

From shame to showcase: Less than a decade ago, the Willamette was the Pacific Northwest's most polluted waterway. Today it flows free of 90

percent of the wastes that once drained into it. Here, where the river slices between Oregon City and West Linn, fishing boats lie anchored in clear waters as chinook salmon make

their spring run to breed in headwater streams. Harmless steam pours from a pulp and paper mill that has spent more than nine million dollars to meet strict waste-control laws.

A River Restored: Oregon's

Willamette

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NATIONAL GEOGRAPHIC STAFF

Photographs by LOWELL J. GEORGIA

the Willamette which, in recent years, has:

- Reduced waste discharges into the river by some 90 percent.
- Boosted overall water quality to meet strict state and federal standards.
- Increased the number of migratory salmon, native trout, and other game fish.
- Made the river safe again for all water-contact sports, including swimming.

Surprisingly, the state—which pioneered and passed some of the toughest environmental legislation in the country—has not had to bring suit against a single violator. And only one small company chose to shut down rather than mend its ways.

Constant Watch Prevents Violations

For a close-up of the cleanup, I put into the Willamette's Middle Fork near Fall Creek for a 20-mile canoe trip downstream with slender, bearded Mel Jackson, outdoor and environmental coordinator for the Eugene Park and Recreation Department.

Though roiled by recent rains, the water seemed free of fouling as we slid past sandspits and danced through rapids white-washed with foam. Only stilt-legged herons, posted like palace guards along the shoreline, noted our passing. The hand of man rests lightly on this region.

A riverside resident most of his life, 37-year-old Mel—who has more than 80 mountain and river rescue missions to his credit—spends some of his spare time as a self-appointed vigilante, searching the Middle Fork for signs of pollution.

"Sure, we've made progress," he conceded, as we shipped our paddles and let the lively current carry us along, "but the old abuses will come creeping back if we don't keep a careful, constant watch over these waters."

A few miles farther on, Mel proved his point; a dark stain was seeping into the stream from the east bank. Beaching the canoe, he struck inland and traced the trouble. Waste from a small mill, unattended on the weekend, spilled from a storage pond.

"There's not much traffic up this way," he said when he rejoined me. "The operators

probably gambled that no one would notice."

With Mel on the lookout, they had lost. On Monday, he reported his observations to environmental officials; on Tuesday, when he revisited the site, the ribbon of refuse had vanished. Obviously, citizen power is an effective force around these parts.

We landed, after four hours afloat, at Eugene, where the Willamette begins to feel the mounting pressures of population. Here the Coast Fork empties effluents from Cottage Grove and surrounding settlements into the main stem. A few miles away, the sprawling Weyerhaeuser pulp and paper mill at Springfield contributes waste waters by way of the McKenzie River.

Once the worst of the pollution began here. Now, with all municipalities on secondary sewage-treatment systems, waters reentering the river are about 90 percent pure, compared with the mere 35 percent achieved by primary plants of the past.

Fish Flourish on Sewage Pellets

Looking to the future, little Cottage Grove has installed the valley's first tertiary system. It removes 95 percent of all impurities and can accommodate twice its present load. So far, residual solids present no problem.

"Once they decompose and dry," supervisor Peter Horvath told me, "we have a free and odorless fertilizer local gardeners are eager to haul away [pages 822-3]."

