information would have been in the hands of the bureaucracy, and the Environmental Caucus could not have mounted a credible attack on Two Forks.

The same pattern can be seen in other natural resource areas. Randal O'Toole's ability to crunch forestry and economic data has made it possible for environmentalists to challenge Forest Service plans. Amory Lovins' analysis of energy information in the 1970s gave outsiders insights into the energy industries that insiders often did not have.

The growing power of desktop computers is not the only reason why the times now work against inflexible, inefficient, environmentally destructive systems. It is clear, for example, that the federal government can no longer support the West's dam-building habits. Arid states may still control a disproportionate share of the U.S. Senate, but their grip is on a body of diminishing power.

It may be that water development will go through a decade or two of reform. But it is also possible that water laws and practices are so inflexible that they cannot be reformed, but instead will hang on and on, until collapse occurs. In that case, those who have fought water

developers for decades should prepare to face the question that Poland's Solidarity Party faces today: What to do with the inherited mess?

An advantage of living in the rural West is that one may grasp certain aspects of international politics better than those who live in the nation's major centers, for the decay of central control can be seen earliest at the periphery of empire rather than at the administrative and financial centers.

No Stetsoned Gorbachev

One must live in America's hinterland to see that what is happening to the Soviet bloc is not a pure triumph of the U.S. free market system over the Soviet system. Nor is it a triumph of one visionary and daring Soviet leader.

On both sides of the now very rusty iron curtain, the same kind of historic processes are occurring. In the American West, this nation's most socialized and subsidized region, the dominoes are falling almost as fast as they are in the Soviet nations. The difference is that we lack a Stetsoned Gorbachev; politically, the West remains mired in the reign of Brezhnev.

With or without a Gorbachev to dramatize this transformation, it will continue. To give some insight into the process of change, these two special issues of *High Country News* focus on the water quality-water quantity debate. This debate over the future of the West's water is important in its own right. But it is also important because it helps to make concrete the larger issues of the West's social and economic transformation.

Quality: the new ingredient

Due to the water development community's past power to confine the way in which water was discussed, water quality is a new topic in water forums. Until very recently, those who ran the region were able to pretend that "the right to divert water" could be exercised independent of the water's quality. That pretense has affected even our vocabulary. Every Westerner knows the units of water quantity: acre-feet and cubic feet per second. But few know the units of water quality. Every land buyer asks: "How much water comes with the property?" Not one in 100 asks: "What is the quality of that water?"

Western water developers had and to some extent still have the power to separate quality and quantity in law, in regulations and in discussions in public forums. But they could not and cannot keep quality and quantity separate in the real world, where water flows over the ground and in streams.

The contamination of flowing streams, discharged irrigation water, and wildlife refuges that serve as catchment basins for Bureau of Reclamation projects have become major factors in the weakening of traditional Western water practices.

The heaviest blow against water development has been the contamination of wildlife refuges such as Kesterson in California. That tragedy destroyed the idea that water can be diverted endlessly, according to the doctrine of prior appro-

priation, without regard to quality. Although the Kestersons and their deformed or poisoned wildlife led to a traditional water user-environmentalist battle, the conflict over the unbridled right to divert water out of flowing streams is not only between developers and those who care about marshes and wildlife.

It also, inevitably, brings one set of diverters into conflict with another, as these issues show. A city whose supply of drinking water from a nearby river is just barely potable, lives in fear that a new upstream diversion will further decrease the river's flow. With the same amount of pollutants flowing into the river out of old mines and farmers' fields and off the streets of towns, the concentration of pollutants in the river would rise, as would the city's water treatment costs.

The same tension is visible on the Colorado River. The United States is pledged by treaty to deliver to Mexico water with limited levels of salt. But upstream depletion of the Colorado River — by Denver, by Phoenix, by Los Angeles and by irrigators — decreases the amount of water available to dilute naturally occurring salt and adds salt when used irrigation water flows back into the river.

Rather than cut off the right to divert, the federal government, at the behest of the West, is engaged in a massive attempt to balance the increased amount of salt each new water project adds to the river with the removal of salt from somewhere else. Such removal is accomplished by lining of ditches, diverting salty flows directly to the ocean, etc. The result is that every new diversion on the Colorado has a salinity control "twin" elsewhere in the basin, so that more and more water can be taken out of the Colorado without violating the treaty with Mexico.

The Bureau of Reclamation has been endlessly creative in thinking of ways to reduce salt loading. It once proposed using salty water to flush baggies of coal in a pipeline to the West Coast.

But the Bureau never proposes what is often the most efficient and least costly measure: purchase and removal from farming of the most salt-laden irrigated farmland. That would run counter to the West's ethic, that the beneficial uses of water multiply endlessly. The water developers may have lost the power to build new projects, but for the moment they have the power to resist the dismantling of existing projects.

Water as a "commons"

A person from the Northeast or Midwest would find nothing extraordinary or even complex about the West's quality-quantity problems. Attorney Joseph Sax has pointed out that there are exact parallels between the use of water and the use of other "commons," such as air. When the nation's air became overloaded — when the flow of pollutants could no longer be sufficiently diluted by the reservoir of air — the nation began to control the ways in which air was used.

Enabling laws, regulations and court decisions first took care of the massive point sources: the big power plants, smelters, and mills. Then they set about cleaning up what might be called the

non-point sources: the 100 million or so motor vehicles, the users of paints and other solvents, and now, in Los Angeles, the all-American activities of barbecuing hamburgers and mowing the lawn.

The nation's air quality is nothing to brag about, but it would be worse without controls. More important, a political, legal and regulatory path has been hacked through to the future. Detroit no longer argues that the nation's economy will collapse if auto emissions are controlled, and utilities do not challenge the constitutionality of laws that keep power plants from suffocating their neighbors.

It is now a matter of technical and economic detail: a matter of tightening the screws. The pace at which we do that depends on swings in political power, technical changes in control technology and whether the nation feels rich enough at any given time to invest in its future.

We may have lagged in improving air quality, but as these two special issues will show, air quality is light years ahead of the West's approaches to water quality. As a result of determined neglect, the West is starting almost from scratch in dealing with water quality.

It must start accumulating data, trace pollution to its sources, build awareness among polluters and citizens, and construct a regulatory system. Not least among its tasks will be tedious legal battles before the water establishment accepts that water, like air, is a commons, is regulable by both the federal and state governments, and is not a sacred resource controlled only by those who own water rights.

These articles aren't upbeat

Pollution has a very long headstart. In a changing world, the West, among the poorest regions in the nation, has saddled itself with major handicaps in dealing with its most important resource.

This first issue is largely about that handicap. The nine articles open with the account of the poisoning by federal irrigation projects of wildlife refuges and of some irrigated farmland throughout the West. It then looks at the Arkansas River in Colorado — a long, important stream contaminated by tens of thousands of so-called non-point sources. The issue then proceeds north, to the interaction between drought and trout in Montana, to Wyoming's petroleum industry — its toxic golden goose — and then south to groundwater problems and conflicts in Arizona. It closes with articles on the Colorado River's endangered species and the hammerlock that salinity and the endless right to divert water have on the Colorado River.

These are not what one would call an upbeat set of articles, but between them they define the issues that the successors to the current establishment — the West's Solidarity Party — will face well into the next century. And those who immerse themselves in the bleakness of this issue will be doubly rewarded by the bursts of hope that will be visible in the second issue.



Tom Evans

8-High Country News — November 20, 1989



U.S. Fish and Wildlife Service

Deformed pelican at Anaho Island National Wildlife Refuge, northeast of Reno, Nevada

Getting off on the wrong foot

The granddaddy of Western water projects has become a diabolical machine whose main products are poisoned and deformed birds

by Tom Harris

FALLON, Nev. — The Truckee and Carson rivers once tumbled unhindered down the eastern slope of California's Sierra Nevada, where they fed a huge complex of lakes and wetlands on the western edge of the Nevada desert. The system supported a thriving population of fish and waterfowl. The area was home to several Indian tribes, but had marginal value to the early settlers.

At the turn of the century — as the beginning of a massive effort to make the deserts bloom — those rivers were altered so as to be useful to settlers. They were dammed, ditched and diverted onto adjacent mineral-rich and saline bottomlands to first grow hay and later corn, melon and other crops.

The water diversions did that, but also did a lot more. As a result of the diversions, the lakes and marshes the rivers formerly fed shrank or dried up entirely. More serious than the outright deprivation were the effects caused when the used irrigation water flowed off the fields and into what remained of the lakes and marshes.

That fouled water has created an ecological disaster in the Stillwater

Wildlife Management Area, which receives the drainage water from the Newlands Irrigation Project.

Moreover, this first-born project of the U.S. Bureau of Reclamation is not unique. Now that researchers know what

to look for, its problems have been found with increasing frequency in many other projects — projects which also made the desert green with irrigated crops even as the waste water coming off the fields was having devastating side effects.

The Newlands project, which has contaminated Stillwater, is not just any project. It and the Bureau of Reclamation had the same father: Nevada Rep. Francis G. Newlands, who wrote the Reclamation Act of 1902, which created the Bureau. A year later, he wrote the act that authorized the Newlands Reclamation Project on the Truckee and Carson rivers.

Today, almost 90 years later, that project, which should serve as a proud pioneering example of the Bureau's decades of work in the West, is instead casting a lethal shadow across the shriveling wetlands of western Nevada, at the westernmost edge of basin and range country.

By economic standards, the project has been a flop: only 60,000 acres of its proposed 200,000-acre service area still are under cultivation.

But that is the least of the problems, for the Stillwater Marsh is a biological disaster. More than 44,000 acres of thriving, productive wetlands that housed most of Nevada's share of Pacific Flyway migratory waterfowl now have shrunk to less than 3,000 acres.

Tainted by selenium

Stillwater's remaining wetlands are heavily tainted with selenium, arsenic and mercury that annually kill tens of thousands of fish and waterfowl that take refuge there (HCN, 1/30/89).

That is only the Newlands Project's most obvious problem. A string of conflicts spawned by the project are being towed along in its wake, pitting Indian



Wildlife refuge workers toss bird carcasses into the flames at Carson Sink, near Fallon, Nevada

Lance Iverson, Reno Gazette-Journal

tribes against each other and against competing ranch and city water users; endangered fish at Pyramid Lake against migratory waterfowl — and protected bald eagles — at Stillwater; and ranchers against farmers and both against the burgeoning cities of Reno and Carson City.

It is often said that the good water projects get built first, with later projects being increasingly marginal. If that rule is true, Newlands, the granddaddy of Western reclamation, may indicate that irrigated agriculture has no long-term future in the West.

As the nation approaches the end of a century of reclamation, it is becoming clear that huge, heavily subsidized federal reclamation projects are less and less economically viable, even without the toxic stains they leave on semi-arid, poorly drained Western landscapes.

Those disasters could cost billions of additional federal dollars to erase. Chilling episodes of dying marshes and poisoned waterfowl slowly are getting the attention of alert Westerners. One after another, names have been added to the registry of poisoned places kept by the Department of Interior. Once dubbed "the Kesterson syndrome" because it was first detected at Kesterson National Wildlife Refuge, near the center of California's sprawling Central Valley, the potential for the same toxic legacy has spread to every Western state.

The agonizing deformities and slow deaths caused by selenium poisoning have now been certified by U.S. Fish and Wildlife Service biologists at four other places: The Tulare Basin, about 100 miles south of Kesterson; Ouray National Wildlife Refuge, in northeastern Utah; Wyoming's Kendrick Project, near Casper; and Stillwater, about an hour east of Reno.

Troubled by the poisonous pattern,

federal biologists are waiting, with increasing trepidation, for the other shoes to drop.

Eighteen other sites are under investigation to learn if they have become so contaminated with irrigation-leached toxic wastes that they endanger the species that use them as havens. And 15 more Western water project areas are known to have levels of selenium in water, vegetation, sediment or aquatic invertebrates comparable to those that triggered the Kesterson poisoning in 1983. In all, 43 areas in 15 states west of the Mississippi, some with three or four different sites each, are being sampled or studied (see accompanying map).

Selenium is known to be the chief cause of death and deformity in the wildlife refuges. But there are other threats, including arsenic, boron, molybdenum, chromium, mercury, lithium and even uranium. Sometimes several elements work in concert — synergistically — to produce a greater effect than they could alone.

More poisonous than arsenic

A natural element of the soil, selenium is unusually quixotic. More poisonous than arsenic, it is essential to healthy growth of humans and some animals in microscopic doses ... mere millionths of a gram.

But it becomes toxic to fish and waterfowl in aquatic ecosystems at extremely low levels. New California and Environmental Protection Agency guidelines specify anything above five parts per billion as dangerous to freshwater aquatic species, and from two to five parts per billion as a long-term threat, since the element readily magnifies itself in the food chain, building

quickly from one predatory link to the next.

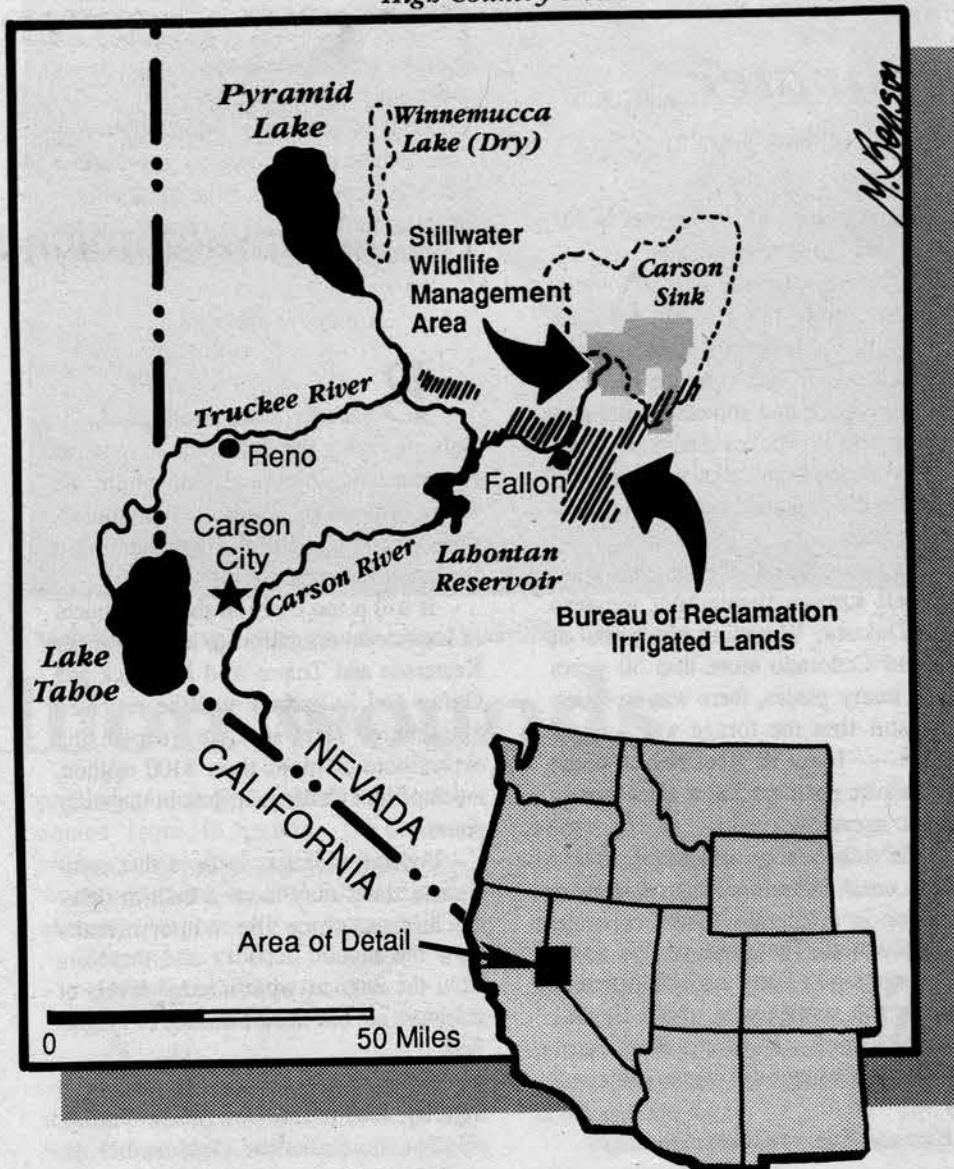
Here is how the slow-motion poisoning occurs.

Selenium was belched from volcanoes or surged to the surface in magma eons ago. Gradually, it was weathered, eroded and concentrated in the silt and muds of massive, epochal lakes spawned by receding glaciers. Those muds were

covered over again and again, with the heat and pressure eventually compressing them into shale.

In a state of nature, gradual leaching by the West's scant rainfall — eight to 20 inches a year or less — kept selenium

(Continued on page 10)



Feds' toxic coverup is foiled by newspaper

Nearly five years ago, in the wake of horrendous discoveries of dead and deformed nestlings at California's Kesterson National Wildlife Refuge, a team of federal scientists gathered in Denver for three days to map a search for similar disasters.

But, the ink was hardly dry on the team's 20-page work plan when it was vetoed by high-ranking Department of Interior officials, including then-Assistant Secretary for Water and Science Robert Broadbent.

The Bureau of Reclamation was the architect of Kesterson when Broadbent was its commissioner and anonymous sources involved in the decision said he became "apoplectic at the mere mention of a search that could yield any more Kestersons."

Fearing for their jobs, the scientists made no public declarations. But a copy of their work plan found its way to the Sacramento Bee, one of California's largest newspapers. Reporters went where the geologists, biologists, hydrologists and chemists had wanted to go, collecting hundreds of water, sediment, vegetation and fish samples in seven Western states.

Those samples were analyzed by federal and state certified laboratories and the Bee printed the results in a September 1985 series titled "Selenium: A Conspiracy of Silence."

The articles, by Bee reporters Tom Harris and Jim Morris, outlined a pattern of selenium contamination covering parts of 15 Western states and Canada's three prairie provinces. In most cases,

agricultural drainage from huge, federally funded irrigation projects was implicated as the source.

Denials came quickly — and heatedly — from Interior Secretary Donald Hodel and an assortment of state and county officials in nearly every state listed. In response to the articles, and reactions, Congress held special hearings and then ordered Interior to audit the Bee's findings.

Interior dispatched teams of scientists from the U.S. Geological Survey, the U.S. Fish and Wildlife Service and the Bureau of Reclamation to sample the implicated areas. Marshaling results of that testing, and drawing from reams of unpublished federal and state laboratory

data gathered for years, Interior reported that it had found evidence of potential selenium poisoning in most of the same places. Many of its samples contained higher levels of the potent trace element than those reported by the newspaper.

Since then, Interior's initial fears about massive economic liabilities have been borne out. So far, about \$105 million has been spent on cleanup and closure of Kesterson's poisonous ponds, on similar studies elsewhere and research into ways to defuse the danger.

Millions more went to buy out ranchers of poisonous land adjacent to Kesterson. And a federal-state task force studying how to cope with a 100-mile-long band of selenium-tainted ground-

water beneath the otherwise fertile San Joaquin Valley is holding public hearings on a management plan that could cost valley farmers more than \$100 million a year for decades.

The contamination Interior first tried to cover up just won't go away. The Bee launched another and even more controversial probe last year, this time looking at the threat of selenium contamination of the human food supply.

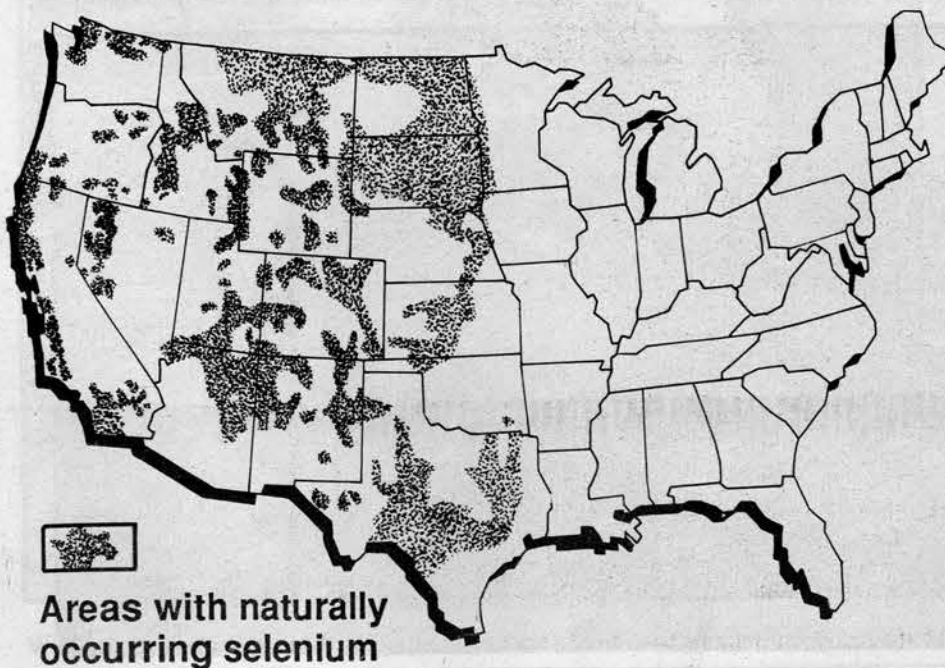
Findings of surprisingly high and potentially harmful levels in such diverse foods as cereal grain, poultry, beef and dairy cattle products triggered another round of heated denials and disclaimers from the federal Food and Drug Administration and various state and local agencies.

The FDA now is under fire from environmental, consumer and animal protection groups for allowing the amount of selenium put into livestock and poultry feeds to triple while it abolished all tests to assure compliance with the newly expanded limit.

Groups as diverse as the Rachel Carson Council, the American Association of Independent Laboratories, the Natural Resources Defense Council and the American Humane Society are seeking reversal of the FDA action and public hearings.

At least two members of Congress have supported the call for hearings into the consequences of increasing levels of selenium in the food supply of both humans and wildlife. FDA has said it is studying such requests.

— Tom Harris



Stillwater . . .

(Continued from page 9)

and its companion trace elements in balance in free-flowing systems.

Only rarely, usually in desert watering holes, were toxic levels reached. Those were the infamous watering holes popularized in old Western movies, where livestock and sometimes unlucky pioneers and cowpokes died a writhing, agonized death from "alkalai poisoning." In reality, the "alkalai" was arsenic, selenium or both.

The presence of selenium hot spots was well known throughout western South Dakota, Wyoming and parts of Utah and Colorado more than 50 years ago. In many places, there was so much in the soil that the forage was — and remains — toxic to livestock, though few modern ranchers know selenium is the toxic agent.

This rich history was largely overlooked until selenium was carried to Kesterson in a federally funded concrete drainage canal. That drain carried away excess seepage — not surface tailwater — from the service area of the Central Valley Project, one of the Bureau of Reclamation's largest irrigation projects.

Extraordinary wildlife deformity

In the series of man-made evaporation ponds the Bureau built to double as a wildlife refuge, the poisonous selenium wiped out a once-thriving sports fishery and, in just a few years, caused, mostly in migratory waterfowl, what federal biologists have called the largest incidence of wildlife deformity ever recorded.

Selenium got into the canal from the rich fields of the legendary San Joaquin Valley, which grow nearly a third of the nation's table food. Those fields are so poorly drained that perforated pipes have been installed to keep the so-called "perched" water from flooding the root zones of crops.

Thanks to the pipes, the excess water did percolate downwards, saving the crops. But that percolating water also dissolved the large amounts of selenium naturally present, and which had already been converted by microbes and oxidation from reasonably inert elemental selenium to very soluble and extremely toxic selenate.

The problem has reached crisis proportions in the San Joaquin. Groundwater there is contaminated with 50 or more parts per billion, over an area that is more than 100 miles long, four to eight miles wide, and up to 148 feet deep.

