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JULY 1987

Bonneville
POWER ADMINISTRATION

The World's Biggest Fish Story: The Columbia River's Salmon

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It's been called the most ambitious effort to rebuild a biological resource on the planet. Thousands of people who live along the Columbia are laboring to bring back one of the river's most precious resources — the Columbia River salmon.

Salmon are a vital part of life in the Pacific Northwest. This delectable fish has been enjoyed by royalty and has been called "king". The salmon has been revered and worshipped by generations of the original Americans.

And for generations, those who use the fish and those who use the water vital to the salmon's existence for other purposes have been locked in conflict.

Water has been used to irrigate crops and develop cities and industries. Using water to produce power pulled the Pacific Northwest out of the Depression and helped it to prosper.

Not that fish were completely ignored.

Since the first Federal hydro dam — Bonneville — was built in 1937, those who used its electricity — the Pacific Northwest electric ratepayers — have been working to protect fish.

They invested half a billion dollars to build fish ladders and a network of hatcheries to replace lost habitat. Ratepayers have spent up to \$20 million a year just to operate and maintain these structures. More recently, power managers have diverted springtime riverflows away from turbines to help millions of fish

migrate to the ocean — at an additional cost of over \$30 million a year.

But it hasn't been enough. By 1973, when the Columbia's last Federal dam was built, the Columbia salmon catch was down nearly 80 percent from the harvests prior to the completion of Bonneville Dam.

Growing concern forced Congress to act. In 1980, it placed increased attention on salmon and other wildlife. With the passage of the Northwest Power Act, it created a regional body, the Northwest Power Planning Council to pull together Pacific Northwest concerns for fish and wildlife.

The Council developed a fish and wildlife program for the entire Columbia River Basin. This program is a blueprint, an overall guide for hundreds of individual projects carried out by the region's state and Federal agencies, including the Bonneville Power Administration. Bonneville and its ratepayers are responsible for implementing over half of the program.

Crews repairing fish habitat — barges carrying young salmon and steelhead past the dams — computer-sensitive fish tags — fish disease research — support for harvest controls — renovated fish ladders — better water flows in the reservoirs for migrating fish. All are part of the program. The goal? To repair the damage to the fish runs caused by hydroelectric dams on the Columbia River.

Indian people living along the river were dependent on salmon for their way of life.

Netting salmon on the Columbia
(Oregon Historical Society)



increased production to 2,000 cases a day at each cannery.

After the fish wheels came gill nets, purse seines and trollers. Bigger boats and better techniques extended the commercial fishery into the Pacific Ocean. Salmon were speared and hooked, netted and trapped, occasionally even dynamited.

Within three generations, the numbers of returning salmon had dwindled dramatically. As early as 1894, an Oregon Fish and Game magazine predicted, "It is only a matter of a few years under present conditions when the chinook of the Columbia will be as scarce as the beaver that once was so plentiful in our streams. [They are quickly] disappearing and threatened with annihilation."

The impact of overharvest was compounded by the construction of dams along the Columbia and its tributaries. The first dams were built in the early 1900s to control floods and provide water for irrigation. But the Federal Power Act of the 1920s and the New Deal Era of the 1930s held a vision of hydropower development that