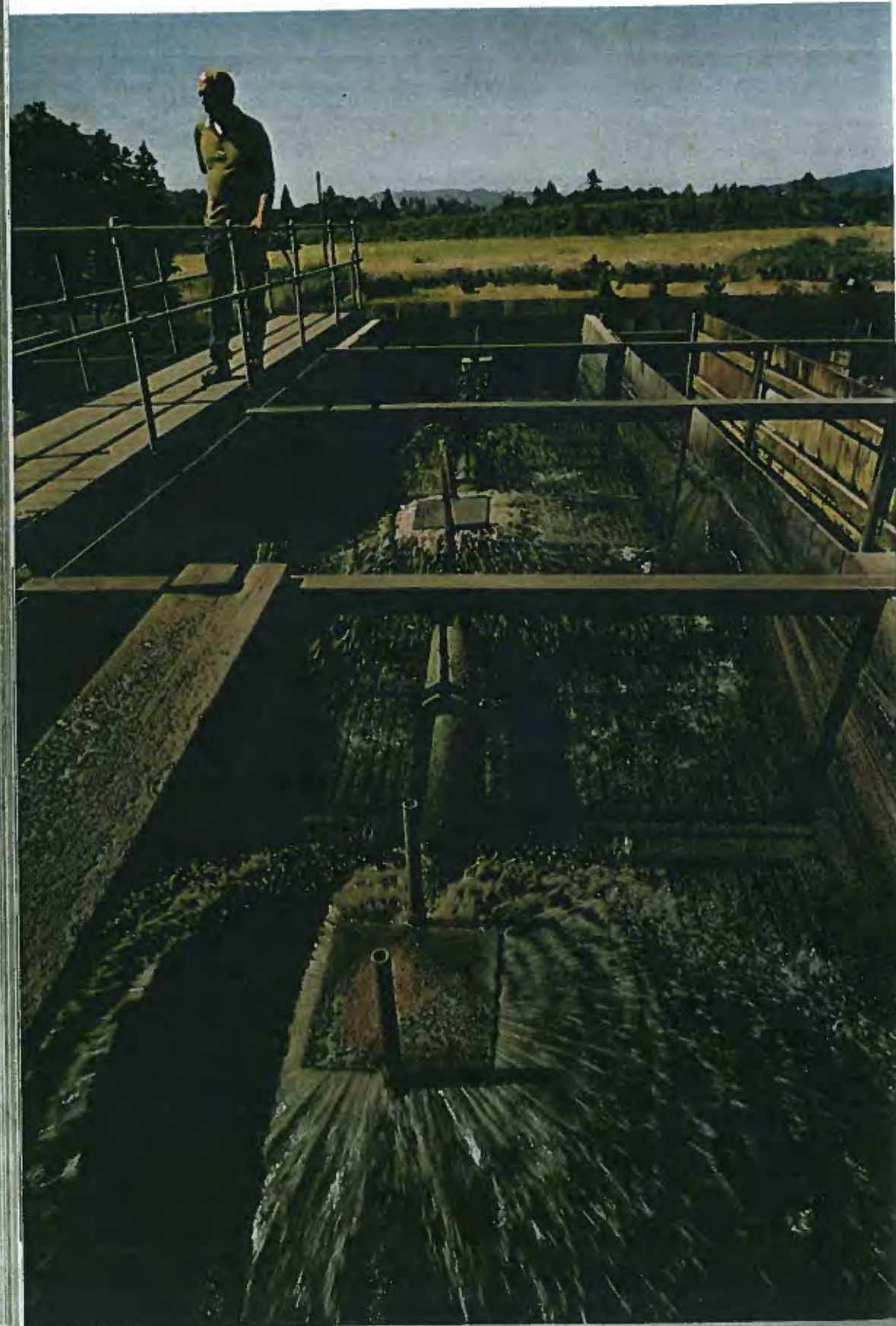
Inside his office, goldfish circled in a bowl and two trout stared from a tank. This, Peter explained, was his latest experiment in waste disposal. "We've kept these fellows healthy for a year on an exclusive diet of BB-size pellets pressed from sewage solids. Maybe pet shops and hatcheries will be our next customers."

There is no doubt that restricting what the river may receive has greatly accelerated the search for ways to recycle solids and further purify pollutants. New disposal techniques must be developed, for Oregon law makes no allowances for additional wastes to flow into the river, even though valley

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Water clear as sunlight buoys Mel Jackson of Eugene along the Willamette's North Fork, near its birthplace in the Cascades. He canoes on lake-fed headwaters free of any contamination introduced by man's industry or carelessness.





Laundering a city's sewage, a three-stage filtering system—the first in the Willamette region—processes wastes from Cottage Grove, Oregon. In the second stage (left), redwood baffles boost the absorption of oxygen, which speeds breakdown of solids by bacteria.



Beakers tell the story: Four samples proclaim results of the three-stage process. Darkest is untreated sewage. Hand-held jar holds the final result, cleansed of 95 percent of its impurities.