The tainted water is migrating downward at nearly a foot per year, through a thick clay layer, toward deep aquifers tapped for much of the valley's drinking and irrigation water.

The problem can't be eliminated. There is no safe place to dump such lethal wastes. But even to manage it so that the selenium-tainted drainage remains in the shallow groundwater formation, but below the root zones from where it also could taint crops, will cost close to \$100 million a year.

Even so, a state-federal task force studying the issue has determined that up to 100,000 acres of land will have to be taken out of production for construction of surface evaporation ponds to contain what can't be stored underground.

Similar tile drain systems underlie hundreds of thousands of acres in the West, many of them in soil formations much higher in selenium than the San

Joaquin Valley, where the average is just under one part per million.

One of those is near Montrose, Colo., where private testing has detected soil selenium levels, in a form readily taken up by plants, at 5 ppm and levels in alfalfa grown there of 2.5 ppm.

Costs are emerging

Relatedly, state and federal officials are facing the dark side of massive reclamation projects. Even where the influx of precious water created productive farms, the long-range costs are beginning to surface.

It still is too early in the Department of Interior investigation to know whether Kesterson and Tulare and Kendrick and Ouray and Stillwater will be repeated elsewhere. That is true despite the expenditure of more than \$100 million, much of it in California, just in the study phase.

Federal scientists believe that cold-climate states may have a built-in delay mechanism, since the winter months slow the aquatic activity and therefore slow the rates at which lethal levels of selenium are bio-accumulated, or magnified.

Other factors boost the element's toxicity, too, including the prevailing pH. The more alkaline (less acidic) the environment, the easier the selenium dissolves in water, in the form of selenate, and the more biologically available it is to harm both plants and animals. Warmer water temperature, too, increases selenium's potent punch.

Just how much more time, if any, their colder temperatures will buy for threatened parts of Colorado, Wyoming, the Dakotas and Montana is not known.

In fact, the death and deformity already have started in some parts of those states. And, according to Interior officials, levels already at, beyond or near the toxicity level are being probed at 43 national wildlife refuges or Bureau of Reclamation project areas.

Those include 12 sites already studied in California, Nevada, Arizona, Montana, Utah, Wyoming and Texas; 10 sites where detailed studies are under way, in California, Oregon, Colorado, Kansas, Idaho, New Mexico, South Dakota and Wyoming; 14 sites under evaluation as potential field investigation sites; and another eight sites where preliminary screening of existing scientific data indicates the possibility of problems.

That is the "where" of subsidized western agriculture's bizarre and unexpected legacy.

The "how" is even more fascinating, and the 86-year-old Newlands Project and the Truckee River is as good a place to start as any.

Legacy of an irrigation project

Only 100 miles from where it feeds the cobalt-blue depths of Lake Tahoe, one of the cleanest and clearest alpine lakes on earth, the Truckee becomes the foul, deadly witch's brew of selenium, mercury, arsenic and chlorides that is choking Stillwater Wildlife Management Area to death.

The immediate impact of the Newlands diversion, which decreased the flow of the Truckee, was the drying up of Pyramid and Winnemucca Lakes, which sit at the Truckee's original terminus on the edge of the Nevada desert.

Winnemucca Lake dried up completely by 1938, only two years after its designation as a national wildlife refuge. The executive order that created it was finally revoked in 1962, the first national wildlife refuge ever to be abolished.

Pyramid Lake, which is just upstream of Winnemucca, has dropped nearly 80 feet, endangering the endemic cui-ui chub (a large sucker fish that typically lives 20 years or more), and in turn the unique and oversized Lahontan cutthroat trout. Destruction of the lake and its fish has had devastating effects on the Pyramid Lake Paiute Indian tribe, which has depended on the cui-ui for both spiritual and physical succor.

Along the Truckee's new, diverted course, which converges with the Carson River to the south, the impacts have been even more lethal, but slower to develop.

At each turnout, canal and spigot, the Truckee/Carson — now more canal than river — becomes more saline because of water loss and evaporation, and leaches more toxic elements from the very soil it was meant to nourish.

Reduced flows have already dried up another national wildlife refuge, and that and the toxic pollutants threaten two more. The Fallon National Wildlife Refuge is now as dust-dry as Winnemucca, and unless it receives a major and sustained infusion of guaranteed safe water soon, Nevada could become the only state in the nation to have two national wildlife refuges revoked.

Caught in the middle of the low flows and toxins is Anaho Island Wildlife refuge in the midst of Pyramid Lake.

Less food — and more poisonous

The island is Nevada's last white pelican rookery, but the shallow parts of Pyramid are gone and with it the birds' natural feeding grounds. Unable to dive for its meals like the brown pelican, Anaho's white pelicans now must negotiate a 60-mile, round-trip journey to

slowly shriveling Stillwater. There it still can scoop enough trui chub — a small, sucker-like fish — to survive.

But there are fewer and fewer fish at Stillwater, where black bass and catfish once supported a thriving sports fishery and are now wiped out. In the past four years, repeated die-offs have sharply lowered the sucker population. And two winters ago, Stillwater became infamous for a virtual ring of death around Carson Sink when millions of tui-chub washed ashore, victims of increasing salinity.

What may be worse, through the process of bio-magnification the remaining chub and suckers are gradually concentrating higher burdens of poisons from the tainted aquatic food chain.

The pelicans' plight has become so bad that there have been reports of them literally falling out of the skies to perish in the desert between their island rookery and Stillwater feeding grounds.

Once a massive marsh that nourished thousands of native Indians, ancestors of both the Pyramid and displaced Fallon Paiutes, Stillwater is receding dramatically.

Deaths galvanize conservationists

Ironically, in its death-throes are the seeds of rebirth.

Conservationists, from birders to duck hunters and almost every other environmental niche in between, have been stirred to anger and desperation by ghastly scenes: millions of fish rotting on Stillwater's shores and boat loads of botulism-stricken waterfowl fed into reeking bonfires.

A powerful coalition has drawn support from lowland farmers and Indian tribes. Together they have generated enough political heat to fuel a movement that could become the Phoenix of wetlands recovery, not only in the West but across the continent.

Massive wetlands rescue efforts, such as the bi-lateral North American Waterfowl Management Plan, are under way on the Great Plains. And elsewhere, environmentalists have learned that if you can't sue successfully for water rights in court or lobby for them in the halls of legislatures, you must get them the old-fashioned way: buy them.

That is happening at Stillwater, where environmentalists have purchased — from willing sellers only — marginal farms and ranches and their water rights. That water now flows to the depleted marsh. And they have prompted the federal government to spend \$1.2 million to do more of the same.

That most successful, if basic, American way is working to restore some of three million acres of historic wetlands lost to similar "reclamation" efforts in California's fertile Central Valley.

There, both public and private initiatives have raised more than \$100 million for the outright purchase of wetlands and water rights to support them.

The new water is not yet enough to save Stillwater, or the critical Central Valley, which winters one out of every five of the nation's migratory waterfowl. But it is a hard-headed, no-nonsense beginning.

Unheard of in the arid, water-crazy West — environmentalists and government buying back water from farmers and ranchers to support wildlife — the market place strategy may become the ultimate "last word" to this very emotional and seemingly endless argument.



Stillwater National Wildlife refuge near Fallon, Nevada

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November 20, 1989-11



Alona Ferguson/Project Lighthouse

Molybdenum tailings ponds near Leadville, Colorado

Bleeding from a million wounds

It is usual to talk of rivers as having watersheds. In the case of Colorado's Arkansas River, it's more accurate to talk of a pollution-shed

by David Fanning

The Arkansas River doesn't look polluted to the motorist cresting Fremont Pass and beginning the descent down Highway 91 toward Leadville, Colo., and the headwaters of the Arkansas.

But in its first three miles, a theme is sounded that repeats itself throughout the river's length. Manganese, cadmium, copper, and zinc — heavy metals — are present in the river in high enough concentrations that livestock shouldn't drink from it.

The metals probably came from rainwater soaking through collapsed mine tunnels or washing over tailings piles of gold and silver mines last operated more than 100 years ago. The metal-laden water flows and seeps into the river and its tributaries from almost every uphill direction.

This is nonpoint source pollution, what Environmental Protection Agency attorney Bruce Ray describes as "the most pervasive water quality problem we have."

Nonpoint sources are defined as human activities, often associated with land use, that add pollutants to a river or stream.

The most common nonpoint source pollutants in the West are heavy metals from acid drainage at inactive or abandoned mines; sediment from land erosion (often caused by overgrazing, road building, and logging); bacteria from inadequate sewage disposal systems; metals and oil from urban runoff; and nutrients, pesticides, and salinity from agriculture.

The Arkansas River knows them all. In fact, if federal and state clean water regulations were totally successful in eliminating pollution from point sources (single sources like wastewater treatment plants that convey their pollutants to the stream in a pipe) the Arkansas would be little changed from the polluted river it is today.

Unfortunately, the Arkansas is the rule rather than the exception.

Nationally, the EPA reports that 65 percent of all water pollution comes from nonpoint sources.

In Western states, with fewer people and less industry, that figure is often closer to 90 percent and nearly every river is affected.

Much like Los Angeles' air pollution, it is hard, if not impossible, to find the responsible party or to correct the

problem. Because nonpoint pollution comes from thousands of diffuse sources, cleaning it up will require monitoring and changing the daily activities of nearly everyone in every watershed.

Mining is a known culprit

Although everyone is guilty, some are more guilty than others. In the West, the problem stems from 100 years of poor land management, with mining the worst offender.

"The Arkansas River is notorious for the pollution caused by acid mine drainage," says Phil Hocker of the Mineral Policy Center in Washington, D.C. In fact, federal officials list the Arkansas as one of three rivers in the nation most affected by mining waste.

Acid from abandoned mines and tailings piles is formed by the oxidation of pyrite, a common mineral especially prevalent in the central mountains of

Colorado. In the presence of air and water, pyrite — also known as "fool's gold" — breaks down to form acids that leach heavy metals from the surrounding ore.

These leached metals are then added to the Arkansas by virtually every major tributary from its headwaters downstream to the Pueblo Reservoir; in all, over 300 stream miles in the Arkansas basin are affected.

The best known source of metals is the Leadville District. It was once one of the most famous mining districts in the world and produced over \$2 billion worth of precious metals. But today the Leadville District is a 40-square-mile area that in places resembles a moonscape of abandoned tailings piles, slag heaps and mine dumps.

The worst of the pollution comes from California Gulch, a tributary to the Arkansas that contributes an estimated 250 tons of heavy metals a year, with 80 percent coming from a single source: the Yak tunnel.

Built in 1895 to drain mines and make it easier to transport ore to the smelters, the Yak tunnel still collects the acid drainage from most of the abandoned mines in the Gulch. The tunnel is an EPA Superfund site and a \$24 million plan to clean up the site has recently been approved. The work is scheduled to be completed by 1992.

Another 100 tons or so of heavy metals each year pour into the Arkansas from the East Fork. Most of these metals come from heavily polluted St. Kevin's Gulch and from the Leadville Drain. The Leadville Drain was built by the Bureau of Reclamation during World War II to drain and reopen strategic metal mines. The Bureau announced this year it plans to build a treatment facility at the site, but funding is currently stalled in Congress.

Thousands of mines are draining

Even if these two large sources were cleaned up, the Arkansas will still be affected by thousands of other mines in its headwaters. The massive quantities of heavy metals in the Arkansas damage fish habitat from Leadville to Canon City, a stretch of more than 60 miles.

Directly below California Gulch, in fact, there are no fish. Rick Anderson, a state wildlife biologist says, "In that section of the river you can put your hand in the water and it comes up covered with iron precipitates."

The situation improves when extra water from the Bureau of Reclamation's Fryingpan-Arkansas project doubles the

(Continued on page 12)



Rocky Ford Daily Gazette

Water from the Arkansas River irrigating crops near Rocky Ford, Colorado

12-High Country News — November 20, 1989

Arkansas...

(Continued from page 11)

river's flow several miles below. Still, surveys on the Arkansas find fewer fish than in comparable waters. And less than one percent of those they find are more than three years old or 14 inches long.

According to Anderson, "It really doesn't seem to matter much where we look, the situation is the same, even in catch and release waters where we would normally expect to find larger fish." Although data have never been collected to pinpoint the reason there are so few fish in the river or the reason they are dying young, most experts believe heavy metals are partly to blame.

Anderson says, "We find cadmium accumulating in the livers and kidneys of fish, and the older the fish, the more cadmium we find." Anderson and other fisheries biologists believe the stress of chronic cadmium toxicity makes it impossible for the fish to spawn.

Interestingly, the metals accumulating in fish do not come from their food source. Pat Davies, a specialist in heavy metal toxicity, has experimented with food pellets heavily contaminated with metals. "The metals don't come from the things they eat. They come from the water they swim in."

Fish are not the only organisms at risk. Ken Barbarick, an agronomist studying plants and soils on pastures near Leadville irrigated with Arkansas River water, says, "We've found heavy metal concentrations high enough to be toxic to plants and livestock."

One soil sample, according to Barbarick, "had a lead level of approximately 3-to-4 percent. That's high enough to mine."

Barbarick says the danger is not so much that animals forage on contaminated plants, although that danger is real; but because "cattle and sheep can ingest up to one-third of their diet as soil" they are susceptible to metal toxicity which results in stiffness and swelling in their joints. These symptoms have been seen in livestock in the upper Arkansas valley since 1939, often waxing and waning in concert with the boom and bust of mining activity.

In 1986, the Lake County Soil Conservation District fed forage from one of the pastures Barbarick is studying to a newborn foal. In less than three months the foal was showing signs of stiffness in its joints. By five months it was lying flat on the ground most of the time, reluctant to move.

Blood tests showed zinc levels eight to nine times higher than normal and an autopsy revealed a slightly enlarged liver and colon. Although laboratory tests did not establish a direct link between the foal's symptoms and the contaminated forage it ate, zinc toxicosis is suspected.

Add sediment and salinity

Once the Arkansas flows out of the high mountains and into the dry canyon country below Canon City, sediment and salinity take over from metals as the major nonpoint source pollutants. The first significant sediment problem occurs just upstream of Canon City at Badger Creek.

A severe thunderstorm in 1979 flooded Badger Creek, completely destroying the stream's banks and decimating its fish habitat. According to Anderson, "The stream banks still don't have any integrity and whenever it rains we get more erosion. Every time we try to stabilize the bank by growing willows or some other kind of plant, they're

trampled down by cattle." The result, according to a recent report, is that 24,000 tons of sediment pour out of Badger Creek and into the Arkansas each year.

Other tributaries in this middle section of the river drain lands that are characterized by shallow soils and little precipitation. That is the classic prescription for erosion in the West.

The sediment destroys fish habitat by covering spawning beds and limiting the food supply.

"The best habitat for a good insect population and diversity are large, clean gravels; the worst is sand, like that associated with stream bank erosion," says Anderson.

Farther downstream to the east of the Pueblo Reservoir are the Huerfano, the Apishapa, and the Purgatoire rivers. They disappear in summer but add more sediment during spring runoff or after severe thunderstorms when they run full, scouring their banks.

Twenty-five percent of the sediment samples taken in the Arkansas between the Pueblo Reservoir and the Kansas border are high enough to limit fish populations.

Salinity is the third major nonpoint source problem on the Arkansas River. It affects almost 400 stream miles. Much of the salinity is natural. For example, Hardscrabble Creek, a tributary above the Pueblo Reservoir, has salt concentrations of nearly 10,000 milligrams per liter, partly because it flows over highly mineralized Cretaceous shale formations.

Salt levels on the upper Arkansas gradually increase from its headwaters to the Pueblo Reservoir. But as soon as the river flows onto the plains, the concentrations skyrocket, rising from less than 250 milligrams per liter to over 4000 milligrams per liter at the Kansas border.

This is more than four times the salt load the United States allows in the Colorado River as it flows into Mexico; it is two times greater than the concentration that will affect salt-sensitive crops; and it is over eight times greater than the concentration recommended for drinking water.

Agriculture adds salts

Much of the large increase in salt concentration is attributed to agriculture. Doug Cain, a water quality expert with the United States Geological Survey, explains, "Agriculture is not introducing a lot of additional salts to the river, it's just concentrating those that are already there by using and reusing the water."

However, almost no one in the valley seems to be upset with the river's high salt concentrations.

Tommy Thompson, manager of the Southeast Colorado Water Conservancy District and a long-time resident of the area, says, "People have adapted to it because the river's been salty for a long time. Where the salt's not too bad, from Pueblo to Rocky Ford, a lot of truck crops are grown. Downstream, where the salt's worse, there has been some change over the years to salt-tolerant crops like milo, sorghum and alfalfa."

The area's farmers have adapted well. The Arkansas Valley is Colorado's second most important agricultural district and one of the oldest agricultural valleys in the state. Its produce, especially its melons, have a national reputation.

In addition to not affecting quality, Ed Langin, an agronomist at the Agricultural Experiment Station in Lamar, says the salty water doesn't affect yields much.

"Farmers just apply a little more water to keep their crops growing." But this doesn't work in dry years. "I'd say Arkansas Valley agriculture is probably more susceptible to drought than other agricultural areas because of the salt," says Langin.

The river's neighbors are more concerned with how the water tastes. "It's drinkable," says Thompson, "but a lot of visitors don't like to stay in places like Lamar and Las Animas because of it."

Last year local officials dusted off a 27-year-old plan to construct a pipeline from the Pueblo Reservoir to Lamar to provide high-quality drinking water, but then quickly shelved it because it was too expensive.

In addition to the major nonpoint source problems on the Arkansas, there are many minor ones. Some nonpoint source pollutants — pesticides, for example — may not be considered a problem simply because no one has ever looked for them. Other pollutants — such as bacteria and nitrates from improperly installed or maintained septic systems — are thought to be serious problems along some reaches of the river, but the evidence is anecdotal or indirect.

Data are missing

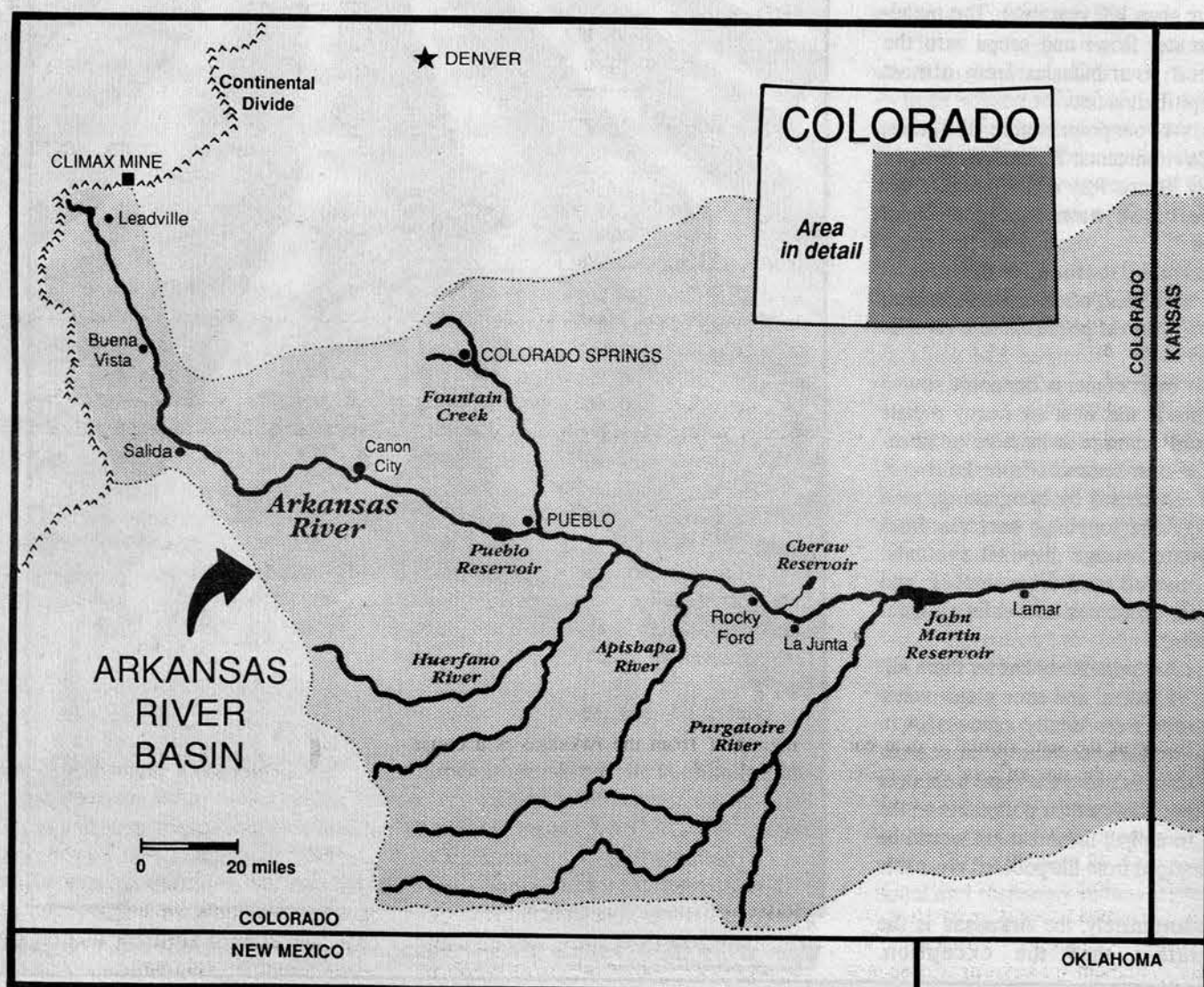
To flesh out the effect of nonpoint source pollution on the Arkansas will require hard data, and hard data are in short supply despite the billions of dollars spent nationally to study water quality.

The basic problem is lack of coordination and communication among the local, state, and federal agencies, which usually collect data to meet the interests of a single agency.

According to Cain, "Data isn't collected over a long enough period of time, or it isn't collected with standard techniques, or different water quality parameters are measured. As a result, you can't compare data from one agency to another and it is difficult, if not impossible, to tell what's going on."

However, pressure to find out what's going on is growing. Environmentalists, taking advantage of the public's keen interest in clean water, are using water quality arguments as a powerful political weapon in their efforts to reform Western water law.

Water developers, afraid this power will make it difficult or impossible to divert new water, are on the defensive. If they don't consider water quality in the context of water management and diversion, and if they don't learn to speak the nonpoint source language, they may find themselves outgunned at public water quality hearings and in water court.



Pollution, pollution everywhere and not...

If there is a snake in the West's Garden of Eden, it is nonpoint source pollution. That millions of individual acts — farming, mining, building — are having major effects on the West's streams may finally force major changes in the way Westerners direct and use water.

The pressure exerted on Western water law by the flow and seep of pollutants off the land and into rivers is illustrated by the Arkansas River.

In 1988, the Arkansas Area Council of Governments, which is the designated water planning agency for the upper Arkansas, found what it considered to be a huge gap in a state-proposed water quality plan for the region.

Bill Simpson, head of the council, said: "It was an act of blasphemy to talk about the relationship between water quality and water dimension in a 208 plan."

The federally required 208 plan draws no conclusion about the effect reducing water flows has on the river's water quantity — even though pollution remains constant.

But events are making this linkage difficult to ignore. The thirsty Colorado cities — Colorado Springs and Aurora — following the precepts of Western water law, have bought agricultural water from farmers in the lower Arkansas River. To get that water into the cities' pipelines, they asked and got permission from the water court to transfer the diversion point of the 70,000 acre-feet of water to the upper Arkansas, above Buena Vista.

As a result, less water is flowing between Buena Vista and the Pueblo Reservoir. But farmers, highway builders, firewood cutters, eroding hillsides and long-abandoned mines are sending the same amount of nonpoint source pollution flowing, trickling and seeping into the Arkansas. And when that pollution reaches a diminished river, the levels of pollution climb.

The municipalities along that stretch of the river have already spent considerable money to improve their water treatment facilities. Less water makes them nervous.