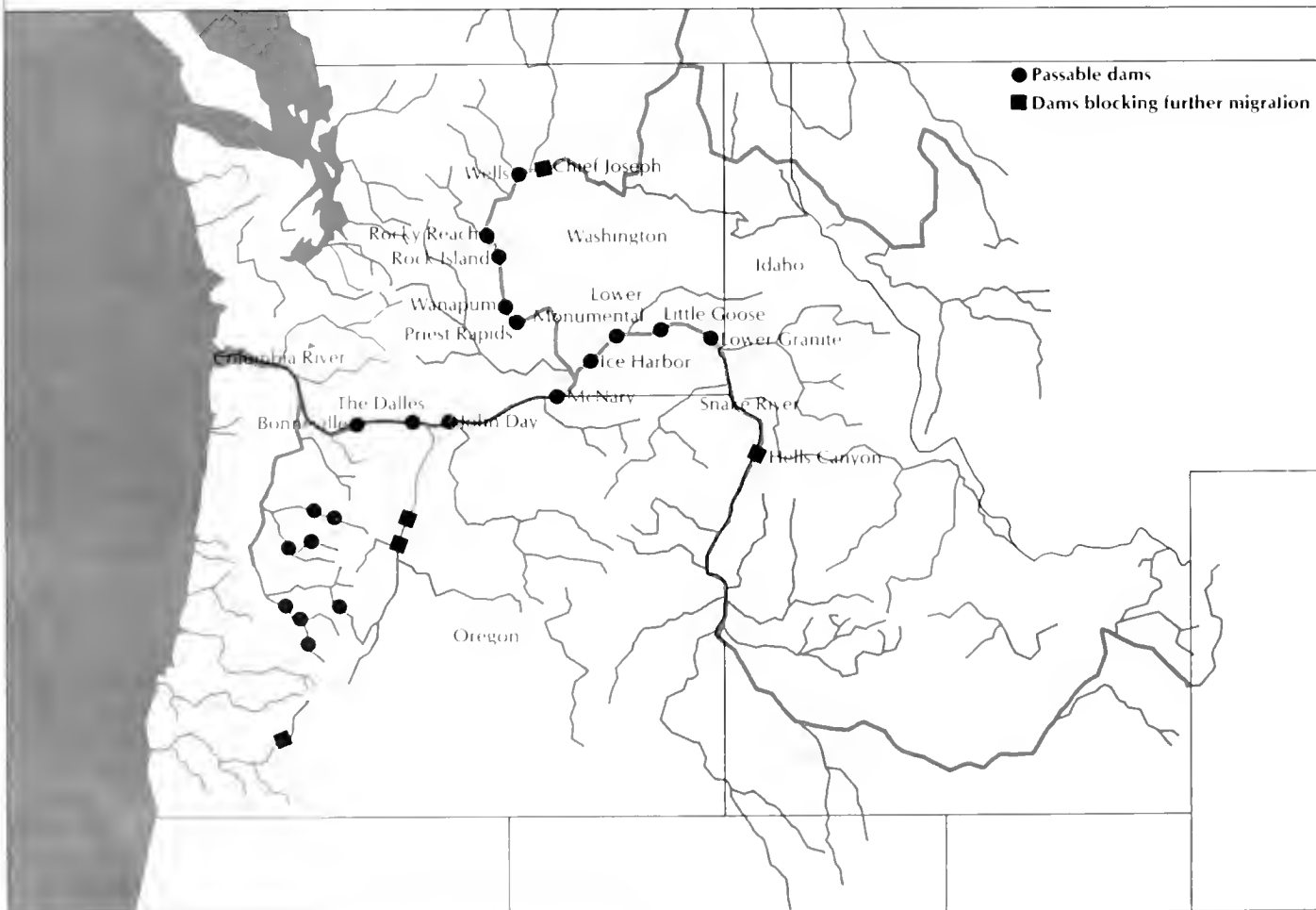
would change the Columbia River forever.

Hardly any major stream of the 260,000-square-mile Columbia River watershed was left untouched. The 1,214-mile "raging river" known by the early Indians and settlers has practically become a back-to-back series of reservoirs from the Canadian border to Bonneville Dam near Portland, Oregon. Less than 200 miles of the United States portion of the Columbia River remain free-flowing.

Fifty-five — including 30 federal — dams were built to supply cheap electricity, irrigation water and provide flood control. By the time they were all in place in the late 1970s, the situation had become critical for some salmon and steelhead runs — and too late for others. Some stocks disappeared completely.

Fish ladders were built at most of the federal dams to provide passage for adult salmon returning to upstream spawning grounds. But engineers thought Grand Coulee Dam on the upper Columbia was too high for fish ladders. Hell's Canyon Dam stopped salmon and steelhead from traditional spawning grounds on the

Dams & Lost Salmon Habitat on the Columbia River



Columbia's major tributary, the Snake River. These two dams blocked migratory fish from more than 1,100 river miles of habitat. All along the river, reservoirs flooded miles of what had been salmon spawning and rearing grounds for thousands of years.

Agriculture also contributed to declining fish runs as farm animals grazed on streamside vegetation and irrigators impounded streams and returned the water laden with sediment, pesticides and herbicides. Careless logging altered watershed runoff, removed shade trees and scoured the gravel streambeds that salmon and steelhead need to spawn. Dredge mining, industrial waste and the toxic drainage from cities and roads polluted the river environment for fish.

The Public Outcry

The drastic decline in fish runs brought a great deal of money and attention to the fish problem through the years. Numerous groups rose to fight for what they considered their fair share of the dwindling resource.

The cacophony of voices in conflict created even more difficulties for the numerous agencies involved in managing salmon and steelhead. In the first place, it was sometimes hard to determine just who had the right to manage the fish.

Often jurisdictional boundaries for state, federal and tribal fish managers overlapped. And through the years, additional regional and international groups have been created to manage the fish.

Because of their differing values, competitive harvest objectives and sometimes sovereign status, the fish management agencies and Indian tribes were not guided by any single vision or program. While individual groups benefited, overall, the Columbia River's fish suffered.

Who, some observers wondered, would get the last fish?

The Act, the Council and the Program

The fish situation was so dire that Congress, in 1980, stepped in and added special language to the Pacific Northwest Electric Power Planning and Conservation Act (the Act). The Act demanded mitigation, protection, and enhancement for fish and wildlife harmed by federal hydro development on the Columbia.