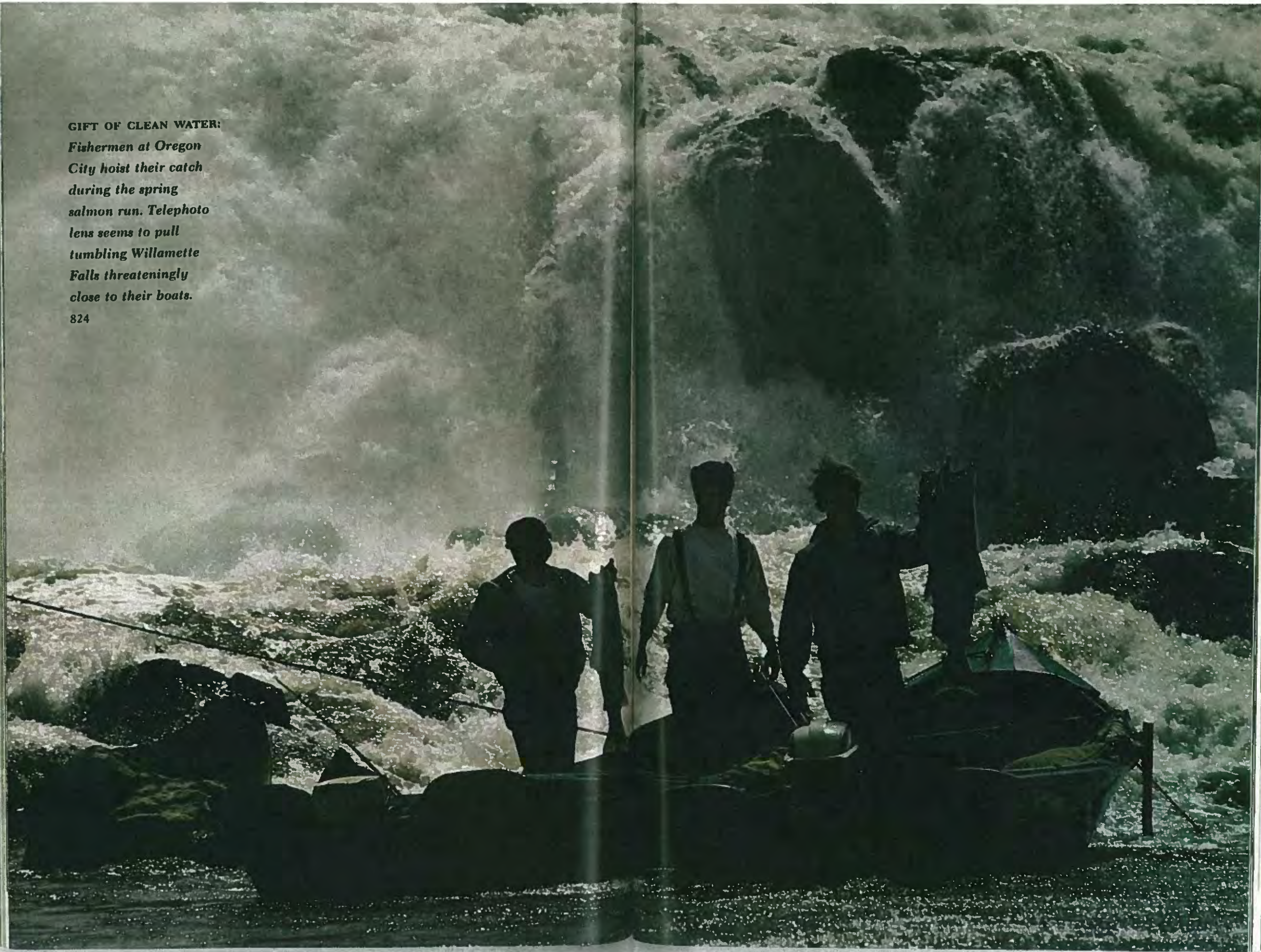
Fertilizer, anyone? Sun-dried sludge that settles out during the sewage-treatment process (upper right) becomes a free bounty for local gardeners, who haul it away by the truckload. Rich in nutrients, the odorless material makes an excellent soil builder.

Fish gobble it up! Pellets pressed from sewage sludge keep goldfish thriving (right). Plant supervisor Peter Horvath looks to salmon hatcheries as possible large-scale users of this food made from recycled waste.



GIFT OF CLEAN WATER:
*Fishermen at Oregon
City hoist their catch
during the spring
salmon run. Telephoto
lens seems to pull
tumbling Willamette
Falls threateningly
close to their boats.*

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industrial production and population are bound to grow.

Demonstration projects have already proved that industrial discharges can be diverted to useful purposes. Hot waste water from Weyerhaeuser's Springfield plant has been sprayed on nearby orchards to keep fruit trees from freezing (page 828). Applied to vegetable fields, the water has made it possible to grow two crops in a single year.

Pulp- and papermakers, once the Willamette's worst polluters, must install chemical-recovery and secondary waste-treatment facilities by this summer. Most have already done so, at a combined cost of some 50 million dollars. To ease this financial strain, participating industries can deduct 5 percent of their costs from their state corporate taxes each year through 1977.

Mills and municipalities follow much the same formula for secondary treatment. Sewage is held until most solids settle out or are skimmed away. Bacteria break down residual waste, then mechanical agitation

beats air back into the river-bound discharge to restore the oxygen level. A state permit system sets quality standards for all liquid discharges and requires frequent testing of outflows. Infractions can result in revocation of this permit and, with it, the operator's dumping privilege.

An early leader in the war to clean up the Willamette, Portland attorney John D. Mosser calls the permit process "one of our most effective weapons."

"Should a company lose its river rights," Mr. Mosser said, "it would have to close or convert to a completely independent disposal system. Meeting permit standards is by far the easiest and least expensive choice."

Fortunately, Oregon's rigid rules were passed without the waivers and variances that have undermined similar efforts elsewhere—and with only slight resistance. A few lobbyists descended on the capitol to oppose the sweeping changes proposed for 1967, but most of the lawmakers listened, instead, to the public demand for action.



Census of home-bound fish counts swimmers making their way up a new fish ladder at Willamette Falls. Television camera aimed at the underwater window videotapes passersby—here two steelhead trout.

"After all," Mr. Mosser said, "politicians want to keep their constituents, and industry its good community relations. So we ended up working together to devise and enact legislation everyone could live with."

Battle Extends to Riverside Clutter

Riding a jet boat from Eugene to Corvallis, I found the results of this effort reassuring. Here, the river has regained its unspoiled charm. A lone osprey flapped overhead, clutching a whitefish in its claws. Two red-tailed hawks battled above the alders for possession of a small snake. Flocks of killdeer skittered along the shore, while mergansers, mallards, teals, and coots bobbed around us like bathtub toys.

Not a beer can marred the setting. Oregon, in another bold move, is choking off such clutter with a new law that requires a deposit on *all* beverage bottles and cans. Officials believe that if buyers don't bring them back for a refund, energetic collectors in search of easy cash will. The sale of pull-tab

containers in the state is totally forbidden.