"These cities are facing tough new standards for treating drinking water and increasingly stringent standards for treating wastewater," says Simpson. Lower flows can only make it more expensive to treat drinking water at one end and to treat sewage at the other, he says.

The council wanted the 208 plan to spell out and address the ways hydrologic modifications to the river, such as diversions and exchanges, affect its quality.

State wasn't interested

But the state turned a deaf ear. Bill McKee, the state official responsible for writing the 208 plan, says "most of the language with respect to water exchanges didn't belong in a 208 plan."

Jack Gillespie, who was hired by the Upper Arkansas Council to write its version of the plan, wasn't surprised. "The biggest problem we have in this state is

integrating water quality into the physical management of the streams. No one seems to care about it, least of all the Water Quality Control Division."

In fact, Colorado has tried hard to separate the laws governing water development from the regulations affecting water quality. The Legislature has gone so far as to add language to the Colorado Water Quality Control Act that specifically forbids "material injury" to water rights caused by exercising water quality control regulations.

Colorado's official position, in effect, is that exercising a water right can't cause pollution. The state's language is similar to an amendment to the Clean Water Act sponsored by Wyoming Sen. Malcolm Wallop, R, that prohibits federal water quality regulations from interfering with state water allocation systems.

But water diversions do affect streams indirectly, primarily by concentrating whatever pollutants already exist, and recent court decisions have acknowledged — legislative language notwithstanding — that water quality may be a factor in water allocation decisions. Thus, the position taken by the state is becoming harder to defend.

Malcolm Murray, a Denver Water Board commissioner frustrated with the Environmental Protection Agency's proposed veto of the Two Forks dam, at least partly for water quality reasons, sees the writing on the wall.

"The dominant social policy today is environmental protection, not economic development. Our system (for allocating and managing water) doesn't take into account environmental, recreational and other legitimate interests in water, (and these interests) have gained political power over the years," he says. "It doesn't do any good to curse the night; we have to learn to play this new game."

The problem is, it is a new game, without rules or even a playing field. Conflicting signals from the courts and shifting political realities have everyone from water developers to environmentalists scratching their heads.

Water attorneys such as Bennett Raley and Greg Hobbs, co-counsel to the Northern Colorado Water Conservation District, and who generally represent water developers, appear to have settled on a back-fire strategy.

They published several articles this year conceding the need to address water quality in the context of water development, but adamantly insisting the issues can be resolved without changing the current prior appropriation system of water allocation.

"You have to make a clear distinction," says Raley, "between adding pollutants to a stream and diverting water from it, both of which may affect water quality."

Raley disputes the idea that removing water from the Arkansas is a cause of pollution. Pollution, he says, should be cleaned up, and not diluted by preventing the exercise of a water right.

Chris Meyer, an attorney with the National Wildlife Federation, says Raley's distinction is artificial. "Do you think the American people care one whit about preserving the integrity of Western



Mine waste is added to the Arkansas River at its confluence with California Gulch

water law? They want clean water and they are determined to get it."

This threat, expressed by several speakers at a recent water symposium as, "If we don't do something about water quality, the federal government is going to do it for us," is the engine driving interest in nonpoint source pollution.

Raley concedes that the failure of states like Colorado to clean up nonpoint source pollution is likely to haunt them. "Ironically, water interests may find regulating nonpoint source pollution is a prerequisite to future water development and management."

Without such regulations, Raley believes, state and local officials will find it tempting to tap the perceived "deep pockets" of water developers to meet the costs of increasingly stringent federal water quality standards.

The alternative, of course, is to make polluters pay to clean up nonpoint source pollution. But this may be impossible.

Consider farmers. "The agricultural community thought it scored a coup when agricultural return flows were defined as nonpoint sources in the Clean Water Act," says Greg Hobbs.

"But now that agricultural practices are identified as one of the major contributors of nonpoint source pollutants, the farmers don't have access to the billions of dollars spent to control point sources. And they clearly aren't financially able to do it themselves in today's farm economy."

It is unlikely that they, or any other nonpoint source polluter, are going to get much help from the federal government. Even though \$400 million was authorized for a nonpoint source program in the 1987 reauthorization of the Clean Water Act, no money has been appropriated.

States wanting to start a nonpoint source program have had to find the money themselves. Colorado diverted \$300,000 this year from a fund to build wastewater treatment plants to start a program. This year the program features six small demonstration projects and two educational programs. The state has pledged another \$1.5 million to the program over the next three years, but this sum is paltry compared to the estimated \$24 million it will take to clean up the Yak Tunnel, a single nonpoint source of heavy metals.

Colorado lacks muscle

Colorado's program also lacks muscle. "I don't think we know enough about nonpoint source pollution to offer a regulatory program," says Greg Parsons, the program's director. "And anyway, we think we are better off getting people to implement nonpoint source controls voluntarily."

Parsons' comment points out another major problem: a reluctance to tell people how to run their business or use their land. "We've been given very specific instructions by the Legislature to do everything possible with voluntary programs and incentive grants before we consider nonpoint source control regulations for agriculture," says Parsons.

But even if the political will were there, a regulatory program now would probably fail due to poor data and a lack of solutions. "The data we've collected in the past just isn't of good enough quality to give us confidence in our ability to track or correct nonpoint source pollution," says Doug Cain of the U.S. Geological Survey, the agency most often responsible for collecting water quality data.

Cain is currently working to establish standards and coordinate the water quality data collection efforts of local, state and federal agencies on the upper Arkansas River. This is the first step in a research program that will evaluate the effects water diversions have on water quality in the Arkansas basin.

In the meantime, conflicts between those interested in water quality and those interested in water development are being resolved on a case-by-case basis in a most unlikely venue: district water court.

Colorado Springs, for example, recently negotiated an agreement with Canon City and Florence in which Colorado Springs agrees not to operate its exchange rights and further deplete the river if the flow in those two cities is less than 190 cubic feet per second. The agreement will keep the cities from violating their wastewater discharge permits in low-flow conditions.

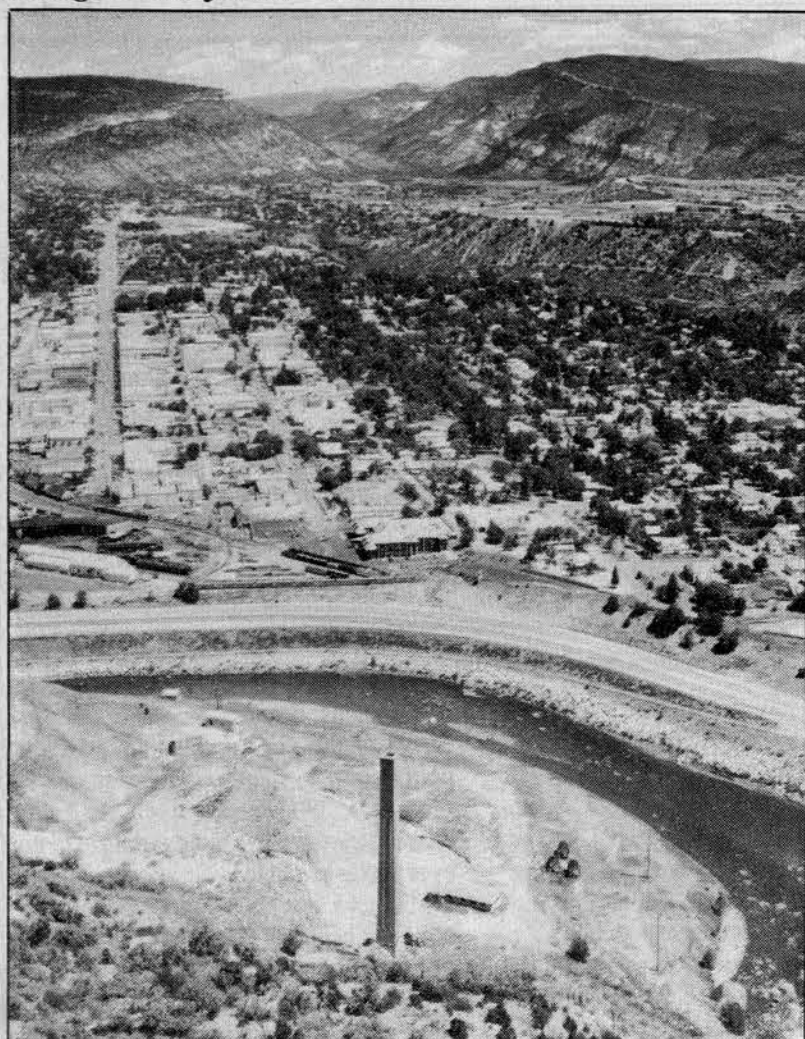
The agreement so pleased John Tracey, the District 2 water court judge who had to approve the Colorado Springs agreement, that he encouraged the city of Pueblo to negotiate a similar deal. Since these agreements have been negotiated between interested parties and not imposed by the courts, there is disagreement about their significance and about whether they should be considered a precedent.

Larry MacDonnell of the Natural Resources Law Center in Boulder sees the agreements "as an indication of the way the wind is blowing. Sooner or later, Colorado's attempt to keep water management and diversion separate from water quality regulations is going to be tested in the courts. I don't think anyone knows what the outcome of that will be."

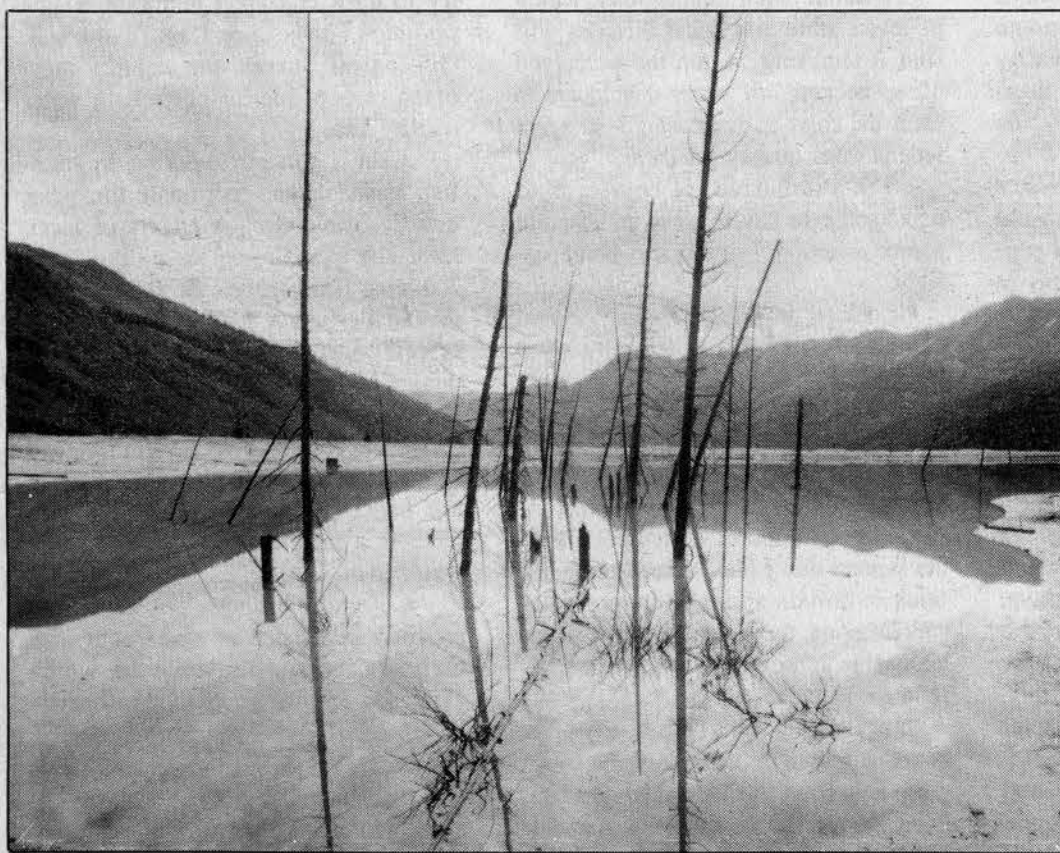
In the interim, the federal government is moving inexorably toward more stringent requirements for clean water, including regulation of nonpoint pollution sources.

— David Fanning

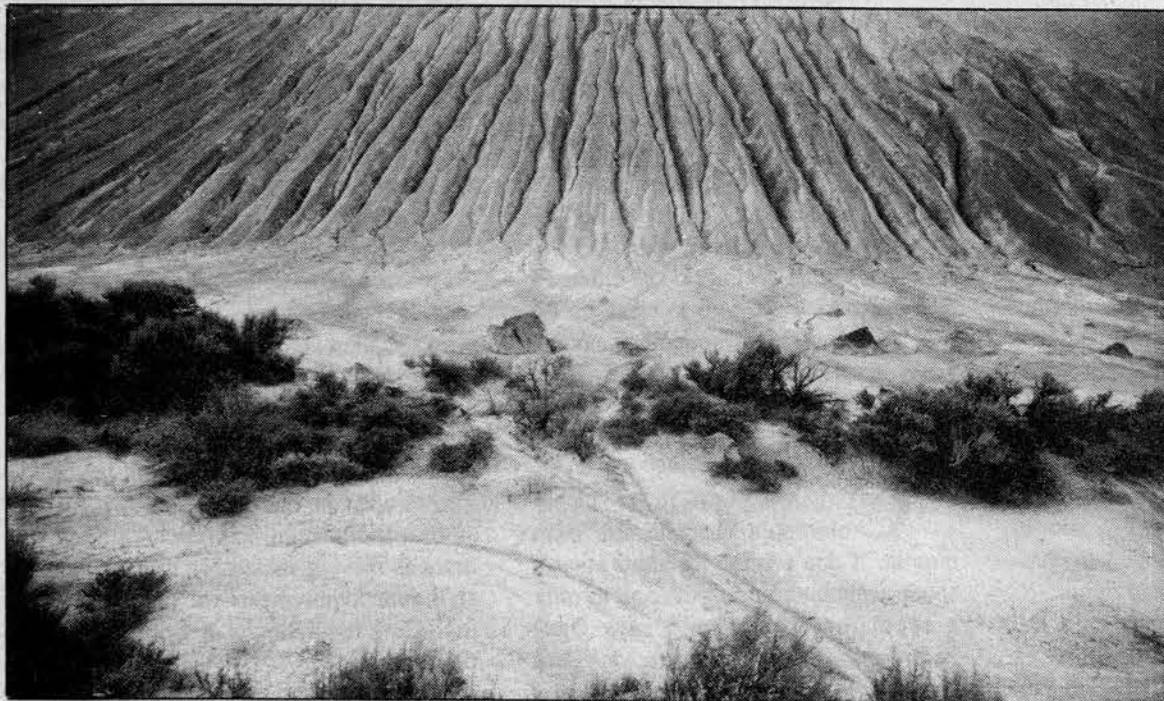
14-High Country News — November 20, 1989



Colorado: Four decades of uranium mining left 1.5 million cubic yards of low-level radioactive mill tailings above the Animas River and the city of Durango. 1986.



Colorado: Part of a Superfund site, tailings ponds on Red Mountain Pass are upstream from the heavy-metal laden Uncompaghre River and Ridgway Reservoir. Over a century of copper, lead, zinc, gold and silver mining in a 16-square-mile area between the towns of Telluride and Ouray will require nearly \$70 million to clean up. 1984.



Nevada: Close view of eroding copper mining tailings near Ruth. 1983.

T R O U B L E D

Robert Dawson's photographs, while stunning and often beautiful, do not portray the West of postcards and engagement calendars. He records a wounded frontier, a West of tailings ponds and dammed rivers, of open-pit coal mines and power plants, an eerie landscape to make us pause and wonder.

Beginning with his first project, portraits of patients in a mental hospital, Dawson dedicated his work to social concerns. In 1979, after completing his M.A. at San Francisco State University, he learned about Mono Lake in the Owens Valley east of Yosemite National Park.

The water companies of Los Angeles intercept the water headed for the lake, leaving it to evaporate into the high desert air and, according to Dawson, "causing the unnatural death of this natural environment."

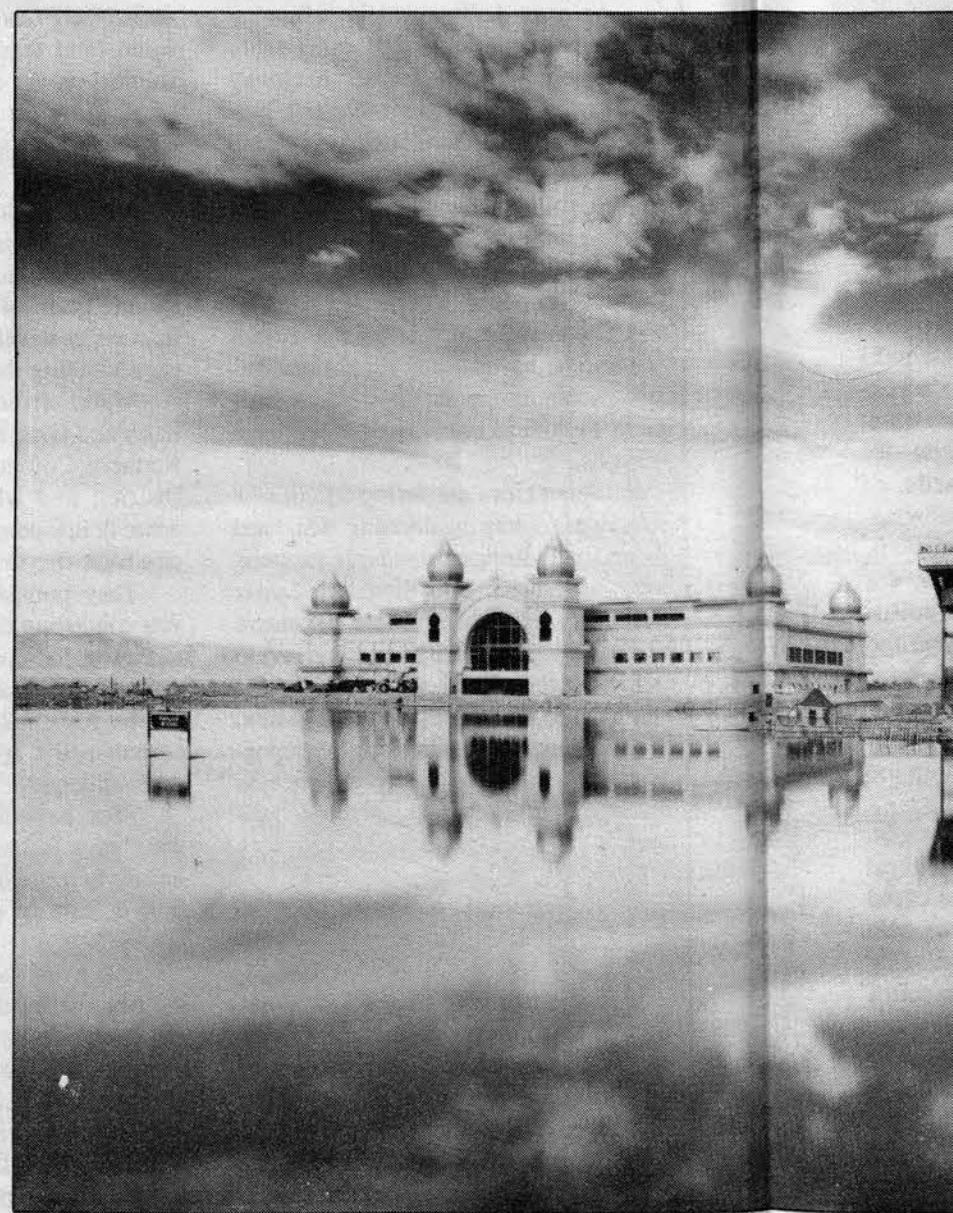
"My photography at the lake," he says, "has become an ongoing project which will continue as the lake itself changes and is possibly destroyed."

His growing interest in understanding and chronicling our relationship to the environment next took him to the Great Central Valley in California. Dawson, who grew up in the valley, photographed a rural culture and landscape reshaped by multi-national agribusiness, water diversions and pesticide residues. *The Great Central Valley Project*, which will be published next year by the University of California Press, juxtaposes his contemporary images of the valley with historical photographs.

The photos shown here are from Dawson's ongoing "Water in the West Project," a study of our abuse of an arid region's most precious resource.



Colorado: Bob and Ellen at the Uranium Drive-In, in Naturita. Bob Dawson and his wife, Ellen Manchester, a photographic historian and curator, spent their honeymoon touring toxic waste dumps throughout the West. 1986.



Utah: When the Great Salt Lake flooded, it threatened not only the Saltair Pavilion, airport, Interstate-80 and a railroad. The state of Utah spent over \$60 million to 1985.

photography at the lake," he says, "become an ongoing project will continue as the lake itself is and is possibly destroyed." His growing interest in understanding and chronicling our relationship with the environment next took him to the Great Central Valley in California, where he grew up in the valley. He photographed a rural culture and landscape reshaped by multi-national business, water diversions and pesticide residues. *The Great Central Valley Project*, which will be published next year by the University of California Press, juxtaposes his contrasting images of the valley with historical photographs.

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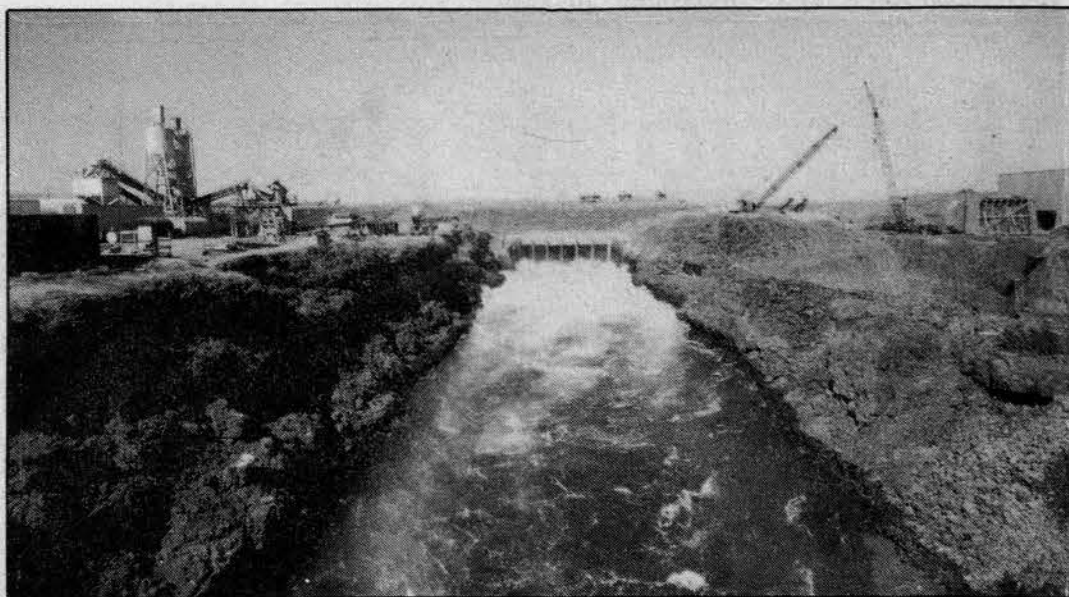
W A T E R S



Drive-In, in Natavita. Bob Dawson, a historian and curator, spent their time in the West. 1986.



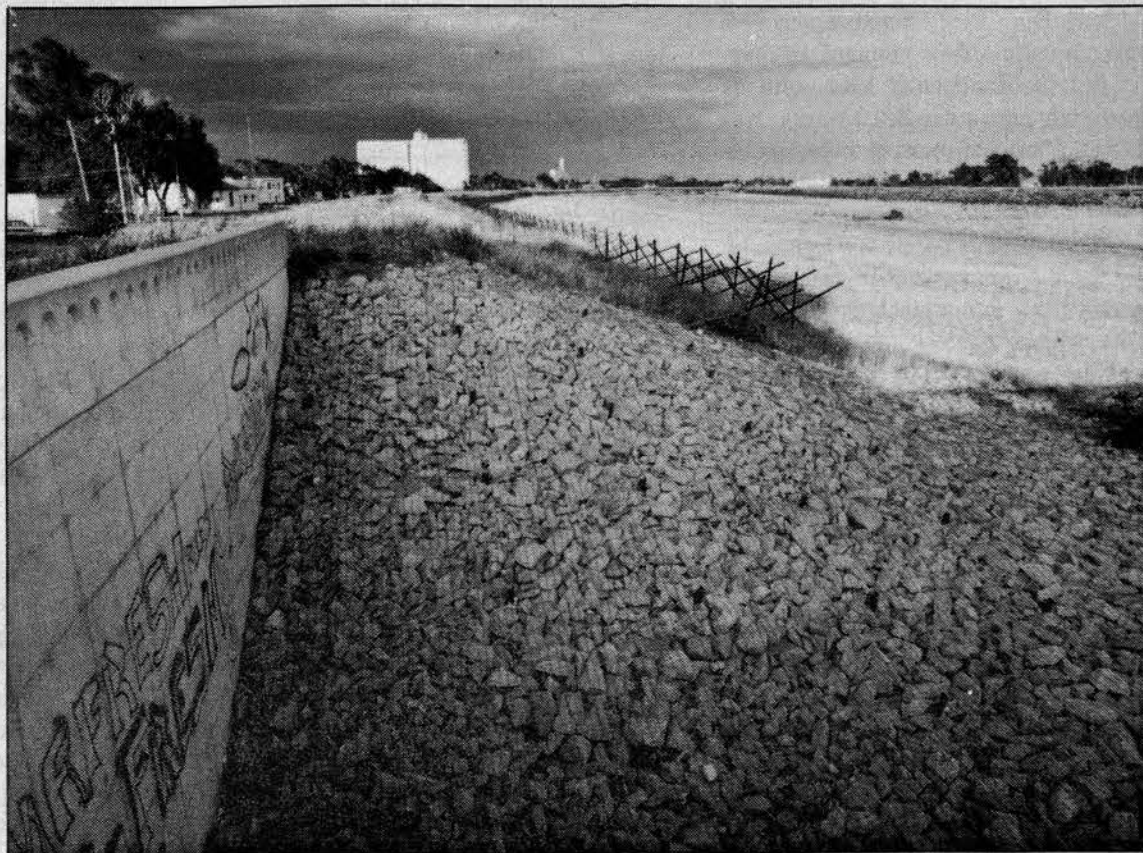
Threatened not only the Saltair Pavilion resort, but also downtown Salt Lake City, its state of Utah spent over \$60 million to pump the water out into the desert to evaporate.



Washington: Near Grand Coulee Dam. Once teeming with salmon and steelhead trout, the Columbia River is now the world's biggest producer of kilowatt hours. Half a century transformed the Columbia from a free-flowing river to a chain of reservoirs.



Nevada: The spillway at Lahontan Reservoir near Fallon. Once the Carson River flowed into the Carson Sink creating 800,000 acres of wetlands. These wetlands were a major resting ground for migratory waterfowl and shorebirds. Now the Carson River water is impounded in the Lahontan Reservoir, where it is supplemented with irrigation water highly contaminated with minerals. Only about 26,000 acres of wetlands remain, and some biologists predict that without supplies of fresh water the wetlands will shrink to 10,000 acres, disappearing altogether in dry years. 1984.



Kansas: There is nothing left of Colorado's Arkansas River when it reaches Dodge City, Kansas. Since it is over-subscribed upstream, farmers grow wheat in its riverbed. 1985.

16-High Country News — November 20, 1989



The Big Hole River near Melrose, Montana, flowing at 20 percent of normal last August

Drained rivers rouse Montana

During the droughty summer of 1988, irrigators sucked many Montana streams dry. The backlash could re-order the way the state manages water

by Bruce Farling

The squabble over water in Montana is typically Western: more people want more water from streams that don't have much to give. And agriculture, thanks to the "first in time, first in right" doctrine of prior appropriation, has long been king, dictating who gets what, virtually always putting itself first.

But the drought of 1988, with its dead fish and near-dead rivers, has sparked a modest uprising among recreationists, outfitters and urban dwellers against the irrigation autocracy.

The result has been a few legislative wins for the upstarts and an understanding that there is not much physical give to the system.

New water for fish and recreation will not be magically pulled out of a hat, unless, of course, it is the king's hat. Agriculture is a bit nervous with this insurrection.

The roots of the insurrection lie in the scarcity revealed by the scorched summer of 1988, which was preceded by several years of drought. During that time irrigators transformed fabled trout havens such as the Big Hole, Beaverhead and Madison rivers into brackish rivulets.

Fish died by the thousands, and biologists predict it will take five to eight years of normal precipitation to bring the fisheries back. The

Beaverhead, which the Montana Department of Fish, Wildlife and Parks calls one of the best native trout streams in the West, was hit especially hard. Its fishery, which the department says is worth \$2.3 million annually, might need a decade to recover because irrigators continue to take the lion's share of its summer flows.

It is the fate of these and other streams that compels environmentalists and outfitters to scrap for water. The first skirmishes have taken place in the Montana Legislature. During the 1989 session the environmental lobby succeeded in passing a few modest bills that help protect the state's streams from abuse.

Foremost was one establishing a pilot program that allows the state department of Fish, Wildlife and Parks to lease agricultural water from willing ranchers for use as instream flows. The program will start on five streams and, if the Legislature approves, may be expanded. Previously, water could be leased only for traditional off-stream uses such as irrigation and mining.

Instream flows are also getting new attention in Montana's two largest river basins, the Clark Fork and Missouri, where state agencies are studying proposals to reserve water for future uses. Among the reserve-flow requests are applications by state agencies for instream flows to protect fish and water quality, much as was done on the

Yellowstone River a decade ago.

Lastly, the state has begun to develop a comprehensive water plan — a project state officials tout as a vehicle for all Montanans to have some say on water policy. Environmentalists and anglers have taken an active role and say it is a valuable forum to discuss their differences with agriculture.

Trend toward environmental values

These developments have been slow in coming and, even if successful, will achieve only small advances for anglers and clean water advocates. But they are important because they represent a trend away from traditional consumptive uses and towards environmental values.

According to Stan Bradshaw, a lobbyist for Trout Unlimited, the instream flow pilot project is more important for symbolic reasons than substantive ones.

"In and of itself, it doesn't represent any dramatic change in Western water law," he said. "Instead, it is a new recognition that water law can't be static in the face of societal change."

George Ochenski, who lobbies the Legislature for the Alliance for Montana Water, a coalition of environmental, angler and outfitter groups, said agriculture only accepted the leasing bill and other stream-protection legislation after the alliance threatened to put instream flow protection on a statewide ballot in the next election. He said the specter of such a challenge split the agriculture industry, and it quarreled over the legislation.

"The ag lobby was in complete disarray for a couple of weeks," Ochenski said. "It's a shame they have to be hit between the eyes before they wake up to realities in this state."

The rare dissension made headlines, and even caused Bob Marks, an influential Republican legislator and long-time rancher, to criticize his industry's lobbyists.

He said they were misinforming

lawmakers about bills sponsored by the environmental alliance, and he feared the lobbying would backfire, and diminish the influence of agriculture, Montana's biggest breadwinner, in future legislatures.

"They may be hanging themselves with their own lasso," Marks said of the agricultural lobbyists last spring. "You start counting the number of boots up there (at the capitol) and there aren't that many."

But agriculture has the power

Despite Marks' nervousness, there are apparently still enough ranchers and farmers in the legislature to scuttle challenges to agriculture's dominance. An alliance bill that promoted drought planning — before droughts occur — was derailed by agriculture interests.

Bristling at the defeat, Ochenski claimed that irrigators, who use 96 percent of the water consumed in the state, are selfish during times of drought. He claimed they ignore the needs of tourism, the state's second largest industry.

"Literally, when drought hits, the farmers suck the rivers dry, the politicians get relief money for them and the rest of us take it in the shorts," he said. Ochenski said some outfitters on the Big Hole River had no business after June in 1988 because irrigators had dried up the streams.

Jo Brunner chafes at such charges. An irrigator and lobbyist for agricultural interests, she said water shortages could be eased by building more reservoirs to store runoff that now goes unused. She also said irrigators use only 4 percent of all water that courses through Montana.

"We believe we wouldn't have problems with in-stream flows if we have storage," she said.

Brunner advocates plugging Montana streams with "multiple purpose and multiple financed" dams. She said recreationists would benefit from in-

In 1988, dry rivers ran through it

Tony Schoonen was used to fishing Montana's rivers during low water years. The Big Hole and Jefferson rivers, two popular fisheries in the southwestern portion of the state, had flowed at well below average levels for three years in a row since 1985. Both, however, had sustained at least minimum stream flows during the dry summer months and into the fall.

But by early summer 1988, Schoonen knew the Big Hole was in big trouble. And the Jefferson wasn't far behind. In early July, when Schoonen, who has worked as a fishing guide for more than two decades, was getting prepared for what would normally be the height of the fishing season, flows in the Big Hole were averaging 20 percent of normal in middle sections of the river and had all but stopped flowing in the lower stretches. Near Twin Bridges, just upstream from the point where the Big Hole and Beaverhead rivers meet to form the Jefferson, the Big Hole was nearly dry.

The Big Hole is a nationally known blue ribbon trout stream, but by the time the hot August weather arrived portions of the river that would normally be ferrying large drift boats downstream or lapping around a fly fisherman's waders could be crossed on foot — without any worries about getting wet.

"Everything was dry in the lower end," Schoonen said recently, reflecting back on what he called his worst summer ever.

Some trout in the Big Hole and Jefferson were able to survive for a time by congregating in deep pools of cool water or side channels and small spring-

fed streams that somehow maintained a flow. But most of the fish — how many is unknown — were left without any escape routes. Trapped in the stagnant water, they baked to death in the hot August sun.

Brown trout and whitefish in the Jefferson survived for a little longer, but just before Labor Day hundreds of dead and rapidly decomposing fish were found at the Silver Star fishing access.

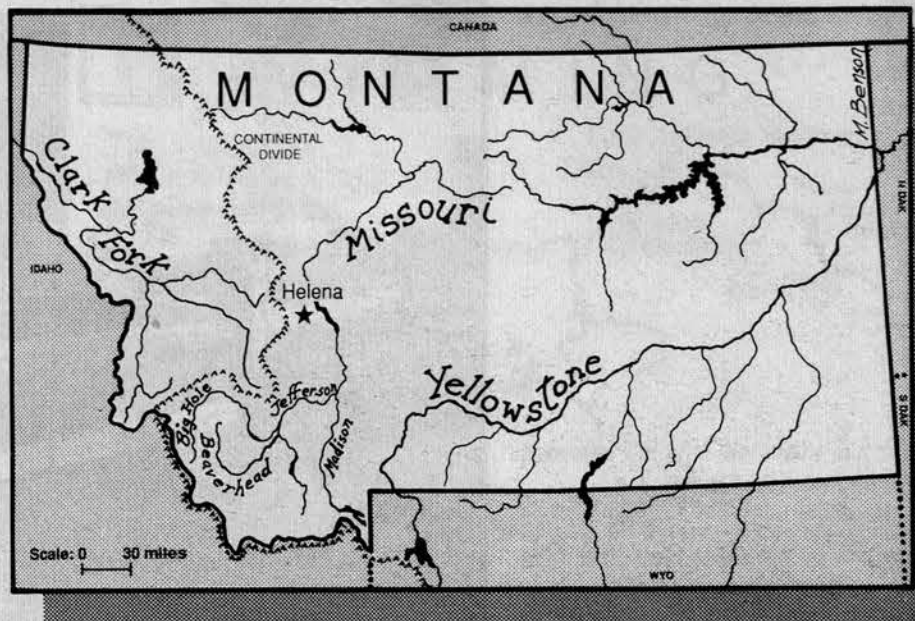
State fisheries biologists like Dick Oswald are still trying to figure out the extent of the drought's damage to Montana's fisheries.

Oswald, who keeps a watchful eye on the Big Hole for the state Department of Fish, Wildlife and Parks in Dillon, Mont., speculated at the height of the drought last August that it would take years for the fishery to recover. Aquatic life such as salmon flies and May flies, the staff of life for Big Hole trout, were killed off.

There's also speculation that trout fed on their spawn while bigger fish ate the smaller ones to stay alive. When the 1989 fishing season began, mid-sized trout — six and seven-inch fish that are the future of the fishery — were all but non-existent.

"This year we caught some decent size fish," Schoonen said, "but there were no little ones and no real big ones in the 18-inch range. For the next two or three years we won't see much of a fish population, I don't think."

While there was little water to be found in the river, there was some water within the Big Hole and Jefferson basins. Much of it was flowing in irrigation ditches, diverted by farmers up and down the watershed in their attempts to salvage what they could from drought-



stricken fields.

In some places along the lower Big Hole, and throughout the Jefferson, diverted river water ran three and four feet deep in canals and side channels not 10 feet away from dry riverbeds.

The right to use the water for agricultural purposes was established through Montana's water rights laws and a long, complicated adjudication process. That process, however, did not allow for in-stream flow reservations to maintain the Big Hole and Jefferson rivers.

Schoonen says he has no quarrels with the farmers' right to use the water, but is upset that neither they, nor the law, understand the biological and economic importance of maintaining in-stream flows.

Instead of just one bad season, Schoonen says southwestern Montana's growing tourism industry may now suf-

fer five bad seasons, and a crippling blow to its reputation.

The devastation on the Big Hole and Jefferson from the drought — also seen on the Madison, Gallatin, Smith, Bitterroot, Missouri, Yellowstone and other rivers — caused conservationists like Schoonen, then president of the Montana Wildlife Federation, to push for new statewide in-stream flow legislation during the 1989 Montana Legislature. Only part of that passed, and Schoonen says it's not enough.

"I still think the fisheries are in serious trouble," he said. "Agricultural depletion of rivers is always going to be a problem until we get an understanding on in-stream flow."

— Dan Carter

stream flows the dams could provide, so they should help pay for them. She also said more dams could be built in the Bitterroot Range south of Missoula, where there are already about 20 small dams, built in the 1930s, inside the Selway-Bitterroot wilderness.

Brunner said she "has no problems" with building dams inside wilderness "because it is a beneficial use."

The issue of increasing water storage is gaining visibility. The state's Department of Natural Resources and Conservation says farmers are telling it to make increased storage a priority in the state water plan.

Trout Unlimited's Bradshaw said calls for storage are misguided. He said though there may be a few sites where new dams could be built, that won't solve conflicts over water. "A lot of people buy into the idea that technology can make the West bloom," he said. "That's ludicrous."

Are 3,500 dams enough?

Bradshaw said most of the best and least expensive reservoir sites in Montana have already been tapped. "We have about 3,500 dams in this state (including those that form small reservoirs such as stock ponds). What's left?"

Some people say that before new storage facilities are built, old ones should be repaired. The Tongue River Dam in southeast Montana has long worried its owner, the Montana Department of Natural Resources and Conservation.

The aging structure impounds water

critical to dozens of irrigators, but is leaking and in dire need of repair. Department staff member Rich Moy said the cost of fixing the dam could be \$40 million to \$80 million, which would result in higher-priced water for the irrigators it services.

Crumbling dams on Indian reservations are also raising concerns. A new study by the Interior Department's Inspector General says many reservation dams are hazards, and one of the nation's worst is Montana's Pablo Reservoir Dam, the largest in the Flathead Indian Irrigation Project.

The department said the Pablo reservoir can't be filled to capacity because the dam might fail, killing hundreds of downstream residents.

Some critics of agriculture say more water would flow in streams if irrigators would conserve. According to Ochenski, "on a hot day in a high wind you can lose up to 40 percent from spray irrigation." He added, "It's the rule that people irrigate more out of tradition and habit than need or scientific knowledge."

But irrigators say calls for conservation ignore the contribution of return flows from flooded fields to streams. They say irrigation water that percolates into streams helps both the fish and can be used again by downstream irrigators. They claim irrigation stretches water for many uses.

But this argument over conservation is almost moot because Montana's water laws discourage it. If a farmer becomes more efficient, so that he needs and uses less water, that saved water can be taken from him. The solution to this "use it or

lose it" quandary, environmentalists and outfitters say, is to change the water law.

While fish and wildlife obviously benefit from in-stream flow protection, other values of flow preservation have emerged in recent years. One reason state and local health officials support in-stream flows in the Missouri River is to ensure water is available to dilute the alarming amounts of arsenic researchers have discovered in the stream.

The toxic metal occurs naturally in the basin, but hydrologists suspect the high levels are coming from irrigation return-flows that leach it into the river and its tributaries. Stan Bradshaw said the arsenic threat illustrates that "water quality and water quantity are inextricably linked. Nowhere could there be a more important example of the equation than the Clark Fork."

The Clark Fork River, which drains Montana's western third, is the state's largest and most polluted river. Its headwaters run through Butte and Anaconda, once the site of one of the world's largest copper mining and smelting districts. Today, the Clark Fork headwaters run through the country's largest EPA Superfund hazardous waste area.

The Montana Department of Fish, Wildlife and Parks has applied for in-stream flow reservations in the upper river and 17 tributaries. Besides protecting fish habitat, the department says in-stream flows are needed to dilute pollutants.

The upper Clark Fork is plagued by periodic fish kills, the most dramatic caused by summer thunderstorms that wash streamside mine wastes into the

river, poisoning fish. The department hopes that keeping current in-stream flows will ensure that water quality at least gets no worse.

Irrigators are fighting the reservations because they fear the water claims will allow the department to stop all new permits for consumptive water use.

The spring and summer of 1989 were good to Montana streams. Most of the state — with the exception of the southwest corner, where the Beaverhead and Big Hole rivers flow — received near-normal precipitation. Disputes between irrigators and recreationists were few. But dry years will return and the environmentalist insurrection will heighten.

In the long run, it appears agriculture's iron grip on Montana's water will be shaken only after two things occur: The state changes its water laws to encourage preservation of water for non-consumptive purposes; and political power shifts away from rural politicians.

The first, which is akin to rewriting the Bible, will come only after much political bloodshed. The second could take amending the state's constitution, allowing legislative re-districting that better reflects Montana's population, which is largely urban.

To accomplish both, environmental groups and sportsmen will have to continue their incremental advances on agriculture's century-old barony. It also wouldn't hurt them to pray for rain.

18-High Country News — November 20, 1989



Jeff Joiner

Abandoned house in the Brookhurst subdivision east of Casper, Wyoming

Wyoming's golden goose lays toxic eggs

*Unfortunately for Wyoming
and its all-important petroleum
industry, oil and water
can, and do, mix*

by Geoffrey O'Gara

When Anna Neumiller moved into her retirement home at the Brookhurst subdivision east of Casper, Wyo., in 1983, she didn't think twice about the Little America oil refinery just west of the subdivision.

"I'd lived in Casper, with that big (Amoco) refinery right in the middle," said Neumiller. "So why worry about Little America? I didn't see how it was any different."

A few years later she and other Brookhurst residents noticed a difference: the smell. In July, 1986, strange odors occurred in several Brookhurst homes. People complained of dizziness and nausea.

Several months and many tests later, state and federal health officials confirmed that the subdivision's groundwater was heavily contaminated with numerous highly toxic petrochemicals (HCN, 5/25/87).

Today, three years later, the Brookhurst subdivision is on the U.S. Environmental Protection Agency's Superfund cleanup list, residents have exchanged their wells for piped-in water, and three industrial sites in the area are undertaking expensive cleanup procedures.

But Brookhurst residents are still raising a stink.

"The smell is still here," said Neumiller. "It's just horrid. Some of it is hydrocarbons, some smells like burnt rubber, but some of it is so bad if I could give you a name for it I'd have it made. These are terrible, terrible smells."

Other Brookhursts waiting

Brookhurst got the attention it did primarily because Neumiller and her neighbor, Linda Burkhart, formed the Brookhurst Citizens Committee and agitated for help. Burkhart, who has since moved to the other side of Casper, contends there are other Brookhursts all over the state, waiting to be discovered.

If true, that is particularly bad news for Wyoming, where the oil and gas industry has long been viewed as a golden goose, providing scarce jobs and sure tax revenues in an often unstable economy. Compared to the state's other energy industries — coal and uranium — oil and gas have always produced far more profits and far less pollution.

It appears now that the golden goose has laid some toxic eggs. However, no one knows how many, where they are and how difficult it will be to clean them up. If Brookhurst is any example, the problem is severe.

After three years of work tracing Brookhurst's pollution, closing off the leaks and then using expensive soil vapor extraction systems to clean up the residues, the EPA found in September 1989 that contamination of Brookhurst's groundwater had actually increased.

Officials say there may be more sources of pollution than originally thought. According to the EPA and the Wyoming Department of Environmental Quality, gasoline is leaking into the aquifer from the Little America refinery to the east, while another plume of contaminants — including chlorinated

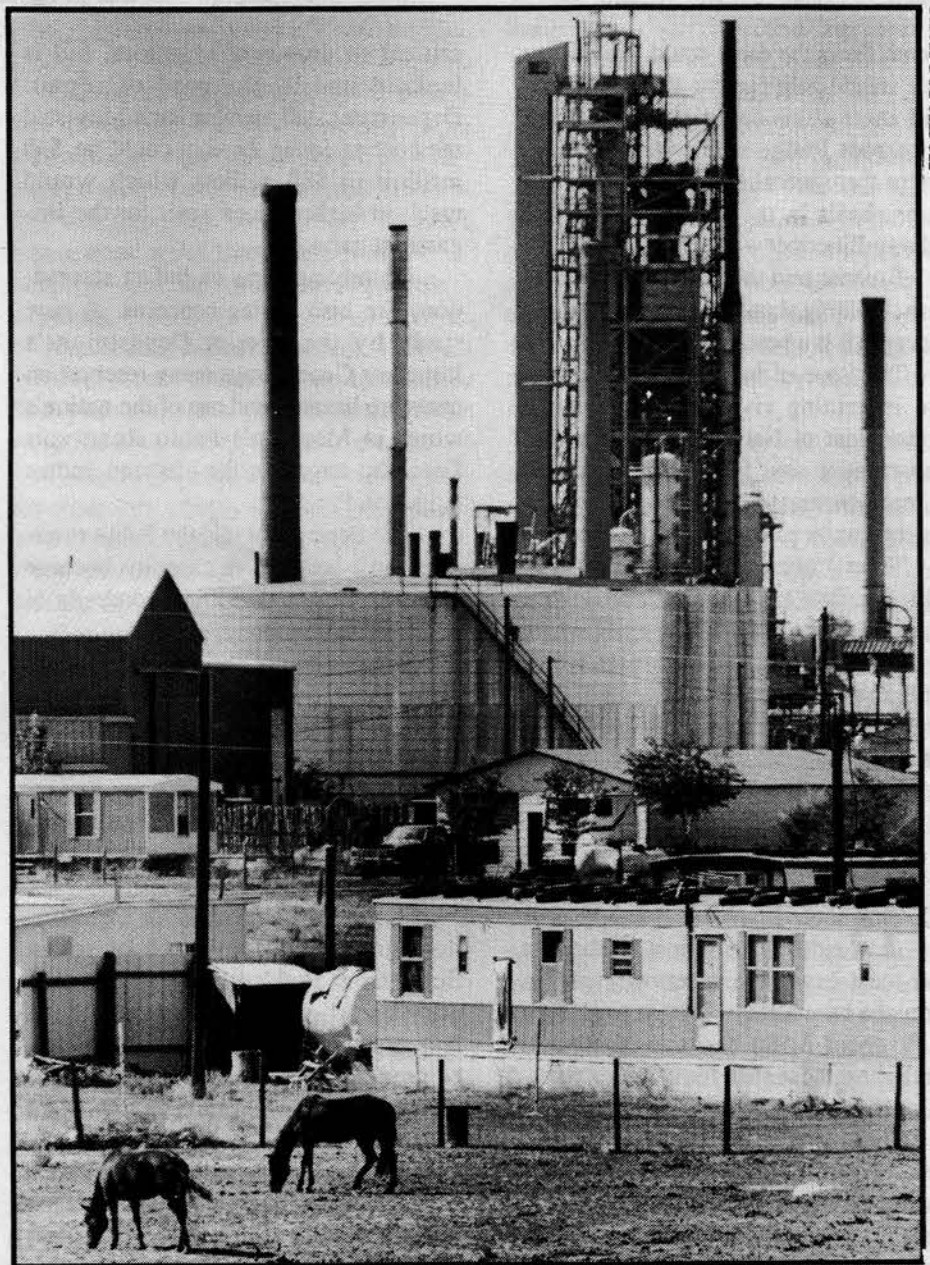
hydrocarbons, "extremely hazardous" toluene, trichloroethane and other chemicals — is allegedly coming from the Dowell Schlumberger and KN Energy plants to the north.