Good companionship added to the delights of the trip. Skipper Wayne Gardner of Leaburg guides professionally on wilder rivers, but has run this one for years. Henry Stewart, civilian planning chief for the Portland District of the U. S. Army Corps of Engineers—and an active environmentalist—knows every sandbar and bend.

Not always compatible elsewhere, Corps and conservationists work remarkably well together in Oregon. "Even many of those opposed to any man-made control over natural resources," Henry said, "realize that restoring the Willamette to full vitality would have been far less feasible had there been no dams on its tributaries."

Planned primarily for flood control and water storage—though some produce hydroelectric power as well—the dams are also manipulated to improve water quality, for the benefit of fish and the pleasure of people.

"This drainage basin averages about nine rainy months a year and, from June to

Return of the natives: These anglers exult in a bonanza unmatched for decades as spawning salmon again return from the Pacific. Only 79 chinooks were counted in the fall run of 1965; the 1971 tally exceeded 5,000.

September, three fairly dry ones," Wayne said. "Spring chinook get the breaks. They migrate from April to June, when the flow is cool and constant, then spend the summer and spawn high up on feeder streams, where the same favorable conditions prevail."

"No such luck for the fall chinook," Henry added. "Arriving this time of year, they'd meet sluggish, overheated waters heavily burdened with waste, if the Corps of Engineers didn't increase reservoir outflow to raise the river level and lower its temperature."

Decisions—for fish, farms, navigation, and recreation—are made in Portland. There the division engineer, Maj. Gen. Kenneth T. Sawyer, and his staff weigh water-release requests against weather predictions and river conditions and arrive, through the use of computers, at a daily rate of flow that satisfies the maximum number of valley needs.

Model Plant Steps Back From River

One of the Willamette's best customers, the American Can Company, completed its model pulp and paper plant three miles east of the river near Halsey in 1969. Four million dollars—10 percent of all construction costs—were spent on pollution controls (page 832). I asked why the mill, which uses 18 million gallons of river water a day, was so far removed from the source.

"We intended to locate much closer," plant manager Thomas W. Orr told me. "But when state officials explained their long-range plans for a park along both banks, their need for the site seemed greater than ours."

In this way, American Can has already shown its support for the highly ambitious Greenway program, which proposes eventually to edge the river with a nearly continuous strip of recreational land for public use.

Below Halsey, our jet boat passed shovels scooping away bars and islands, satisfying a growing need for gravel to make concrete. To prevent destruction of spawning areas and silting that kills fish eggs, the law insists that a berm—a protective strip—be left around all excavations. As a further precaution, stone crushing and washing operations ashore must return only unclouded water to the Willamette.

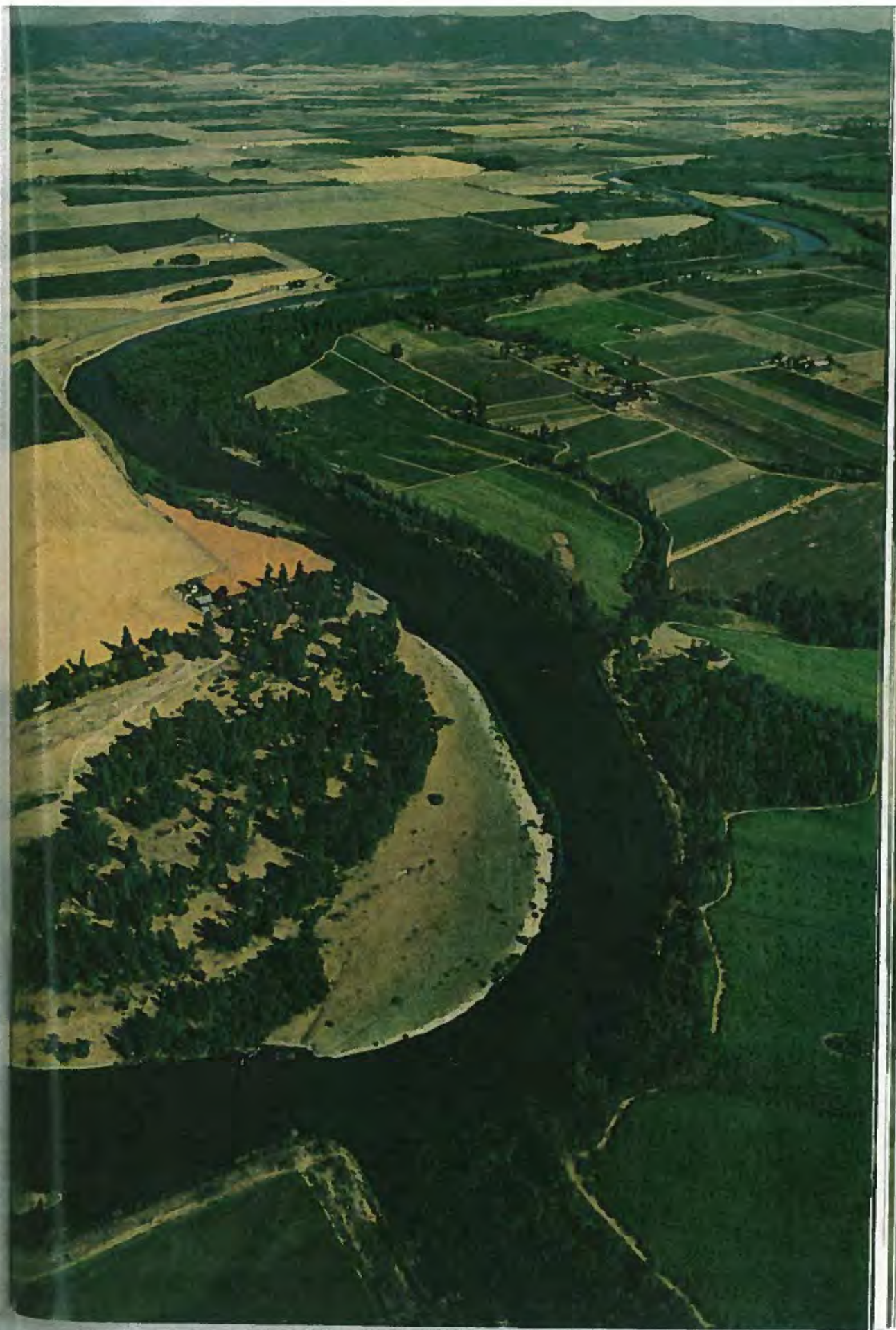
A brown streak off our starboard side hinted at another infraction. How well do citizen complaints really work? When I telephoned from Corvallis, I learned that ten other river-watchers had already reported the matter and remedial action had begun