Under the 1984 revisions to the U.S. Resource Conservation and Recovery Act, a company cited as the probable cause of groundwater contamination must stop the source of contamination and then clean up its mess. The three companies traced to the pollution so far have all started expensive steps to remove pollutants from the soil and

water, although Little America officials still contend they are not responsible for the gasoline spill.

DEQ's Larry Robinson recently acknowledged that there may be still another source — a corridor of seven or eight oil and gas pipelines that pass close to the subdivision. DEQ has issued notices of violation to WYCO Pipeline and the defunct Texaco refinery, and a joint study is under way to determine the pollution source or sources.

However, a definitive map of Brookhurst's pollution would be nearly



Rick Sorensen

Little America refinery dwarfs the Brookhurst subdivision

impossible. There are about 20 industrial plants in the immediate vicinity, and nearly all of them use or treat hazardous chemicals of some sort. Both state and federal officials acknowledge that the technology to trace and remove those pollutants is relatively primitive, and say the work is slow-moving and outrageously expensive.

On top of all that Brookhurst has yet another problem: jurisdiction. The responsibility for cleaning Brookhurst's various problems does not belong to any one agency, but is split among Natrona County, the state Department of Environmental Quality and the EPA.

Throughout the investigations, Brookhurst residents have complained of inter-agency squabbling, long work delays and gaps in the data. If the pipeline leaks are confirmed, it could add two more agencies to the equation.

Brookhurst, with its pipelines, refineries and other factories is only a tiny part of the oil and gas industry's presence in Wyoming, and probably just a tiny part of the overall pollution problem.

Oil- and gas-related pollution begins at the wellhead, where drilling wastes are buried in unmonitored pits. It continues through the pipelines, where pinprick leaks can go undetected for months or even years. It occurs most famously at the refinery sites, and finally, as gasoline it drips into water tables beneath hundreds of leaking underground storage tanks.

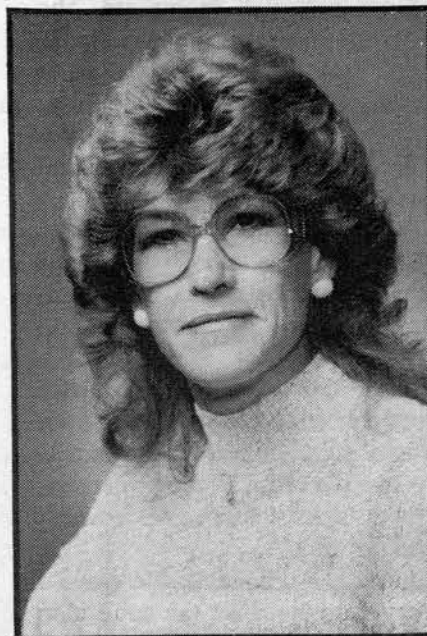
Sorting it out is an insoluble mess. Again the problem is jurisdiction. Hazardous waste disposal at the drill site is overseen by the Wyoming Oil and Gas Commission. Pipelines are under the domain of the oil and gas commission and the U.S. Department of Transportation. Refineries and underground storage tanks are regulated within federal guidelines by the Wyoming Department of Environmental Quality, but the EPA looks closely over the state's shoulders.

Perhaps because of the split jurisdiction, no one has ever made a full accounting of the industry's pollution problems. Each agency, however, reports significant problems.

A strong lobby

Oil and gas traditionally has a very strong lobby in the states," said Pam Herman, state project officer in the groundwater division of EPA's Denver office, explaining why Wyoming does not regulate toxic wastes at drilling sites.

Oil and gas has a strong lobby in Washington, too: The EPA in a 1988 report to Congress declined to regulate oil and gas drilling wastes as hazardous materials, citing the cost to the industry.



Footie Photography

Organizer Linda Burkhardt

There are thousands of waste ponds at drilling sites around the state, some lined to prevent seepage, some not. Those above shallow groundwater or near streams could cause problems. "Even some of the pits that are lined," said the EPA's Herman, "are just covered over with dirt when the drillers move. So the stuff ends up being spread around, and the lining doesn't do much good."

The waste ponds in the oil fields haven't even been counted, much less investigated, by the agencies charged with protecting groundwater. EPA's Herman thinks the states should regulate them by requiring restrictive groundwater discharge permits.

Jake Strohmer, Groundwater Programs Manager at the Wyoming Department of Environmental Quality, recognizes the problem but notes, "Statutorily, we can't do it. We are specifically exempt from regulating oil and gas."

Leaking pipelines

Some consider the problem of leaking pipelines minor. Because a high-pressure pipeline not far below the surface will likely blow upward through the ground, spills should be quickly found and fixed, Strohman said.

But others, including some of Strohman's colleagues at DEQ, think a pinpoint leak could go undetected for some time in the more remote corners of Wyoming. And precautions have not prevented above-ground pipelines from spilling gallons of kook into Wyoming's rivers. At Brookhurst, for instance, DEQ's Robinson now suggests that leaking pipes may be part of the problem.

The Brookhurst refineries are not the only ones to have infected water and soils. Casper, the center of Wyoming's oil and gas industry, has the most to worry about.

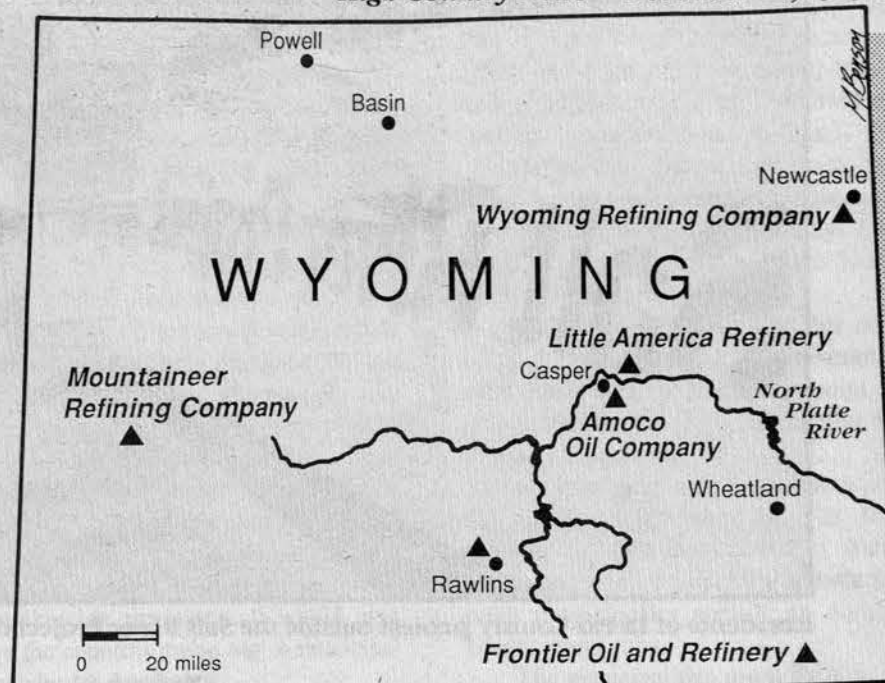
The Texaco refinery, located three miles from Casper's downtown and closed since 1982, is mired with volatile hydrocarbons and residues at 25 waste sites. The aquifer near Parker Drilling Co.'s facility west of Casper was found to contain toxic chemical pollutants in 1988.

Elsewhere in the state, there is serious groundwater contamination around the Sinclair Oil refinery east of Rawlins, and similar problems in the vicinity of the Wyoming Refinery in Newcastle. Neither company has complied with DEQ requirements, though Strohmer notes the problems have been known since 1980.

The real strain on DEQ's small groundwater staff is enforcing federal and state laws governing underground storage tanks. Congress passed a law to clean up leaking underground storage tanks in 1984. Wyoming passed its own LUST bill this year, after much legislative wrestling, and DEQ has struggled to evaluate over 8,000 such tanks around the state. Officials have trouble saying just how large the problem is.

In the small Wyoming town of Basin, employees at Security State Bank had noticed a gasoline odor, but it seemed worse than usual last spring as the water table rose and accumulated in the building's basement. So a sump pump was installed to push smelly water out of the basement.

One afternoon clerk Ron Boyd went downstairs to see if he could find the odor's source. As he was poking around, he saw a spark fly from a water heater and land on the water. Then — whoomp — the "water" caught fire.



"What's sad about the Basin situation," said DEQ's Strohman, "is that they knew there was a problem, and they put in the pump, which drew more gasoline, increasing the risk of an explosion. Then they pumped it into the city sewer."

Boyd suffered minor injuries, and the fire in the basement was controlled and put out. Officials from DEQ rushed in and identified seven possible culprits.

Basin gas station owners are angry and uncooperative — the owner and operator of a property with a leaking underground tank has to pay the cleanup costs.

In Wheatland, contamination lies within 300 feet of municipal water wells (the wells are mothballed, for now).

In Powell, gasoline was found accumulating against the wall of a school auditorium, prompting emergency soil venting and recovery wells. Powell has several plumes of pollutants in its groundwater; DEQ's Steve Gerber said of one Powell resident: "When he watered his lawn you could smell the gasoline."

Cleaning up the leaking tanks is a daunting and expensive task. "I think you're going to see a lot of gas stations going under," said Gerber. The state has set up a fund, financed by a one cent per gallon gas-pump tax, to pay the cost of orphaned tank cleanup. In the future, tank owners will have to pay into a clean-up insurance fund. Owners who can't afford to pay will have to bare their financial souls before the state's Environmental Quality Council to get help — and there is a constitutional question regarding whether the state can pay to clean up private land.

The cost of cleaning up a leaking tank ranges from an average of \$95,000 in Arizona to \$225,000 in Florida. Strohman thinks the cost in Wyoming will be in the Florida range, or higher.

The education of Linda Burkhardt

Linda Burkhardt lived in the Brookhurst subdivision for 18 months before moving out. Six months after she and her husband moved to Brookhurst, toxics were found in the groundwater there and she switched to bottled water. But they were still showering in the stuff until a new — and expensive — water supply was piped in from Evansville, she says.

There has been no definitive finding of health problems relating to the Brookhurst contamination, and the EPA has refused to relocate people from the subdivision. Brookhurst residents recite a litany of health problems — from birth defects to cancer and skin disease — many of which are still going on. Some

said the worst problem is the mental stress of having been exposed.

Last month, residents filed suit against the 20 companies operating factories in the area, as well as the developer that built the subdivision. With 270 plaintiffs and 20 defendants, it will be one of the largest cases in Wyoming history.

Burkhart now lives in a subdivision west of town, uphill from the Casper-area pollution sources. Last year she ran for the state senate as the Democratic nominee for Natrona County. Her campaign was built around Brookhurst and other environmental issues, and she was soundly defeated by her two Republican rivals. But Burkhardt calls it a success anyway.

"We (Burkhart and her neighbors) were labelled hysterical, nutty housewives, and less than three years later I was running for the state senate and got 7,400 votes in a very industrial county."

Since then she has teamed up with six of her old neighbors to start a group called "Pollution Posse." The group gets four or five calls a week from all over the state — from concerned citizens, whistleblowers and anonymous callers reporting contamination from petrochemical and other industries. After getting a call, the posse investigates the problem and if it is significant will write a report and send it to the state Department of Environmental Quality and local and county officials.

Burkhart says so far the Pollution Posse has uncovered scores of what it considers significant problems, but that the state seldom takes action.

"At this point our DEQ is so understaffed, underpaid and seemingly uninterested, that we have little enforcement," she says. "The companies are more or less betting on that."

A man called a while back about some problems with his well water, and she told him, as she tells many such callers, how to get the water checked and what agencies were in charge. Only later, when the DEQ found serious contamination on the property of the Parker Drilling Co., did Burkhardt realize the problem was near her new subdivision.

The DEQ has since declared Burkhardt's well water free of industrial pollutants, but, not surprisingly, she's wary. "It's okay for now, but nothing is forever," she says. "We're taking our own precautions. We've learned a lot from Brookhurst."

20-High Country News — November 20, 1989



Sundi Klenstad, The Arizona Republic

Residents of La Paz County protest outside the Salt River Project offices in Phoenix

Arizona digs deep for water

*To slake their thirst,
Arizona's cities prepare to dry up
agriculture, and its dependent
communities,
in the state's western desert*

by Douglas Towne

Heat and isolation, but mainly the apparent absence of water, dominate the rugged, cactus-strewn Sonoran Desert scrublands around the town of Salome, Ariz., located about 100 miles west of Phoenix.

The local motel's swimming pool is probably the area's largest body of water. Washes flow only after the rare desert monsoon thunderstorms. Even Salome High School's mascot, the Salome Frog, is a play on the region's mere seven inches of average annual rainfall.

Both the mascot and the town were founded by Dick Wick Hall, who called attention to his settlement by composing tall tales about desert living. Those tales were syndicated in the 1920s, including this one about the Salome Frog.

".... Hatched out here by some Mistake—

Three Hundred Miles from the Nearest Lake,

And all the Water I can get to Drink,

Is what Leaks out of the Kitchen Sink ..."

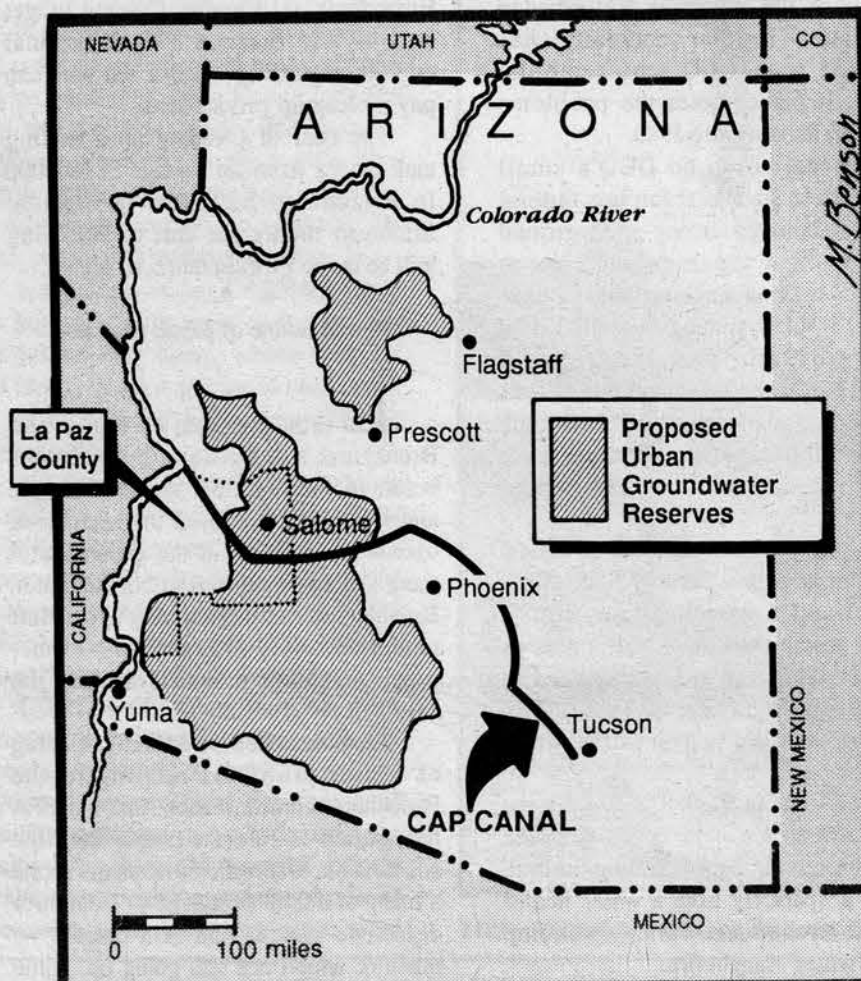
But Dick Wick Hall had it wrong: Salome and surrounding La Paz County are rich in water, underground water. The five aquifers in La Paz County contain an estimated 38 million acre-feet of recoverable water. That is almost three times the annual flow of the Colorado River and 25 percent more water than either Lake Powell or Lake Mead holds when full. Hundreds of millions of gallons more lie beneath the other counties in Arizona's western deserts.

In the arid but fast-growing Southwest, that water is a coveted commodity. Over the last decade, urban growth and intense speculation in groundwater have triggered a bitter fight between Arizona's cities and rural counties over the state's underground reserves. The prime target is the underground water around Salome.

At present, those aquifers are tapped mainly to produce cotton, but cotton growing is in trouble economically. Although a few farmers have diversified into crops with higher value, such as pistachios, pecans and jojoba, most stay with cotton "because cotton's the only crop these farmers know how to grow," says Larry O'Daniel, a local water improvement district board member.

Over the decades, fewer and fewer farmers have raised more and more cotton on bigger and bigger outfits. Those operations — sometimes with absentee owners — produce an energy and pesticide-dependent crop destined for distant markets and supported by government subsidies. The place is not now and has never been an agrarian dream.

Water as a bumper crop



But those farms may have one last bumper crop. Despite the economic decline of cotton, farmers putting their nearly bankrupt operations on the market have gotten premium prices, often with leases that let them continue farming. The price of cotton and the condition of the land are irrelevant to the buyer: all they want is the groundwater.

The buyers are municipalities and speculators. With most water supplies in Arizona claimed, or over-claimed, satisfying urban growth in the state now means converting water from agriculture to urban uses — turning cotton farms into water farms.

In La Paz County, the sudden invasion of the water market has made a few farmers rich, mostly around Salome.

But it has left the rest of the county — a 4,400-square-mile stretch of desert with fewer than 16,000 residents — facing the threat of becoming a water colony, reminiscent of California's Owens Valley.

La Paz County straddles the Central Arizona Project canal, which brings Colorado River water to Phoenix and Tucson. That makes it attractive for water farms because the plumbing to move the water to the cities is already in place.

Municipalities and speculators have bought deeds or options on nearly 60,000 acres in the county, says Gene

Fisher, chair of the La Paz County Board of Supervisors. But because only 10 percent of the county's land is privately owned, that 60,000 acres adds up to half its deeded land.

Fisher warns that if all that land is turned into working water farms La Paz will become an economic and environmental sacrifice area for the future growth of Arizona's central urban corridor. Yuma and Mohave counties, La Paz's neighbors to the south and north, are in similar, though less severe predicaments.

Law had unfortunate consequences

The rural counties, Fisher argues, are endangered by a law that was initially praised as the first responsible approach to groundwater use in any state in the desert Southwest.

Arizona has far more water underground than on the surface. That water is both in the western deserts and in numerous deep basins throughout the state. The aquifers are heavily used for domestic, industrial and agricultural needs, but recharge so slowly that they are essentially one-shot, non-renewable resources.

By the late 1970s, intensive farming and exponential growth in Arizona's central urban corridor — Prescott, Phoenix and Tucson — resulted in tremendous overdrafts under the cities. Groundwater levels dropped sharply, causing ground fissures and subsidence.

State officials ignored the problem but Congress didn't. It threatened to cut funding for the massive Central Arizona Project unless the state got its house in order.

In response, the Arizona Legislature passed the 1980 Groundwater Management Code. Technically, the code protects all groundwater in Arizona. But stringent regulations are in force only where there are significant overdrafts: the aquifers under greater metropolitan Phoenix, Tucson and Prescott.

Those basins are labeled Active Management Areas, and the cities must decrease groundwater pumping to equilibrium, with withdrawals equal to recharge, by 2025.

Many expected the code, which also requires a developer to guarantee a 100-year water supply before building a new house, to force urban Arizona to get serious about water conservation. It hasn't worked that way.

In part, the cities were able to avoid conservation because the code also repealed an old law that required

groundwater to be used on the land from which it was pumped. The repeal allowed the cities to try to balance their overdraft problems by raiding the countryside for rural groundwater.

As Roger Manning, executive director for the Arizona Municipal Water Users Association, explains, most of the 1.8 million acre-feet a year CAP will bring from the Colorado River will be used to replace water the cities formerly pumped from underground. New water, brought in from the La Paz county and other water farms, will be used as a 100-year assured supply for the cities' future economic growth.

In fact, opening rural aquifers to market forces may have been an implicit, though unadvertised, goal behind the code. "Economic development is stifled by a perceived lack of water in Arizona," comments Bill Stevens, a member of the commission that formulated the groundwater code. "[If a corporation is considering] moving an industry that requires any water, Arizona drops off the list of potential sites. We can't afford to impact the economy of the state," he says.

Manning says water transfers are a necessary and historic fact of life in Arizona. "Moving water from places of relative surplus to places of high demand is going to be a part of our water management policy for a long time." In that sense, Manning argues, "The code is working." Several of the many cities that have sprung up around Phoenix have "water farms."

But Fisher says that the 1980 code has failed La Paz County. "The intent of the groundwater law was a noble one," he says, "but it has not been practiced in a way any reasonable person would put into place. It's you against me."

Cities have taken advantage of the code and a poor agriculture economy to secure a substantial amount of water from outlying areas. Any attempt to modify the law, impose regulations, or limit the cities' access to rural groundwater is strongly resisted. Fisher says, "Try it and people say, 'They'll break the code.'"

As it is, he says, it's breaking the county. Fisher says there are problems with the cities over taxation and pumping schedules. But a worse problem, he says, is the speculators, who have bought up even more land than the cities.

The largest of those is AgriCom, which Stevens labels a "special interest out to make a lot of money." The company was formed by Ron Ober, a former staffer for Arizona Sen. Dennis DeConcini, D, who made a small fortune buying up land in the path of the CAP canal. AgriCom's sole business is to purchase lands in western Arizona to market the water to municipalities, especially those too small to finance their own water farms.

However, instead of concentrating on farmland, AgriCom purchased 26,000 acres of mostly undeveloped, dirt-cheap desert land, says Cliff O'Neill, co-chair of the Citizens For Water Fairness in La Paz County. O'Neill says while residents were willing to work with the firm, it became greedy. "Their big push was through lobbyists towards legislators, not hydrologists to discuss the situation with the locals."

The firm helped sponsor a bill that went before the Arizona Legislature early this year. Currently there are no restrictions on groundwater transfers in Arizona, except for the protected aquifers in the central urban corridor. Outside the Active Management Areas, surface owners may extract as much water as they please and send it anywhere they like, so long as it is put to beneficial use.

House Bill 2666 would have banned groundwater transfers from all the state's aquifers except for nine groundwater basins in the western desert. While the bill also limited pumping from those nine aquifers to about 70 percent of capacity in order to conserve a minimal supply for the future, and would have required cities to pay in-lieu taxes before taking the water, it left them as the only source of new water for the fast-growing cities.

The measure, dubbed the "Bill straight from hell" by angry residents of La Paz County, nearly set off a minor war.

"It is morally and ethically wrong to sacrifice any part of the state — to say that we will take your future so that another part might grow," says Fisher. "La Paz County, almost to the individual, will agree with the approach we're taking."

Led by the Citizens for Water Fairness and the La Paz County Board of

Supervisors, western Arizonans picketed AgriCom's corporate offices in Phoenix and delivered 1,500 tied straws to the Arizona Legislature on the eve of the vote. The bill lost, killed by La Paz County's outrage, Manning says.

The passions inflamed by the bill may have also killed chances for any negotiated reform of the groundwater management code. But in the last days of the legislative debate on the issue a new idea surfaced that may provide a solution both the cities and the counties can live with: turning the entire problem over to a state or regional water authority.

That authority would have the power to eliminate speculation and competition in the water market, set rules for use of water farms, and require better conservation practices. It would also give the counties some say in municipal groundwater purchases.

The first target may be agricultural holdings — 300,000-plus acres — that surround Phoenix and use massive amounts of water. "If you have a water crisis and you are going to plant houses and grow people ... and agriculture takes 70 to 80 percent of your water, you can't justify keeping that land in production," says La Paz County's Fisher.

Manning says the large cities would also like to be able to tap into agriculture close to home. "The question is whether or not continued investment of 85 percent of our water resource base into an activity that returns less than 2 percent of our GNP is a sound investment in economic, social or environmental terms."

But at the moment, those farms are protected from being turned into water farms. Because they are within an Active Management Area, the groundwater code requires groundwater from those farms to be retired when the land goes out of production; whether their water remains immune remains to be seen.

Manning says the farms control enough surface water to supply 15 million to 20 million people — three times the projected population of Phoenix in 2025.

Arizona is going dry

While the cities and counties fight over water, conservation and limits

on growth are overlooked. Arizona has lost 90 percent of its riparian areas: Dams and diversions have halted rivers, and groundwater pumping has dried up smaller streams and desert springs.

Rather than reverse that trend, the groundwater management code marks a further failure of conservation, says Joni Bosh, a water specialist with the Sierra Club in Phoenix.

"[The cities] have decided that augmentation is preferable to conservation," says Bosh, who questions the point of achieving safe yield in one aquifer by mining another.

Bosh criticizes the conservation requirements in the code. The law requires the state Department of Water Resources to set conservation goals for each municipality within an Active Management Area.

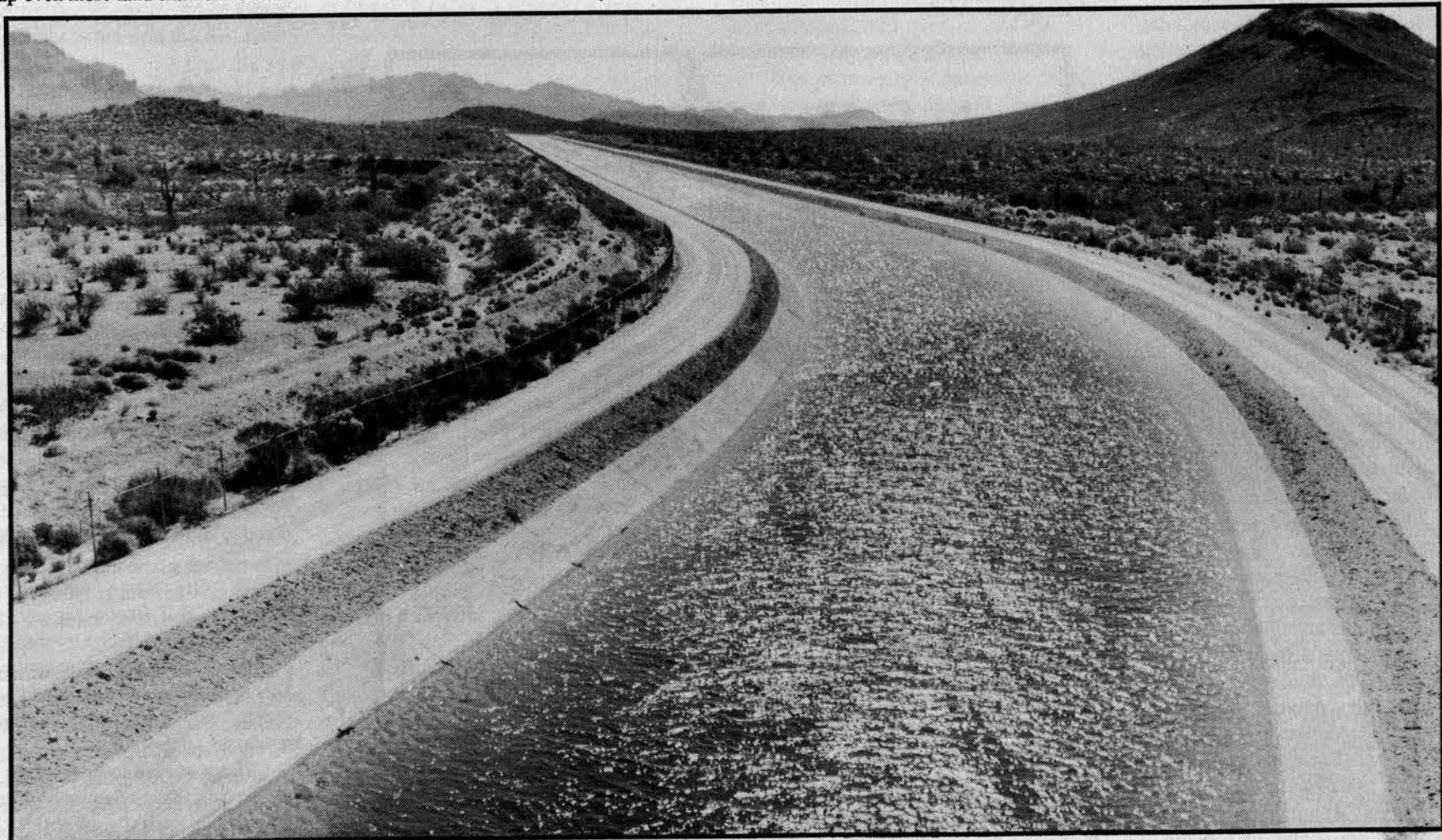
The municipalities must then write their own conservation plans, but are not required to enforce them. Bill Plummer, director of the Department of Water Resources, says the majority of cities in the Phoenix area missed their conservation goals in both 1987 and 1988. Plummer is now in negotiations with most of those cities, trying to prod them toward water savings.

While Plummer admits the state is "not there yet" on conservation, he warns, "you cannot achieve enough conservation to take care of the growth that's predicted."

To meet the needs of the six million people who are predicted to inhabit Phoenix in the next 35 years, Plummer says the state is also researching cloud seeding and vegetative management — thinning vegetation in selected northern Arizona watersheds to increase water production.

However, Fisher says the cities' greed for more growth has gotten out of hand. He points to recent studies showing that for every three people that come to Arizona, two leave.

"People come to Arizona because of clean air and open spaces. Phoenix has so many problems with traffic congestion and air pollution at this point they don't need to fuel more growth. It's a quality of life issue as well as a water issue."



Central Arizona Project canal northeast of Scottsdale

Sean Brady, The Arizona Republic

22-High Country News — November 20, 1989

Subterranean toxics threaten city

*Southwestern cities are famous
for drawing down their aquifers.
But Albuquerque, New Mexico,
may exhaust its aquifer while still
leaving it in the ground*

by Tony Davis

Four years ago, Paul Godinez had no suspicion that polluted groundwater lay beneath the neighborhood where he owned a cozy, cinderblock house just north of a grimy industrial area of Albuquerque, N.M.

But a few months ago, that polluted water surfaced. It happened when Godinez sought a \$10,000 bank loan secured by the house.

"While processing your application, it was discovered that your property is in the area of a hazardous waste site of some type," said the letter from ABQ Bank, one of Albuquerque's largest savings and loan institutions.

"Since there are many potential risks and liabilities involved, we cannot consider this loan request any further."

The "hazardous waste site of some type" referred to is the San Jose Superfund site, a one-square-mile tangle of groundwater pollution whose northern boundary is just across the street from Godinez's house.

State and federal health officials say the aquifer has been polluted by a plume of industrial solvents and oil that leaked from a jet engine parts manufacturing plant. The plant has been successively owned by the Atomic Energy Commission, the Air Force and, now, General Electric. Six other factories occupy the area as well.

San Jose is Albuquerque's only Superfund site, but it may be just the

start of the city's problems. Albuquerque depends entirely on groundwater for its municipal supplies, and groundwater contamination has been discovered at 60 different sites in and around the city, according to a 1988 survey done by the

Southwest Research and Information Center, an Albuquerque-based environmental group.

Both the sites and contamination sources are widespread. For example, a few miles south of city limits sits the rural subdivision of Mountainview, where another one-square-mile section of aquifer is unusable due to nitrate contamination.

Health officials can't pin down the source despite years of study. Under suspicion are old landfills on Kirtland Air Force Base to the east; an abandoned explosives plant to the west; farms, dairies and de-icing chemicals used on U.S. Highway 66 and on the runways at Albuquerque International Airport.

To the west of the San Jose site and across the Rio Grande River, a 20- to 100-foot-deep layer of groundwater is also contaminated. Foul-tasting but non-hazardous metals like iron and man-

ganese seeped into the ground there many decades ago from septic tanks carelessly placed near a shallow river-valley aquifer. City officials say it's not worth the cost to clean the mess up. Environmentalists disagree.

Less extensive problems include private wells contaminated by gasoline and miscellaneous oil products leaked from underground storage tanks; a meat-packing company well that is loaded with nitrates; monitoring wells that show high levels of diesel fuel underneath warehouses; and public wells with naturally occurring arsenic. New cases of pollution are called into the city's environmental health office each month.

Despite the many cases of pollution, plenty of clean water is available. In San Jose, for example, neither Godinez nor anyone else is known to be drinking polluted water. Only two private wells and two municipal wells have ever been found to have significant levels of solvents. All are now out of service.

A limit to growth

But the problems raise troubling questions about this Sunbelt city's ability to protect its only source of drinking water from industrial poisons.

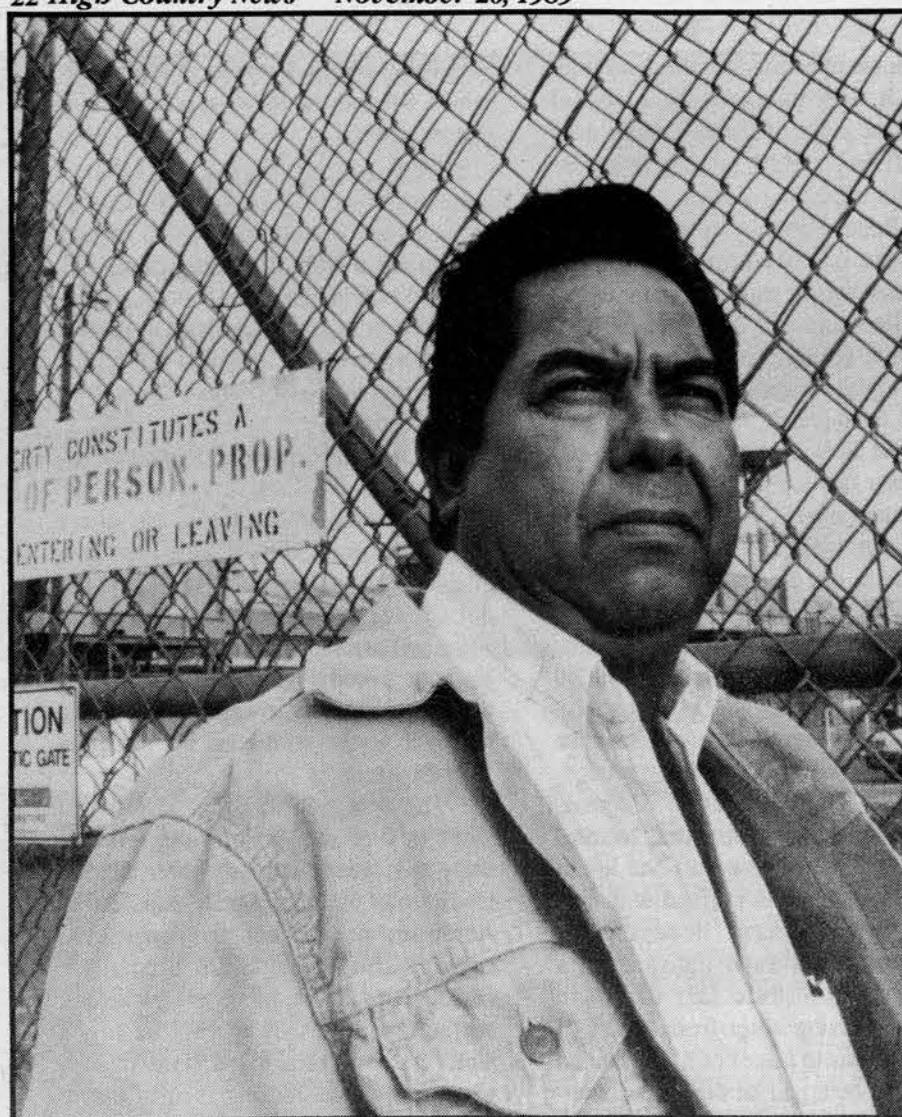
Another question is whether Albuquerque can supply water at reasonable cost as the area population grows from about 500,000 today to a predicted one million by 2030.

The immediate problem confronting Albuquerque is economic. The New Mexico Environmental Improvement Division estimates that cleaning up the San Jose aquifer will take at least two decades and cost \$35 million to \$45 million.

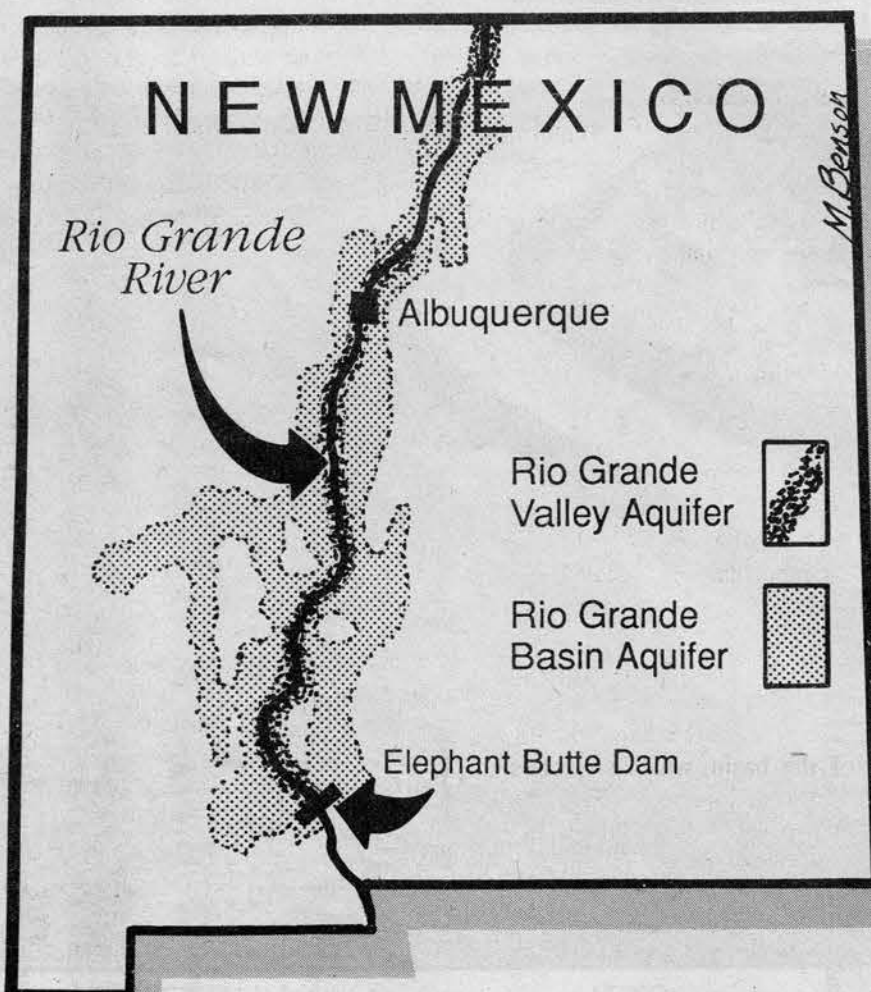
The city won't have to pay those costs, but Bill Bennett, a city environmental health official, warns that the cost of cleaning up other contaminated sites around Albuquerque would be "staggering," and will eventually show up in residents' water bills.

There seems to be no way around these costs. Kelly Summers, a geologist with the city's Public Works

(Continued on page 23)



Paul Godinez stands in front of the General Electric plant in Albuquerque, New Mexico.



Albuquerque . . .

(Continued from page 22)

Department, asks, "Is it better to stop or reduce the rate at which the water becomes polluted, or just go ahead and accept the pollution if you plan to treat it? To prevent it costs money and to treat it costs money."

She says those questions won't be settled for two to five years, when city officials finish a multi-million-dollar study of the area's groundwater.

No action in 11 years

In the meantime, the community will continue to deteriorate. Besides Godinez, a second San Jose property owner who sought a loan from ABQ was turned down for the same reason.

Bank Assistant Vice President Ted Barre says, "I can understand these people's frustrations, but when I called the agencies they all referred me back to each other. Everyone wanted to pass the buck." Without firm information, Barre said, the bank couldn't make the loans.

Another San Jose resident with a polluted well, Eddie Jaramillo, has had a "For Sale" sign in front of his house for a year. He's had no takers.

For Godinez and his neighbors, the blue and white General Electric tower

across the street has now become a symbol of a sore that will not heal. Although the San Jose contamination was discovered 11 years ago, and the site put on the Superfund list eight years ago, the Environmental Protection Agency has yet to clean a drop of water because of complex negotiations.

Recently, General Electric agreed to clean up the aquifer directly underneath, to the east and slightly north of its plant. But that will not rid the aquifer of low levels of solvents that have tainted two private wells in the San Jose area just north of the formal EPA Superfund site.

If city officials aren't in a hurry about conditions in San Jose, an aging neighborhood where 30 percent of all families live at or near poverty level wages, and where 92 percent of the 1,800 or so residents are Hispanic, they may be more worried about long-term impacts. The pollution could cut into the city's fresh water supplies.

Even though Albuquerque's residents use a lot of water on a per capita basis — as much as Phoenix residents and more than Los Angeles residents — Albuquerque has never worried about its long-term supply.

In fact, in 1984, Albuquerque City Hall placed a magazine ad boasting that the city sat on top of an aquifer that contained as much water as Lake Superior. The boast was wrong. At best the aquifer has only one-quarter the water of Lake Superior.

That estimate was made by the U.S. Geological Survey in 1975, and may have been too generous. At that time, the Albuquerque subregion of the Rio Grande basin aquifer was thought to hold 2.3 billion acre-feet of "recoverable fresh groundwater."

Six years later, the well-respected, all-powerful State Engineer Steve Reynolds translated the USGS estimate into more familiar terms. He wrote in a newspaper article that the basin, which stretches from the Colorado border to Elephant Butte Reservoir near Truth or Consequences, has enough water to last 500 years.

Sam West, a now-retired scientist who helped write the USGS report, says today that the numbers stemmed from assumptions "that were not necessarily too good," although he continues to believe the city has plenty of water.

Perhaps the key flaw in the study: It failed to consider the economics of pumping deep into the clays and sands of the aquifer where much of the water lies. Last winter, city researchers drilled two 3,000-foot-deep test wells. The wells, deeper than any ever drilled in the city except oil exploration wells, found more clay and less sand than many researchers expected to find.

Clay is far less porous than sand. It may contain as much water as sand, but it is far more expensive and difficult to pump. Some officials say the clay-laden areas drilled below 1,500 feet may pro-

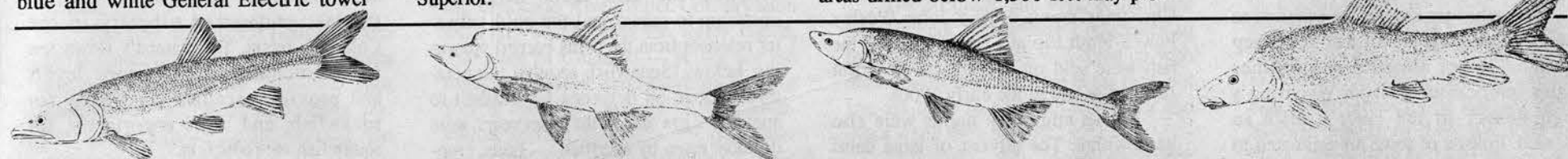
duce only a fourth as much water at reasonable cost as what lies above 1,500 feet. "When you get into clay, you don't even bother," says Summers.

Spawned in part by the results of those studies, city officials say they will consider tough new regulations in the next few years to prevent any further contamination of the aquifer. The most controversial proposal would place restrictions on where new industries can locate, to keep them out of areas where water tables are too shallow.

If a tough plan can pass, city officials are confident they can prevent crippling damage to the aquifer, says Sam Cummins, Albuquerque's utility division planning manager. Without a strong public policy, pollution could threaten the city's long-term supply.

For example, new evidence from the New Mexico Environmental Improvement Division shows that Albuquerque's high rate of groundwater pumping has reversed the flow of water underground. Now, instead of flowing away from the city, the San Jose contaminants are slowly flowing toward city wells.

Meanwhile, this year's winners in a local civic beautification contest included a three-story senior citizens complex that is surrounded by eight acres of lush green grass.



Will the West stamp out the real natives?

Damming and diverting the Colorado River ecosystem has left four fish species on death row. Biologically, they could still be saved, but politically the verdict is still out

by Steve Hinchman

GRAND JUNCTION, Colo. — Standing knee-deep in the Colorado River, U.S. Fish and Wildlife technician Tom Fresques plunges a small seining net below the surface and then runs toward the bank, kicking up mud and water. His partner, Anita Martinez, waits on shore with a pair of tweezers, a notebook and a bottle of formaldehyde.

Fresques and Martinez are hunting the endangered Colorado squawfish in the quiet backwaters and eddies where the river flows through town.

They are actually looking for larval squawfish — young fish three and four weeks old — that are so tiny that Anita Martinez says, "all you can see is their eyes, golden in the sun. They are smaller than a thread."

This 15-mile reach of the Colorado River, from the confluence with the Gunnison River 10 miles below us to an irrigation dam that blocks the river five miles upstream, is targeted as a priority area by the U.S. Fish and Wildlife Service's Colorado River Endangered

Fish Recovery Program. In the project's 10 years of research, the 15-mile reach was one of a few areas in the upper Colorado River basin identified as an active spawning ground for the rare squawfish.

The larvae Fresques and Martinez find are actually of many species. Samples are sent to a laboratory where the percentage of squawfish is determined; those numbers are used to estimate spawning levels, explains Lynn Kaeding, who is standing next to me on the bank. Kaeding heads Fish and Wildlife's Grand Junction project office and has studied the endangered squawfish for nearly 10 years.

Once they know the spawn, Kaeding and other biologists can predict how population levels are doing in their section of the basin, which stretches along the Colorado mainstem from the top of Lake Powell in Utah to the 15-mile reach in Grand Junction. The news, he says, is not good.

"We are looking at a downward spiral of the Colorado River population," says Kaeding. "In an average year of sampling the whole river for a couple of

months, we only find 100 to 125 [adult] squawfish. Indications are there are not enough little fish to even replace the numbers of big ones we've got out there."

Fresques' net plunges underwater again and comes up mostly empty, except for a tiny, inch-long green sunfish. The green sunfish — a species introduced from the Midwest — may be one of the reasons there are so few young squawfish. The sunfish is a voracious predator and even at this size is feeding in the squawfish nursery areas.

"The green sunfish did real well this year," says a worried Kaeding. "Even in a bad year they do good enough to be a real problem." He watches silently as Fresques and Martinez drop the sunfish into a bottle of formaldehyde.