RICHARD SIPTON

"Warm ice" may save fruit buds from frost damage. Hot waste water from the Weyerhaeuser pulp and paper plant at Springfield has been experimentally sprayed on trees in nearby orchards. Sheathing the branches with a coating of ice, the technique keeps delicate buds insulated at about 30.5° F., even when the air temperature plummets as low as 15° F.

Lazy-looping river meanders through lush farm country near Eugene. Fertile bottomlands, saved from flooding by upstream dams, make the Willamette Valley one of the most productive in the United States. The ambitious Greenway plan calls for eventually bordering the river with an almost continuous belt of parkland for recreational use



"Hand-in-hand with nature"—theme of the ambitious Greenway program designed to border the river with parkland—inspired the official flag (below) of Wilsonville, a new town 20 miles south of Portland. A Wilsonville youth (bottom) helps clean up riverside property bought by townfolk for the project.



At Corvallis, Henry and I transferred to the tug *Maria*. With towing business seriously curtailed by a shipping strike, owner Bill Bernert had agreed to a charter that would carry us downstream to Portland at a leisurely pace.

Occasional openings in the bank cover of cottonwoods and willows revealed the empty lines and vines of hopyards, cornfields bannered with silk, dark green carpets of growing mint, stake-sided trailers heaped with the last of the beet harvest.

Bisecting one of the Nation's most productive food-growing valleys, the Willamette has long carried away most of the refuse attendant upon a rich agricultural community. But those days and ways are dying. Animal wastes may no longer accumulate on cattle feedlots to be washed into the river by heavy rains. And canneries and food-freezing companies must tie into municipal sewage systems—if facilities permit—or develop waste-treatment plants of their own.