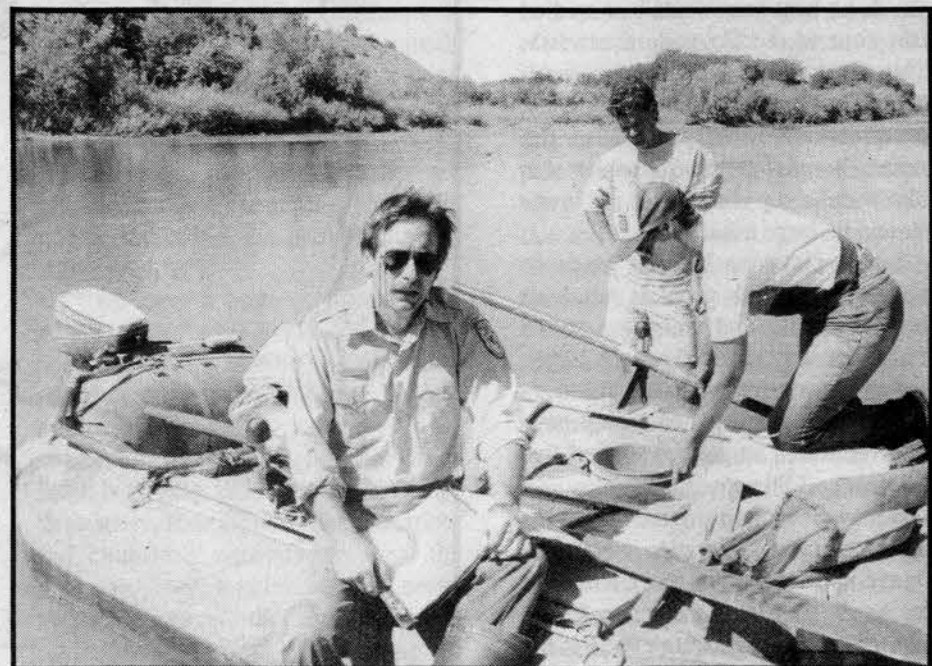
A political fish story

The biologists' fight to save the Colorado Squawfish and its three endangered cousins — the humpback chub, the razorback sucker and the bonytail chub — is a gripping story, but it is only half the battle. The second and perhaps more difficult half of the fight is political.

Saving the four endangered fishes of the Colorado River basin will mean spending tens of millions of dollars, securing complex agreements between the federal government and three states and coordinating the work of more than a dozen state and federal agencies.

The irony of their mission does not escape those involved. The endangered

(Continued on page 24)



USFWS biologist Lynn Kaeding on the Colorado River near Grand Junction, Colorado

Steve Hinchman

Fish . . .

(Continued from page 23)

fish are indicators of the health of the Colorado River ecosystem. After 100 years and billions of dollars spent trying to tame the Colorado's muddy torrents and capture its water for human use, that ecosystem has been nearly destroyed. Now the basin states and the federal government are desperately trying to put enough of it back together to save the fish and their unique habitat from extinction.

If it were just money, the issue would not be controversial. But the price of the fishes' survival is water and that is why it is so politically explosive and why the fishes' chances of survival are still unsure. In the end, saving the fish will require buying water rights, opening dam gates or protecting instream flows, and then letting that water flow downstream and across state boundaries to where the fish are.

The Colorado River is relatively isolated from neighboring river basins. When the first white settlers arrived here there were only 13 species of fish native to the basin. Of those 13, seven live in the cold mountain headwaters and are also native to the high mountain streams of the Columbia and Missouri river basins and to the Great basin. That probably means they invaded or escaped the Colorado basin in relatively recent geologic times.

The other six species are endemic to the Colorado, and are ancient fish. They occur at lower altitudes and warmer water temperatures, from Wyoming's high desert to the river's delta in Mexico. Fossils of some are estimated to be more than three million years old. Over that time, and subject to the Colorado's harsh conditions — warm, muddy waters, raging spring floods and warm, low flows in late summer — they have evolved into highly specialized species, markedly different from their nearest relatives in other river basins.

While the fish are fascinating from an evolutionary standpoint, their bizarre shapes and habits have not helped them survive in a tamed and harnessed river. Development of the Colorado has altered historic conditions drastically and nearly wiped out four of the Colorado's six endemic fish species.

Now, the Colorado squawfish, humpback chub and bonytail chub are on the federal endangered species list. The razorback sucker is listed as endangered by Colorado and Utah, and is a candidate for the federal endangered species list.

A minnow that grew

The best-known and best studied of the four is the Colorado squawfish, the largest member of the minnow family native to North America. Historically, the squawfish lived throughout the Colorado basin, but its prime habitat was in the wide, deep channels of the lower river and its large tributaries.

Squawfish can live 40 years or more. Today's fish grow as much as three feet long and weigh up to 15 pounds, but they used to be much larger. Bone remnants from Anasazi middens indicate that some squawfish may have once lived much longer and reached five or six feet and 80 pounds or more.

Squawfish often migrate hundreds of miles to spawn. Migration is triggered in early summer when water temperatures begin to rise as the spring floods abate. Its migratory habits earned it the common name of Colorado salmon or white salmon, and it was once a popular

24-High Country News — November 20, 1989



This 25-pound adult Colorado River Squawfish was taken from the Green River near Dinosaur National Monument, circa 1928

National Park Service

food. White salmon was on the Christmas menu of the John Wesley Powell-Flash trip at Lee's Ferry and the fish were sold on the streets of Grand Junction as late as the early 1900s.

But its migratory habits were also its downfall. The advent of large dams on the Colorado, beginning with construction of Hoover Dam in 1930 and ending with completion of Glen Canyon Dam in 1963, precipitated a rapid decline in squawfish populations in the lower basin by preventing spawning.

The dams in the lower basin

blocked the fish from migrating upstream to spawn, and the cold tailwater releases from the dams barred spawning below. (Squawfish require temperatures above 68 degrees Fahrenheit to spawn.) Eggs laid in the reservoirs were quickly eaten by sportfish — bass, crappies, sunfish and walleye — introduced after the dams were completed.

Dams were not the only cause of decline. In the Gila and Salt rivers in Arizona around 1850, squawfish were once so thick, Kaeding says, "that they were pitch-forked from the river and

used as fertilizer." Those fish essentially vanished by the early 1900s due to irrigation diversions, channelization and timbering and overgrazing, which altered the streams and eliminated the quiet backwater nursery areas necessary for survival of young squawfish.

Arizona is now experimentally stocking squawfish, but Kaeding says there is not much hope those fish can re-establish themselves without significant improvements to their habitat.

In the upper Colorado River basin the squawfish is still surviving on its own, but its hold on life seems tenuous.

A remnant population of squawfish was recently re-discovered in the San Juan River in Utah, but they are few — just two or three adult fish have been seen in the last five or so years. A much larger population lives in the Colorado mainstream. Kaeding puts its numbers between 1,000 and 2,000 fish over the entire 205 miles of river, but says because of poor spawning success the population is not stable.

The healthiest squawfish populations are in the Yampa and Green rivers in Utah and northwestern Colorado. The two rivers have 350 miles of good spawning and nursery areas, and are estimated to have 10 times the population of the Colorado mainstem, says Harold Tyus, who heads Fish and Wildlife's Vernal, Utah, projects office and oversees the Green and Yampa river work.

This last stronghold of the squawfish depends on two variables. The most important is the Yampa River, which is the last undammed tributary in the Colorado basin. The Yampa's flows are nearly unchanged from historic levels and provide excellent conditions for squawfish, and, more importantly, for squawfish reproduction.

The other variable is Flaming Gorge Dam on the Green River, just below the Utah-Wyoming border. When the dam was finished in 1963, cold water releases wiped out the squawfish for 70 miles downstream, past the mouth of the Yampa. Squawfish populations plummeted.

Some of the damage also came from Utah, where federal wildlife biologists poisoned the squawfish with rotenone to start a rainbow trout fishery below the dam. After Flaming Gorge's outlet works were modified in 1978 to increase downstream water temperatures, squawfish spawning success increased and population levels bounced back.

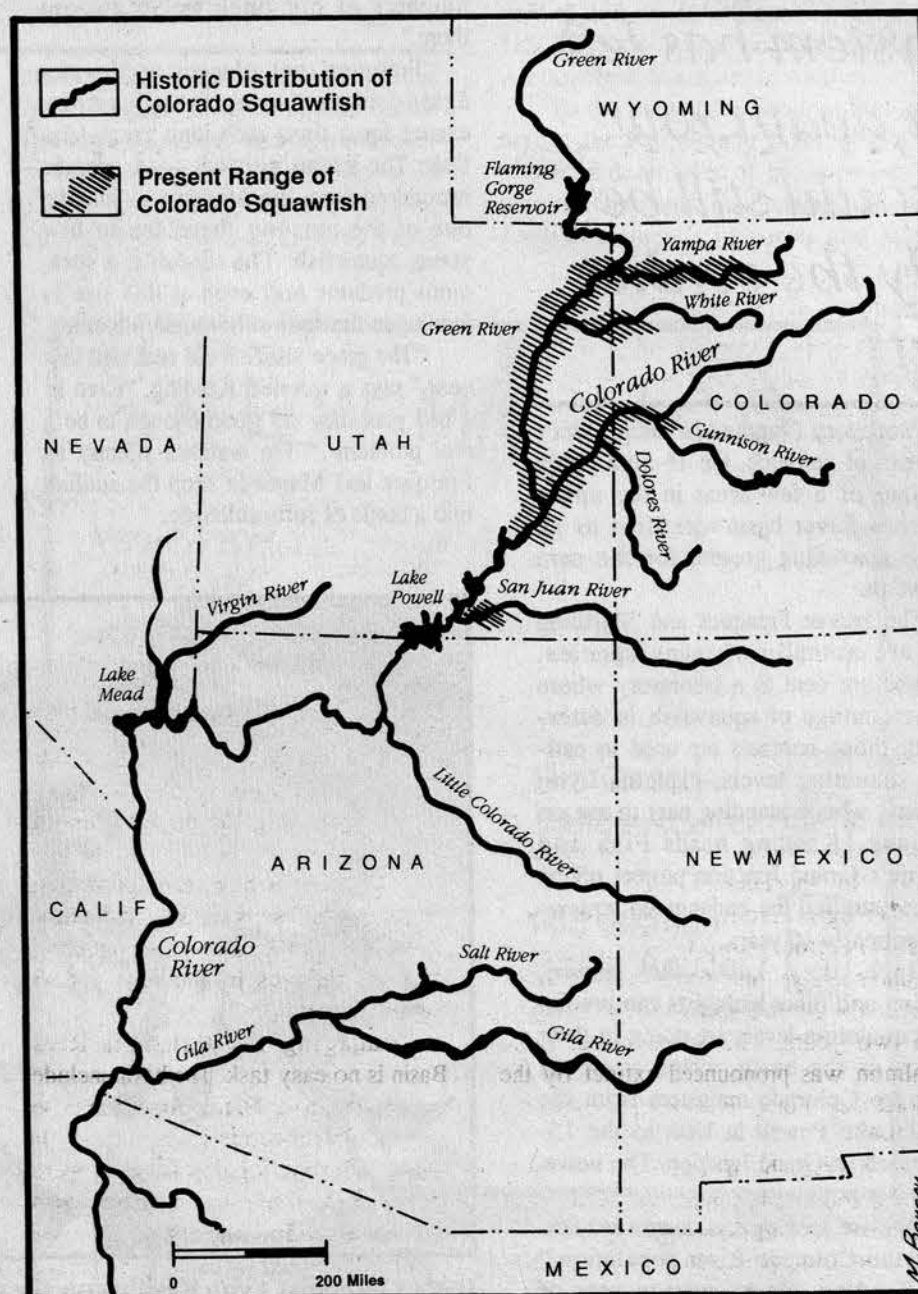
Fish aren't fuzzy

The U.S. Fish and Wildlife Service started trying to recover fish populations in 1979, but for years its work was virtually ignored.

"Fish are slimy," says Lynn Kaeding. "They're not the warm, fuzzy creatures that we tend to identify with when we're dealing with endangered species. Most of the public will never see these fish. They're not high-profile, emotion-charged species."

But in 1982, when the service released its conservation plan for the recovery of the four endangered fish species, it set the whole upper Colorado basin in an uproar. The document strongly recommended substantial instream flows for the fish, which in some cases called for more water than was currently flowing or had ever flowed in the streams.

The plan had very little involvement from outside Fish and Wildlife, and it was ripped apart. Peer review from other agencies blasted holes in the study, and the water development community successfully argued that there was not enough biological or scientific basis for



the flow recommendations.

Faced with overwhelming opposition, the agency dropped the plan, but the problem did not go away. Until the fish were protected, the Endangered Species Act of 1973 (both the Colorado squawfish and the humpback chub are listed in the original language) potentially could block any further development of the river.

The water developers, the states, the federal agencies and several environmental groups entered negotiations in 1983. Those lasted five years and culminated with the signing of the Colorado River Endangered Fish Recovery Implementation Plan in January 1988 by Interior Secretary Donald Hodel and the governors of Utah, Wyoming and Colorado. The water users associations and environmental groups that participated signed resolutions supporting the agreement.

The plan is intended to solve both the political and biological battles and de-list the fish in 15 years. Biologically, it will focus on five approaches to the problem. Water is still the critical element, with the major goal to identify water levels necessary to protect the fish and then acquire the water rights to support those levels.

Other techniques include habitat manipulation (fish ladders, etc.); hatcheries and restocking; controlling non-native fish; and research and public outreach.

The plan defuses the political bomb by putting the recovery program under the responsibility of an "implementation committee," which meets twice a year and acts as a forum for all interests. The committee reviews the Fish and Wildlife Service's research, sets the budget and research priorities and will also be responsible for identifying and acquiring water for instream flows. A second group, the management committee, which also includes representatives of all parties, meets every other month to do the day-to-day work.

Politically, the plan is working. "We are building a strong political coalition," says John Hamill, who directs the recovery program for Fish and Wildlife. "The endangered fish are getting good exposure in the water politics that drive Colorado. We're a major player at the table right now. I think that's good for the program and good for the fish."

The plan has strong support from Colorado officials and water users associations in Colorado, Utah and Wyoming. Four environmental groups also participate. The coalition has raised \$1 million from Congress to buy water for the fish, and has a promise for \$6 million more.

Over the last year Fish and Wildlife biologists have identified two critical locations for the survival of the fish, and have recommended a range of instream flows that would enhance fish populations. Those two areas are the Yampa River and the 15-mile reach on the Colorado.

On the Yampa, the service calls for protection of the river's historic flow pattern. The Nature Conservancy, a private environmental group, is putting together a deal to purchase a large ranch along the river that would supply rights to 3,400 acre-feet of water. But the key factor on the Yampa is the proposed Juniper-Cross Dam near Craig, Colo.

Juniper-Cross has long been coveted by many residents of the valley and by the Colorado River Water Conservation District, which owns the water rights. The state of Colorado — acting for the implementation committee and using federal money — has offered the conservation district \$6 million for the water rights and held public meetings in Craig to discuss the proposal.

On the Colorado, recommendations call for flows in late summer of between 700 and 1,200 cubic feet of water per second to protect squawfish in the 15-mile reach. Current flows average 200 to 300 cfs.

The first part of that — 10,000 acre-

feet of water from Ruedi Reservoir on the Frying Pan river near Aspen, Colo., — was released this July, increasing flows in the 15-mile reach by 65 cfs to 130 cfs, says Hamill. The implementation committee is now considering buying more water from irrigation companies in the Grand Valley.

Can the fish be saved?

Despite those successes, implementation committee members disagree about how well the project is working. Carse Pustmueller, a National Audubon Society staffer in Boulder, Colo., who also represents the environmental groups on the implementation committee, says the committee process is too cumbersome and hamstrung by special interests.

The Ruedi Reservoir water was identified in the original agreement, she says, but it took two years to get any water in the river and it only adds up to a tiny portion of what is needed. Pustmueller also points to resistance from water developers to allocate water from the proposed Muddy Creek Dam in Colorado and the proposed Sandstone Dam in Wyoming for instream flows.

Similarly, progress on the Yampa will be held up until Fish and Wildlife can do a two-year study to find a smaller, alternate dam site on the Yampa to replace Juniper-Cross.

The problem, she says, is the water development community's reluctance to provide water. "They will come up with money until they are blue in the face, but you ask them to come up with water and that's when they say no."

Tom Pitts, who represents water users associations on the implementation committee, agrees that the way to save the fish is to put water in the river, but argues that the burden to find that water is on the recovery program, not on water developers and their projects.

The intense heat generated by the issue is starting to work its way down to

the rank and file. In addition to the implementation and management committees, the recovery plan also established a technical committee, which is supposed to select studies proposed by biologists in the field, review completed studies and set the overall research agenda. That information is then passed up to the management and implementation committees for executive decisions.

But project biologists say the information flow is reversed: Orders come from the top; not the field. Numerous field-level staff from both state and federal agencies, none of whom are willing to be quoted for fear of losing their jobs, say special interests influence the technical group's decisions. Even though it is labeled a technical committee, most of the members are administrators with little or no experience in the field.

The administrators come with lots of "political baggage," biologists say, which includes pressure to save the fish through hatchery production and other technical fixes, rather than by focusing on river flows.

Those biologists held a closed meeting in October and are now working with U.S. Fish and Wildlife administrators to form their own informal research advisory group to pool experience and debate ideas on the best strategy to speed recovery of the endangered fish.

There are no easy solutions left, says Kaeding. "This fish (squawfish) is in trouble across its whole range. Just returning conditions in some parts of that range is not going to be enough to recover that fish. If there are certain things we can do to recover that habitat beyond historic conditions then we need to do that ... the selling point of these species is not the intrinsic value of the species itself, it's through maintaining these species we maintain the ecosystem."

Columbia basin 'solutions' may speed extinctions

On Oct. 22, 1805, Meriwether Lewis and William Clark feasted at Celilo Falls, 200 miles upstream from where the Columbia River meets the Pacific Ocean. Sacred to the tribes of the Pacific Northwest, Celilo Falls was a prolific fishing ground that had been the focus of tribal life for 9,000 years.

At the time of Lewis and Clark's great salmon feast, and for 150 years thereafter, the hardiest fish were able to leap over the falls to reach their spawning grounds hundreds of miles upriver.

But in 1956, the falls were replaced by a more formidable obstacle: the Dalles Dam. Today that dam is one of 11 on the Columbia River. Ten more dams interrupt the flow of the Snake River, the Columbia's largest tributary. Overall, there are 79 hydropower projects in the Columbia River Basin.

The mighty Columbia — once the world's most productive salmon fishery — has become the world's largest producer of hydroelectricity, a staggered assemblage of dams and reservoirs. What's left of the fishery are fish in hatcheries, interspersed with a few stubborn runs of wild salmon and steelhead trout. Artificially bred fish account for 70 percent of the total population.

The wild runs are fading fast. Programmed to migrate to and from their spawning grounds in the northern Rockies, the fish bang against the dams

like wind-up toys against a wall. In some years, 90 percent of the migrating young die, unable to survive the dam turbines, unnaturally warm waters, disease and destroyed habitat. But costly efforts to replace the lost salmon with hatchery-bred fish may be making the situation worse, weakening the gene pool of the wild fish and introducing disease.

This year, two lonely Idaho sockeye salmon, the last of their lot, migrated toward their spawning grounds 900 miles upstream in central Idaho. Beginning their journey in the Pacific Ocean, the two fish managed to get through the Columbia River dams and were recorded crossing the Lower Granite Dam on the Snake River, heading toward the same clear Sawtooth Mountain streams in which they were born. No others made it that far.

Oregon Trout, a Portland-based conservation group, has labeled the Idaho sockeye functionally extinct, making it the Basin's second major casualty in two years. The Snake River coho salmon was pronounced extinct by the Northwest Power Planning Commission in 1987.

"It's possible that another age group of the sockeye has more numbers," said Idaho Fish and Game manager Steve Elle. "But the potential of these two fish to get to their spawning grounds, find each other and have a meaningful contribution to the stock is next to nil, as far

as this year." Elle said it may be possible to replenish the stock with sockeye from Alaska.

But transplanting Alaska stock to Idaho will never work, according to Oregon Trout director Bill Bakke. "It's foolishness," said Bakke. "The sockeye are the most localized stock salmon we have ... the population has adapted through natural selection to its specific environment. You can't just replace it."

Bakke points to the lost coho and sockeye runs as the latest indicators of an ecosystem gone awry from years of over-harvesting, habitat disruption and poor management. Oregon Trout has documented that since 1850, 101 stocks of salmon and steelhead have become extinct. Bakke calls at least 16 current stocks, including the prized Chinook, endangered.

"We have a huge ecological crisis on our hands," says Bakke. "The extinction of these two salmon runs represents stunning failures by the state, federal and tribal agencies."

Managing the Columbia River Basin is no easy task. The basin includes three states, four Native American tribes and countless constituents from the power industry, logging industry, recreational anglers and the commercial fishing industry. In order to mitigate the heavy toll created by dams, fish management agencies have built scores of expensive hatcheries that can breed fish in a controlled environment.

Bakke argues such measures are misguided; managers, he says, should be preserving wild fish rather than breeding inferior clones. The hatcheries further erode the ecological health of the basin by compromising the genetic integrity of wild fish, says Bakke. When the hatchery-born fish interbreed with wild stocks, the resulting generation has a reduced capacity to fight disease.

Pure, wild steelheads, says Bakke, are much stronger than their hatchery counterparts, and are eight times more effective in producing the next generation of adults.

Idaho Fish and Game manager Elle acknowledges that hatchery fish do compromise wild ones. He says his department has tried, where possible, to keep the stocks separate, especially the Chinook. In addition, the state prohibits fishing in areas where wild Chinook are known to run. "We don't even have hatcheries on the main Snake (River)," says Elle. "We're protecting them as best we can."

Bakke believes the best way to protect wild runs is by preserving spawning habitat, before it is too late.

"With a few bucks we can buy natural hatcheries," says Bakke. "Our money is going to the right place — to natural production rather than to technological solutions."

— Florence Williams

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River users in a pickle

The waters of the Colorado River were carefully apportioned in 1922, but no one ever considered the problem of salinity

by Steve Hinchman

Draining ancient seas

AUSTIN, Colo. — Gary Tharp digs into the shale hillside above where his irrigation ditch used to be and pulls out a slab of raw salt, holding it out for me to see.

More salt is visible behind him: thin, dirty-white bands running through crumbling gray rock. At his feet the ground is littered with clumps of weathered crystals.

Until recently, those salts washed into the Gunnison River, and then into the Colorado River and eventually to California. Now they don't.

"California ought to be proud of us," Tharp says. Tharp and his son-in-law Doran Etter are showing off their new irrigation system. It lies two and a half feet below their boots, in a 15-inch pipe they buried last spring.

When it's finished, the system will pipe water from Tharp's headgate on Dry Creek across two miles of barren, highly saline Mancos shale to emerge onto the rich volcanic soils of Tharp's mesa-top farm. The new pipes will follow the same course as the old ditch and carry the same amount of water. The only difference is the water won't touch the ground, or the salt.

Tharp and Etter, the second and third generations to run the family farm, are among the first farmers in western Colorado's Gunnison River Basin to join the Colorado River Basin Salinity Control Program.

Run by the Bureau of Reclamation and the Department of Agriculture, the Colorado River Basin Salinity Control Program is the nation's first serious attempt at controlling a non-point pollutant — a huge, multi-phase, seven-state, 36-year, billion-dollar effort. But no one knows if it's going to work.

The Colorado is a naturally salty river. It drains 244,000 arid square miles, much of it composed of marine shales — old sea floors — rich in salt. Almost half the river's salt content is from natural sources.

The rest comes from development, with irrigated agriculture the worst culprit. The problem comes when large amounts of water seep through highly saline soil that historically received only a few inches of rainfall a year.