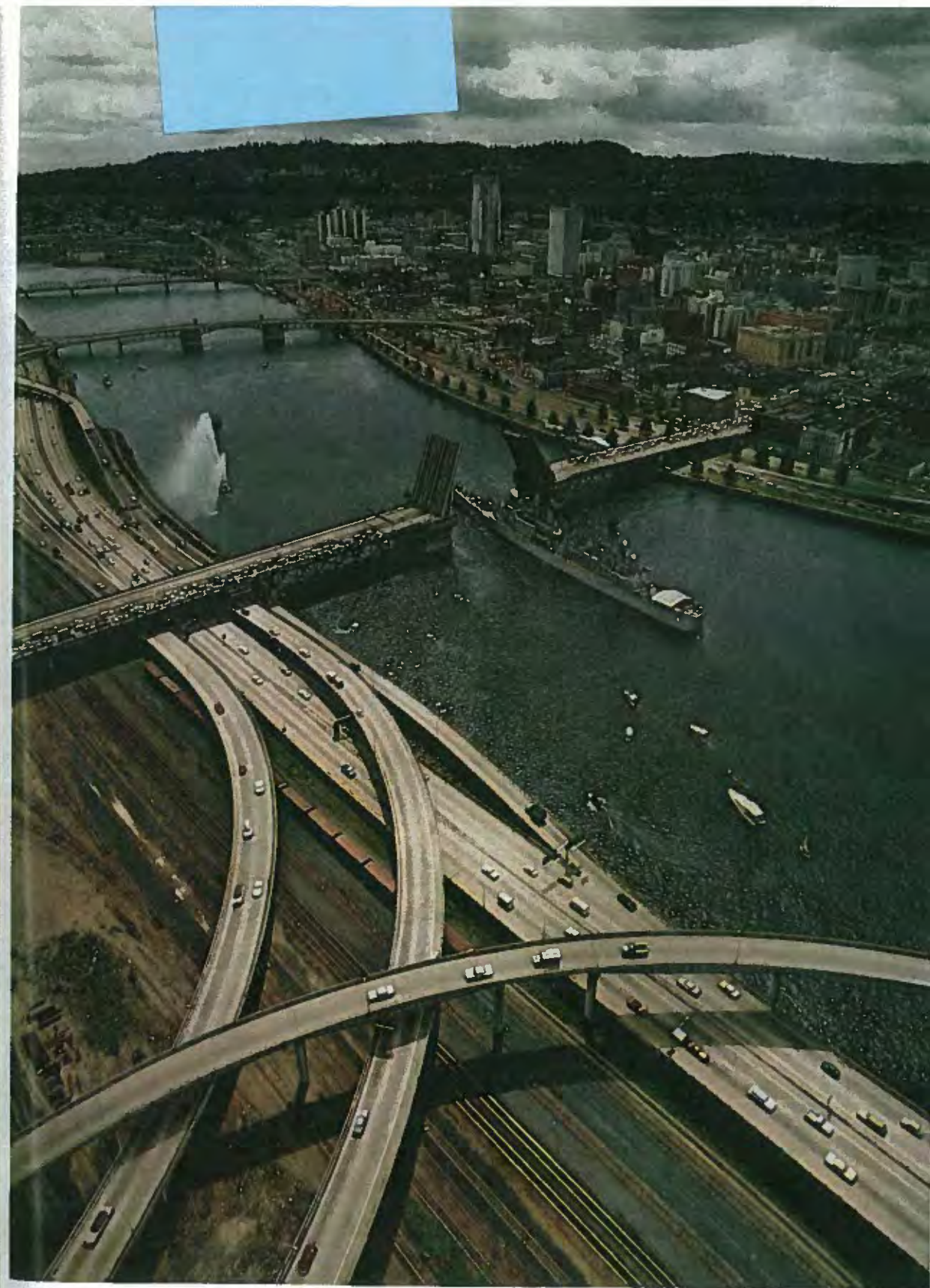
Some nutritious effluent from food canneries and feedlots, diluted to safe strengths, pours back onto fields, reducing the need for stronger fertilizers. As urbanization nibbles away at farmlands, however, cultivation will become more intensive. Then residents along the Willamette will have to worry about runoff of chemical fertilizers that, so far, have presented no problem.

Waterborne Seeds Yield Bumper Crops

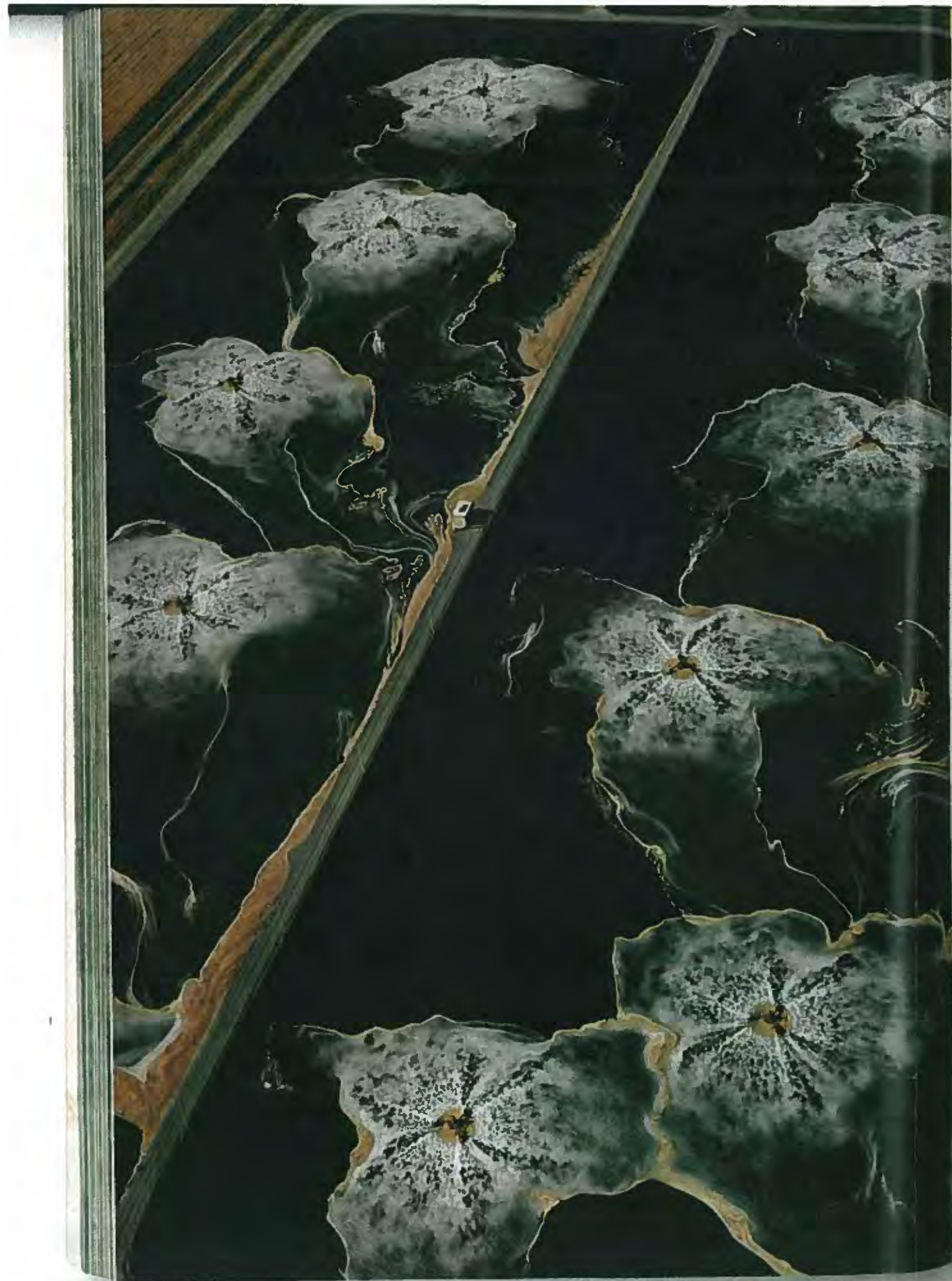
Approaching Salem, the region's largest food-processing center, we drifted under a half-topped apple tree and sampled its ripening fruit. Bill later butted the tough little tug into a bank where we gathered windfall filberts from the river's edge.