On the Tharp farm, for example, irrigation water seeped into the ground where the old dirt ditch crossed the Mancos shale. That is very saline shale, and as the escaped water percolated back down to the creek, it dissolved whatever salts it passed through, adding over 560 tons of salt a year to the Colorado River system, according to Soil Conservation Service figures.

The 225-acre Tharp farm is just one of thousands that add salt to the river system. Ken Pitney, coordinator of USDA's part of the salinity control program, estimates there are about 1.7 million acres of irrigated farmland in the Colorado basin; together they contribute 37 percent of the river's salt load.

Salts added by agriculture in the upper basin become highly concentrated when they hit the lower basin, where the river's flows have been significantly depleted by evaporation from reservoirs and diversions to farms and cities. The Colorado is the only major river in the country that has more water at its head than where it runs to the sea.

Bureau of Reclamation studies estimate that water loss due to reservoir evaporation contributes 12 percent of the salt problem, while the annual diversion of over 5 million acre-feet of water from

the basin contributes another three percent. The diversions are less of a problem because they remove both water and salt from the river; evaporation removes only water.

Just about every water project in the basin, from the big dams and reservoirs to tiny stock ponds or a small town's sewage system, adds to the salt load, little by little, year by year.

Considered separately the problem seems trivial, but the combined effect is tremendous. The Colorado now picks up over nine million tons of salt a year. Recent studies by the Bureau estimate that those salts cause \$300 million a year in damage to agricultural, municipal and industrial water users at the lower end of the river. Most of the damage such as reduced crop yields, corroded plumbing and clogged car radiators occurs in California, which uses most of the water, but Mexico and Arizona are also affected.

The waters of the Colorado River were divided among its seven basin states in 1922 by the Colorado River Compact. That document is one of the most important political agreements in the modern West. However, it makes no reference to water quality or salinity even though, as each state develops its share of the river, salinity levels rise and water quality and the water's usefulness drop.

Mexico cried foul

Salt has not always been a problem on the Colorado. Historically, the river averaged about 400 milligrams per liter of water in the lower basin. While salt levels started to rise early on, it was not considered serious until the 1960s. Then the last user on the river, Mexico, got dosed with a surge of water with enough salt in it to stunt crops in the Mexicali Valley, render the water undrinkable, and, the Mexicans complained, violate the 1944 United States-Mexico treaty guaranteeing water deliveries to Mexico. Mexico claimed that receiving its full share of water was meaningless if that water were so salty it would kill or stunt crops.

That salt did not come from the upper Colorado mainstem. It came from just across the border, where the Wellton-Mohawk irrigation district on the Gila River in Arizona drops its return flows back into the river. Desert farming requires irrigation, but to keep an irrigated crop's root zones free of constantly rising, salty water tables, desert farming also requires drainage.

The Bureau of Reclamation completed Wellton-Mohawk's drainage project in 1961, and when the agency turned on the pumps to lower the water table it drew up water containing about 6,000 mg/l of salt, and dumped that into the Colorado just upstream of the Mexican border. Because hardly any water is left in the river at that point, Mexico got flows with salt concentrations as high as 2,700 mg/l.

That precipitated a bitter argument that ended in 1973 with the signing of an international accord. The United States agreed to deliver water to Mexico with an annual average salinity of no more than 115 parts per million, plus or minus 30 ppm, over the annual average salinity at Imperial Dam, the next dam upstream on the American side (HCN, 11/10/86). A canal was dug to divert the Wellton-Mohawk drainage water directly to the



Gary Tharp

Gulf of California, and the U.S. spilled water from upstream reservoirs to make up the difference to Mexico.

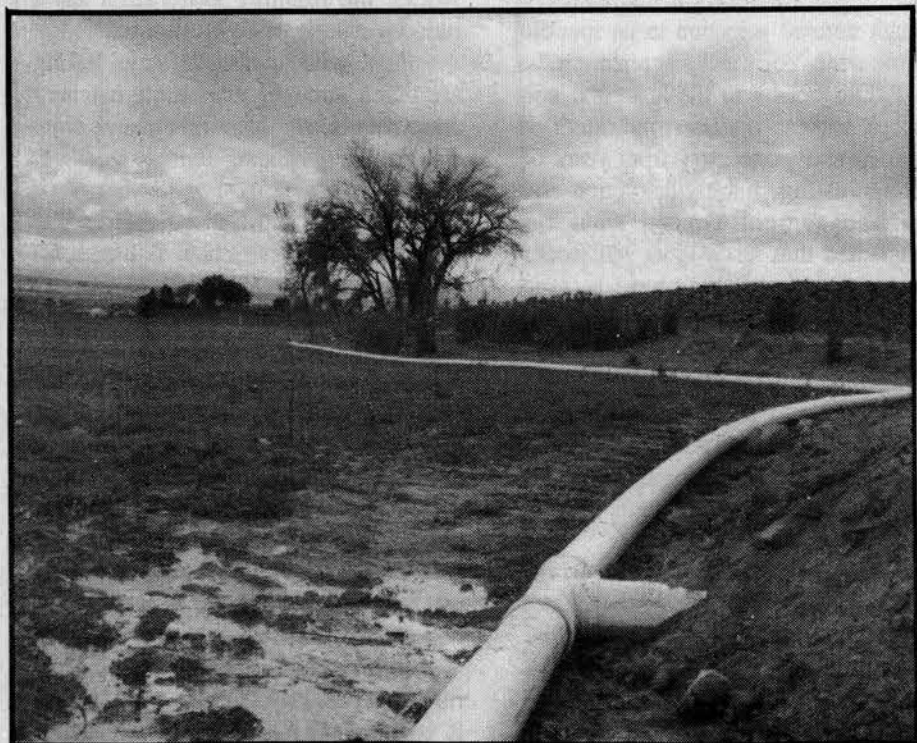
At the same time, salinity had begun to cause problems on the U.S. side of the border, although those problems were more political than environmental. In 1972, armed with the recently passed Clean Water Act, the newly formed Environmental Protection Agency demanded that the seven basin states develop legal standards to limit rising salinity levels. The states, which had successfully resisted similar federal pressure before, argued that not enough was known about salt behavior to justify arbitrary limits. They also complained that state-line standards would interfere with their right to develop water under the 1922 compact.

The states organized themselves into the Colorado River Basin Salinity Control Forum and pressured the EPA to accept its basin-wide approach to salinity. The EPA eventually agreed, but required the forum to develop standards to keep salt in the lower river to 1972 levels. The forum and the EPA finally agreed on those numbers in 1976, and selected three measuring stations in the lower basin. Those standards and stations are: 723 mg/l below Hoover Dam, 747 mg/l below Parker Dam, and 879 mg/l at Imperial Dam.

Based on those two treaties — the accord with Mexico and the impending agreement with the seven basin states — the U.S. Congress passed the Colorado River Basin Salinity Control Act in 1974. It has two parts. Title I is intended to clean up Wellton-Mohawk's drainage problem to meet the treaty obligation to Mexico. It gave the Bureau \$156 million, most of which was allocated to construct a desalinization plant in Yuma, Ariz., to treat Wellton-Mohawk drainage water. But some of the money also went to build a series of projects to increase Wellton-Mohawk's irrigation efficiency.

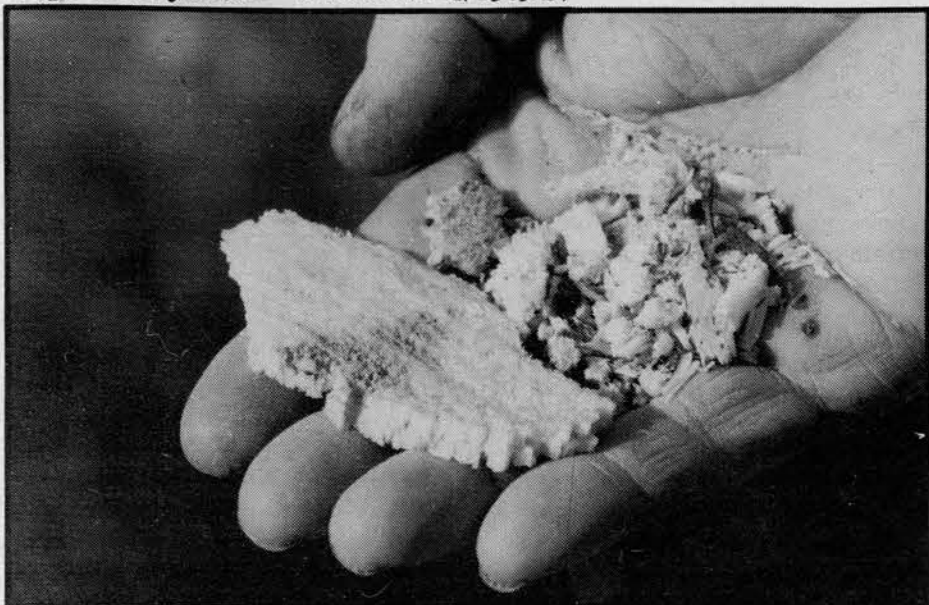
Title II established the Colorado River Basin Salinity Control Program for the basin above Imperial Dam and laid out the strategy that the program has followed to date: individual salinity control projects would be developed and brought on line at the same rate as water development projects were finished, thus keeping salt levels at the three lower basin measuring stations below the standard agreed to by the states and EPA.

The strategy spread the costs of the program out over nearly four decades. Originally four projects were authorized for construction and 12 for planning; the



Gated pipe carries irrigation water to Gary Tharp's alfalfa

Steve Hinchman



Steve Hinchman

Salt from ancient seas found in Colorado's Mancos Shale formation

program now includes more than 20 projects.

Congress gave responsibility for both Title I and Title II to the Bureau of Reclamation, and later included the U.S. Department of Agriculture for "on-farm" work.

A terrible start

Both the Title I and Title II programs got off to a terrible start. At the time, no nonpoint pollution programs existed. The Bureau of Reclamation had almost no information on the mechanics of the salt problem and there were no proven strategies to deal with the problem. The Bureau initiated scores of studies which focused almost exclusively on large, capital-intensive projects, such as the Yuma desalting plant and lining canals with concrete.

Five years later nothing had been constructed under Title II. The Bureau was beginning to run out of money for Title I and it was no closer to understanding the problem.

Then, in 1977, the Environmental Defense Fund sued the EPA and the Bureau. The suit sought, among many things, to force the EPA to establish state-line salinity standards. EDF argued that the lag time — estimated to take as long as three years — between new water development projects that brought more salt into the river in the upper basin and measurable impacts in the lower basin made existing standards an inadequate measure of the salt problem.

The suit also challenged the Bureau's choice of projects, arguing that retiring agricultural land was far more efficient and cost effective than the Bureau's technical fixes.

"The suit infuriated the Colorado River Basin states and they all joined the suit on the side of the Bureau," says Dan Luecke, head of the Environmental Defense Fund's regional office in Boulder. Luecke says the upper basin states saw it as an attempt to break the Colorado River Compact.

"Since all the sources of salinity are in the upper basin, the upper basin states would have been forced to use less of their allocated share of Colorado River water," he says.

That is heresy in the West, and politically it led to a bloody battle, with the environmentalists doing most of the bleeding. The states and the federal agencies won in 1980 and again in 1981 on appeal. A battered EDF replaced its entire Boulder office staff and dropped the case, says Luecke, who was brought in to do the salvage work.

Even though they won in court, in the field the feds and the states were still unable to implement the Salinity Control Act. By 1980 the program was at a standstill. No structures were in place,

no salt had been removed, the Bureau was close to running out of money and agency officials were nervous.

"It was stopped dead, says Mike Clinton, the "hit man," sent in by the Bureau in the fall of 1979 to rescue the project.

The Bureau was immobilized

Clinton says the project suffered from three main problems, the worst of which was bureaucracy.

Clinton, now the vice president of an engineering firm in California, says Bureau technicians had come up with several theories about how to reduce salt levels in the river, but all were expensive and untested. Agency officials were unwilling to risk testing those theories and instead kept refining their studies. Says Clinton, "The Salinity Control Program was in a very classic study loop."

The program also suffered from an inbred conflict of interest. Most of the salt damage occurs in the lower basin, but most of the opportunities for control are above Glen Canyon dam, in the upper basin. The upper basin states, however, have always been more interested in water development than salinity control. When it came time to allocate regional funds at the agency's upper Colorado River basin office in Salt Lake City, Clinton says, there was simply no pressure for salinity control projects.

The third problem was that the program's natural constituency, the states' Salinity Control Forum, was little more than an ad-hoc committee with a rotating chair, no staff and no clout.

Clinton attacked those difficulties by pushing a few test projects into the construction phase and setting up a central Salinity Control Project Office to lobby for money within the Bureau. He also convinced the Salinity Control Forum to hire an executive director.

But he says the real turning point happened when he realized that the Bureau's traditional "hardware, structural approach" was not cost effective.

Instead, Clinton says, "We found that the cooperative work the Soil Conservation Service was doing — the on-farm stuff that everyone was laughing at — was already working and producing salinity reductions at lower cost."

The Bureau started funneling money to the USDA's Soil Conservation Service, and asked Congress to include the USDA in the Salinity Control Program budget.

Gradually, the work begins

Since then, gradually, in a delicate and piece-meal fashion the salinity control program has begun to work, at

least partially. Title I is the furthest along.

By 1986 the SCS and farmers in Yuma had installed a full range of water conservation techniques: concrete ditch liners, piped laterals, laser-levelled fields, sprinklers and other high-efficiency irrigation practices, and precise measuring devices. In addition, 10,000 acres of the 65,000-acre district were taken out of production. Together, the measures reduced Wellton-Mohawk's irrigation consumption by 100,000 acre-feet a year, at a cost of \$27 million from the federal government and \$6.8 million from the farmers.

The Yuma desalinization plant has not worked so well. Construction of the massive, reverse-osmosis plant began in 1980, but it won't be fully operable until 1992. Cost overruns have increased the plant's price tag to over \$388 million, although the SCS's success at reducing Wellton-Mohawk's irrigation drainage may allow the Bureau to scale down the project and save \$60 million. In addition to being expensive to build, it will cost about \$20 million a year to operate.

Bob Steele, the Bureau's public relations officer in Yuma, says the federal government will pay the tab: "When Congress authorized the Salinity Control Program it did so knowing that it was based on social and political justification, not on economic justification."

Steve Magnussen, assistant to the director of the Bureau's Lower Colorado region, says the combined Title I work will cost \$485.5 million when finished, but will easily meet the country's treaty obligations to Mexico.

The Title II program is way behind. Stan Gappa, the Bureau's Salinity Control Program coordinator, estimates the project must remove one million tons of salt a year by 2010 to keep the river's salinity below 1972 levels. After 15 years and \$142 million, the Bureau and SCS projects only remove a little over 166,000 tons of salt a year.

Bureau statistics predict a violation of the standards as early as 1993 unless more salinity control projects are implemented soon. USDA program coordinator Ken Pitney says that the only reason the standards haven't been violated already is that the Colorado River's record high flows in the mid-1980s diluted salt levels, while an unexpected reduction in the number and pace of development projects has slowed the rate at which salt is added to the river.

"Now it's swinging around," he says. "Flows are dropping off and the salinity concentrations are swinging up."

Pitney is confident the program can catch up. Nine projects are on-line and working, and he says the two agencies are learning how to increase their effectiveness. The work is split into two parts. The SCS is responsible for the on-farm work and the Bureau is responsible for everything else: the canals and laterals that bring water to the farms as well as natural, municipal and industrial sources of salt.

The Bureau has five operating projects. Two projects lined irrigation canals in Colorado's Grand Valley with concrete and pipe. Two more contain salty runoff from Las Vegas Wash in Nevada. The fifth cut salt by sealing an old oil well in Meeker, Colo. Between them they remove an estimated 83,500 tons of salt a year.

Based on capital costs, the five projects will remove salt at about \$94 a ton. But the cheapest half of the Bureau's work — 48,000 tons at \$14 a ton — came about as the result of an accident.

(Continued on page 28)



Salinity...

(Continued from page 27)

While sealing a test well in the Meeker Dome, the agency simultaneously sealed an old oil well that had been leaking salty groundwater to the surface.

The SCS only has four projects on line, but they seem to be working well. The two largest — Uintah basin in Utah and the Grand Valley in Colorado — have been operating for nearly 10 years. Two more just got underway: the Big Sandy project in Wyoming and the Lower Gunnison project in Colorado. Combined, the four remove about 76,500 tons of salt a year at an average cost of just under \$50 a ton.

Progress may soon accelerate. Gappa expects the Paradox project on the Dolores River in Colorado to begin operations in 1992, removing 198,000 tons of salt a year, and he says a new project in Glenwood Springs may take out another 70,000 tons a year. Meanwhile, SCS officials report they are receiving more than twice the number of applications than they can fund, and say other SCS projects have been planned but await funding.

Dave Robbins, who has chaired the state's Salinity Control Forum for the last 10 years, says, "Sure we're only 10 percent of the way there and it's been 15 years... but the important thing to remember is this is probably the first and most successful nonpoint pollution effort in the U.S. We've led the way in defining the means to deal with nonpoint, and that's taken a substantial amount of time and money."

Where the problems are

Behind those successes loom problems. With a couple of exceptions, the Bureau of Reclamation's part of the Salinity Control Program is not working well. A recent report by the Department of Interior's Inspector General stated, "Between 1974 and 1987, the Bureau spent more than \$14 million to investigate eight potential projects, which included natural salt sources, without successfully identifying one that was both economically viable and acceptable to the applicable state."

Because of high construction costs — most Bureau projects rate at over \$100 per ton of salt removed — the Bureau has shelved many of its projects. The agency dropped at least one, the Dirty Devil project, in part because Utah would not commit to a water right for the project and in part because it was too expensive. The Inspector General also found resistance from farmers involved in Bureau projects. In one case, McElmo Creek, the Bureau essentially bought the farmer's cooperation by including \$4.4 million in extra work, the federal report says.

The SCS does not have those problems. Rather than consume water or increase a farmer's costs, SCS projects tend to save water and increase a farm's efficiency. Gary Tharp says that even after only one year his project has noticeably cut labor, operation and maintenance costs, reduced topsoil loss, increased production and increased irrigation efficiency.

"We didn't have enough water before and we will now," says Tharp. He expects to bring an idle field into production and still be able to irrigate his entire spread throughout the growing season. Currently water starts running short about mid-summer.

However, the SCS is hamstrung by lack of money. About two-thirds of the Salinity Control Program's budget goes to the Bureau, and Tharp says as far as he is concerned that is the only real problem with the salinity program.

"[The SCS] is short of help down there and that's going to cost them. If you overstress the program they're not going to inspect projects good enough and something is going to break down ... Those guys need more help and more money."

In the past, those kinds of problems were identified and solved by the Bureau of Reclamation's Colorado River Water Quality Office — an office that Mike Clinton formed and headed. That office has been cut from a staff of seven to just

one man, Stan Gappa, who is new to the job.

That factor is the one that worries Clinton most about the program. "In the past two years I've watched the Bureau take apart a lot of the capability of managing the program that existed 10 years ago," he says.

"If Reclamation really and truly wants to move from its history and roots as a dam building agency to a new mission [as a water resource agency] then this is an area where they've gone backwards," Clinton says.

Meanwhile, the pressure is starting to build. Salinity levels have been rising steadily since 1986, as river flows have dropped. And, as the drought cycle continues, a number of large water projects — Animas-LaPlata, the Dolores Project, the Central Arizona and the Central Utah projects — are beginning construction or nearing completion. All will significantly add to the problem.

Should the West dry up?

There is an alternative to the traditional salinity control projects, but it makes state officials, county commissioners and water developers break out in hives.

The idea — ceasing to irrigate highly saline or marginal agricultural land — was considered in the Bureau's Salinity Control Program system-wide Environmental Impact Study in the 1970s. However, it was rejected as politically and socially unacceptable by both the seven basin states and the Bureau.

Dave Robbins, the chair of the Colorado River Basin Salinity Control Forum, which represents the states' interests in the program, says the impact of land retirement would spread far beyond salinity, and could affect state and county tax bases, school districts and small towns throughout the basin, particularly in the upper basin.

"The fabric of two-thirds of our state is based on small agricultural communities," Robbins says. "[Those communities] raise crops like hay and alfalfa that are not such high value, but the towns are very important to Colorado."

Given the costs of the Salinity Control Program and the uncertainty of its success, the idea of land retirement may be worth reconsidering. In Wyoming, the idea came up as an alternative in the Soil Conservation Service's Big Sandy Project EIS. Farms in that area — the Eden Valley along the Green River in Southwestern Wyoming — were created by a Bureau of Reclamation water project that today seems economically absurd.

A short growing season and poor soils make the Eden Valley a miserable place to farm. When the SCS presented 12 options for salinity control, 87 percent of the valley's farmers voted to accept either land or irrigation retirement (HCN, 11/10/86).

Retiring the land would have reduced salt levels in the Colorado by as much as 133,000 tons per year. Despite the willingness of the farmers to sell, the option was yanked from the final EIS.

Dan Luecke, who heads the Environmental Defense Fund office in Boulder, Colo., says, "When the draft report came out the governor of

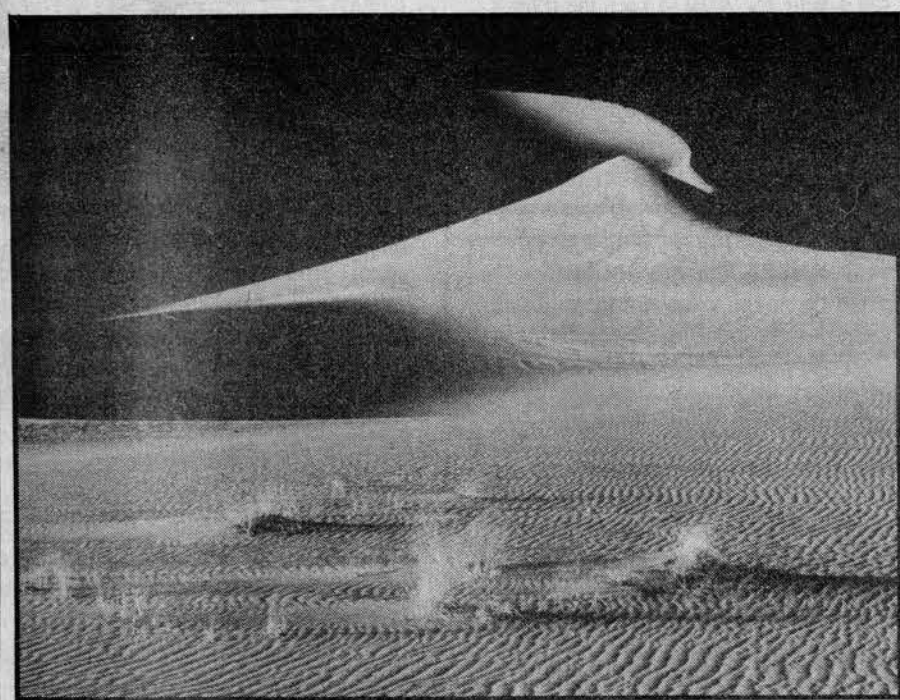


Wyoming [Ed Herschler] went right through the ceiling... When you take land out of production what is really out of production is your water. Then it flows down river to the lower basin states and everyone knows that is heresy."

The alternative selected instead — a mix of pipelines, pumps and sprinkler irrigation systems — will remove less than half the salt and cost about \$8.5 million, between two and three times the cost of land retirement. The SCS finally began the work at Big Sandy in 1988, after waiting several years for funds.

David Getches, a law professor at the University of Colorado in Boulder, warns that eventually the salt problem will catch up to the upper basin. "In the long run the structural solutions aren't going to be adequate. Something else is going to have to be done and that's why closing down farm lands in the upper basin is inevitable."

—Steve Hinchman



The Great Sand Dunes National Monument, Colorado

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