"A few years back," he said, "I could have picked you the makings of a full meal without ever leaving the river. All legal, you understand. A lot of seeds from cannery garbage caught on the shore and sprouted. Why, I've collected a couple of bushels of prime tomatoes on that bar right over there."

Bill and the *Maria* generally work the Willamette—navigable from Corvallis to the Columbia—towing rafts of logs from upland forests to wood-products plants along the river or into Portland for relay shipment. Newly cut timber, just passing through, adds no pollutants, but storing logs in the water does. Some rafts, moored along the banks



Fireboat sends up twin plumes as it welcomes the cruiser U.S.S. *Providence* to Portland for the city's annual Rose Festival. The busy harbor, once a festering sinkhole for all the Willamette's ills, now ranks among the cleanest in the Nation.



near Canby, have been afloat so long they've grown a thatch of weeds and bushes.

"Authorities are working on ways to reduce that problem, too," Henry said. "Tree bark soon flakes off and sinks to the bottom. Decaying there, it uses up a lot of oxygen. Possible solutions include requiring lumber industries to stack their logs on land or hold them in man-made lagoons."

Proscriptions placed on river use have cut into Bill's business, but he takes his losses philosophically. "After all," he said, "these waters are everybody's business. I'd far rather see them enjoyed than destroyed."

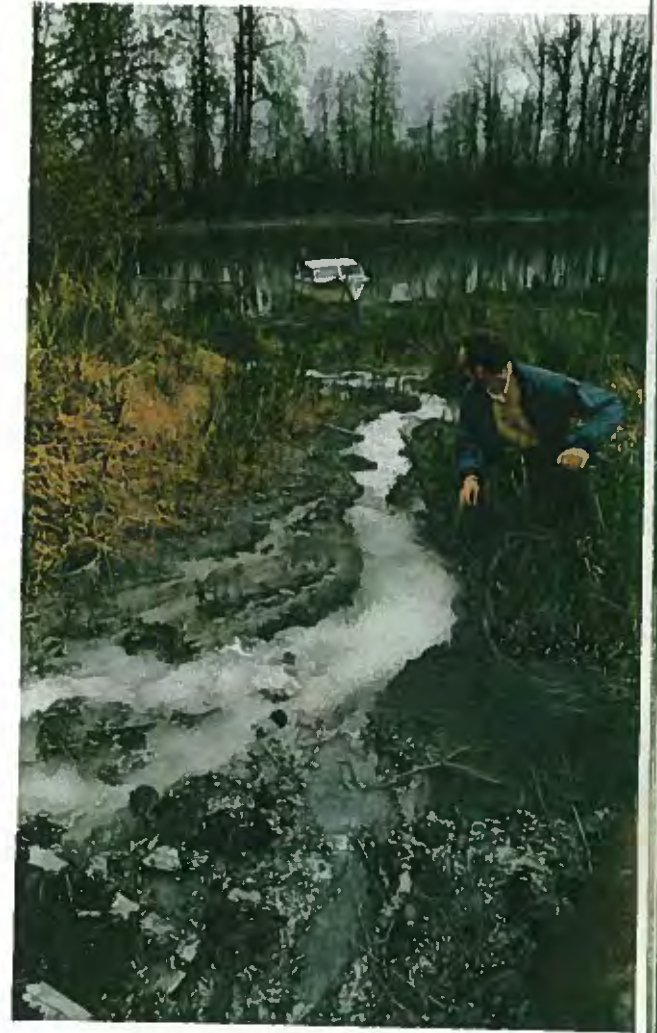
The enjoyment that people find along their rejuvenated river becomes fully evident in the last ten miles above the twin towns of West Linn and Oregon City. Here boathouses and sleek cruisers nestle beneath the bluffs. Fishermen crowd the current, trolling effortlessly downstream. Water-skiers perform their aquabatics, while 20th-century Tom Sawyers pole makeshift rafts along the shoreline. Commercial craft like Bill's creep slowly by, leaving such pleasures undisturbed.

Fish Climb a Watery Ladder

Industrial activity returns to the river at West Linn, where the Willamette cascades over a cliff 50 feet high and sluices past a power plant and two paper mills (pages 816-17). A new fish ladder now climbs the face of the falls, long an impassable obstacle for many salmon and steelhead trout trying to reach spawning beds upstream. Although the ladder cost some 3.7 million dollars, experts expect it to pay for itself by boosting the river's fish population by about 350 percent. To assure the venture's success, one good corporate neighbor—the Portland General Electric Company—donated more than half a million dollars.

Squeezed onto small rockbound sites on opposite sides of the falls, with little space for waste-treatment installations, Publishers Paper Company and the Crown Zellerbach plant are paying a high price for pollution controls. And rather than run its own hydroelectric turbines, which might injure young salmon as they head toward the ocean, Crown Zellerbach has agreed to shut them down and purchase commercial power during periods of fish migration.

A few miles downriver, Sellwood Bridge arches above some forty handsome houseboats, bright with potted plants and blossom-filled window boxes. Their owners, too, have



Unceasing vigilance keeps the river from reverting to its old untidy ways. A government official on pollution patrol checks wastes from a chemical plant. Rather than face court action, offenders have been quick to correct mistakes.

Whipped to a froth by rotors, effluent from American Can Company's pulp mill near Halsey (opposite) undergoes aeration to renew the oxygen content and speed the growth of bacteria that break down wastes. Despite the cost of such processes, only one small firm chose to close down rather than comply with tough regulations.

cooperated with the antipollution campaign by piping their sewage into the municipal system ashore, as the law now requires. Since the cleanup, demand for floating homes has skyrocketed, and even residents who were once indifferent to the Willamette's welfare are now its watchful guardians.

I found Frank Peters on the front deck of his houseboat, tossing bread crumbs to a greedy Canada goose. "You can really get hooked on this river living," he said. "Why, I catch trout and salmon from this very spot, swim when I please, and—if it gets real hot—paddle around on an inner tube, keeping cool and at the same time calling on my neighbors. No mowing or sowing for my yard; just a little litter prevention keeps it neat. All of us snag out debris and report drifting refuse we can't handle. And we don't toss so much as a matchstick overboard."

"A lot of little efforts," the governor had said, "make the big difference between success and failure." From Mel Jackson to Frank Peters—almost the river's length apart—thousands of Oregonians now live by this creed. Flotsam that finds its way into the water seldom stays there long.

Oregon Plans the Willamette's Future

"What's next for the Willamette?" I asked L. B. Day, Director of the state's Department of Environmental Quality.

"Our eventual aim is to divert *all* wastes from the river," he answered. "And I'm convinced it can be done. Maybe not tomorrow, but we're moving in on the problem."

For, to Oregon, the future is worth planning today. The Greenway program, which may not reach fruition for many years, typifies the state's farsighted attitude.

"The river itself is now relatively clean," State Parks Superintendent David G. Talbot said, "but much of its beauty lies along the banks. We are determined not to let the setting deteriorate the way the water did."

"It will take time and many millions of dollars to acquire a protective strip of parkland," he continued. "If the Greenway doesn't

prevail over development of the fringe property, we'll all be the losers."

With strong support from government officials and civic groups, the Greenway is gaining ground. Although state and local public lands presently preserve only 60 of 510 riverbank miles, another 156 miles will soon be purchased with state and federal matching funds. In January, the Department of the Interior awarded a grant of \$5,000,000; Oregon's \$5,000,000 already is allotted.

There has been such a citizen surge in preservation planning that last year the state passed 37 separate pieces of environmental legislation, much of it relating to the river. One bill directs state, counties, and cities to spend 1 percent of their highway funds for bicycle and foot trails along developing roads and in park recreation areas. It is hoped that the allocation, which will amount to about three million dollars this year, will include acquisition of pathway property to support the Greenway concept.

Pacesetter Project Wins National Praise

By passing progressive antipollution legislation, Oregon has produced a highly imaginative, innovative cleanup program that could well serve as a pattern for other states.

"Possibly for the whole country," commented Chairman Laurance S. Rockefeller (page 818), when I met him in Portland at the fall meeting of the Citizens' Advisory Committee on Environmental Quality. "We intend to recommend parts of the program to the President for national consideration."

"The success on the Willamette teaches a simple lesson," added fellow member Frank Borman, the former astronaut. "If people want action, they carry the clout to get it."

Recognizing the ecological ills infecting other states, Oregon acted before time ran out. Now chinook spawn even below once-deadly outfalls. Little untreated waste ever enters the stream. Transgressors have learned that the laws won't bend.

Obviously, man and nature have come to terms along the Willamette. □

A river for everybody: With Old Glory at the masthead, a foursome competes in a Fourth of July raft race near Independence. Today, the entire length of the Willamette to Portland provides a safe playground for water sports, including swimming. Perhaps even more important, Oregon's accomplishment instills a valuable environmental awareness in the state's young people, heirs to the river of tomorrow.