Not that dams are the only factor in declining fish runs, but they are the most obvious. The inescapable logic that moved Congress to actions was this: users of electricity, who benefit from cheap power produced at the

Columbia River Salmon and Steelhead Runs¹

	1939 ²	Average 1976-85	1986
Chinook			
Spring	76,708	85,556	186,100
Summer	23,477	36,994	31,041
Fall	186,051	217,723	416,802
Coho	14,383	38,274	130,835
Sockeye	73,382	69,089	58,099
Steelhead	121,922	158,954	379,429

¹ Source: Corps of Engineers

² The year after Bonneville dam was built. The first full year of fish counting.

federal dams, should help pay for the damage those dams have inflicted on fish.

The Act created a Northwest Power Planning Council (the Council) whose first charge was to come up with a comprehensive "Program": a list of measures to increase the numbers of fish and wildlife. The Council, in turn, issued its first Program in 1982.

It is too early to assign specific results to the Council's Program. But, fish biologists are encouraged by salmon and steelhead runs in 1984, 1985 and 1986 that far exceeded those of other recent years on the Columbia. Although a number of factors have led to the improvement, everyone agrees the efforts taken so far to implement the Program are a step in the right direction.

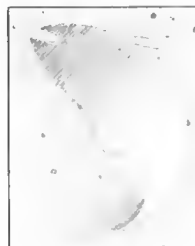
The Players

With such a varied collection of governments, agencies, tribes and others involved in the Program, it is no surprise that their respective roles are still being refined and sorted out. Each organization has its own strong ideas about fishery priorities and how they should be fulfilled.

However, a common theme echoes clear: Save the fish. The Act outlines roles for many of the players and a structure for their interaction.

The Council

Congress created the Council —composed of representatives appointed by the governors of Montana, Idaho, Washington and Oregon — to set in motion a plan to "protect, mitigate, and enhance" fish and wildlife on the Columbia and its tributaries. A key provision in the Act directed the Council to look at the



Columbia River Basin and the dams as a whole system. The Act also directs the Council to ask for recommendations from all directly-affected groups: the fish and wildlife agencies, Indian tribes, Bonneville, dam operators and utilities.

The Council designates responsibility for the projects that are part of its Program, but does not carry them out. The Council's scope is limited to projects that address the impacts the Columbia River's hydro dams have had on fish and wildlife.

And its Program must be developed "while assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply."

The Council issued its first Program in 1982. The Program has since been amended, in 1984 and in 1987.

Bonneville and the Ratepayers

Bonneville was created to sell power from the Columbia's federal hydroelectric dams. The dams now have a capacity of some 20,000 megawatts. They can supply enough energy to power 20 cities the size of Seattle. Bonneville built over 14,000 miles of transmission lines to transmit that power.

The Act gave Bonneville additional responsibilities. Bonneville must fund efforts to protect, mitigate and enhance fish and wildlife to the extent they were affected by federal hydroelectric dams and in a manner consistent with the Council's Program.

Bonneville moves Program measures from ideas to reality, asking the utilities, tribes, and fish and wildlife agencies to help flesh out the ideas. Once a project has been created, Bonneville pays others — agencies, tribes, universities and private business — to do the actual project work.

Bonneville is wholly financed by Pacific Northwest ratepayers. It receives no appropriations — tax dollars — from Congress. Bonneville has no income other than what it gains from marketing electricity. Thus, Bonneville customers — mostly public and private utilities and aluminum companies — and their customers — ratepayers — fund the protection and improvement of fish and wildlife.

Responsibility for using hard-headed cost analyses and emphasizing "high-payoff" projects rests on all the groups involved in the effort. Ratepayers want assurance that their money is being spent wisely and well. Bonneville, as the steward of that money, has the legal responsibility to provide that assurance.

Their dollars repay the federal Treasury for many of the large hatcheries and fish ladders

that have been built on the Columbia River over the years. As funders, in large part, of the overall Program, ratepayers play an important role in the public review process that is built into the Program

Fish and Wildlife Agencies

Fish and wildlife agencies in the states of Oregon, Washington, Idaho and Montana, along with two federal agencies, the Fish and Wildlife Service and the National Marine Fisheries Service manage fish and wildlife resources. They also police commercial and sport fish harvest.

Pacific Northwest fish and wildlife agencies are central players in the Program. They recommend new ideas and provide technical advice on the feasibility of each other's ideas. Fish and wildlife agencies carry out most of the work on Bonneville-funded fish projects.

Indian Tribes

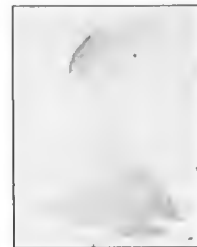
The Council's Program must be consistent with the legal rights of Indian tribes in the Columbia River Basin. Several tribes have been very active in offering recommendations for the Program. In many cases, the tribes have been on the contracting end of the process, too, using ratepayer dollars to build hatcheries, conduct research and improve fish habitat. The tribes are also responsible for managing fish and wildlife and setting fishing limits and seasons in areas under their control.

Federal Dam Operators

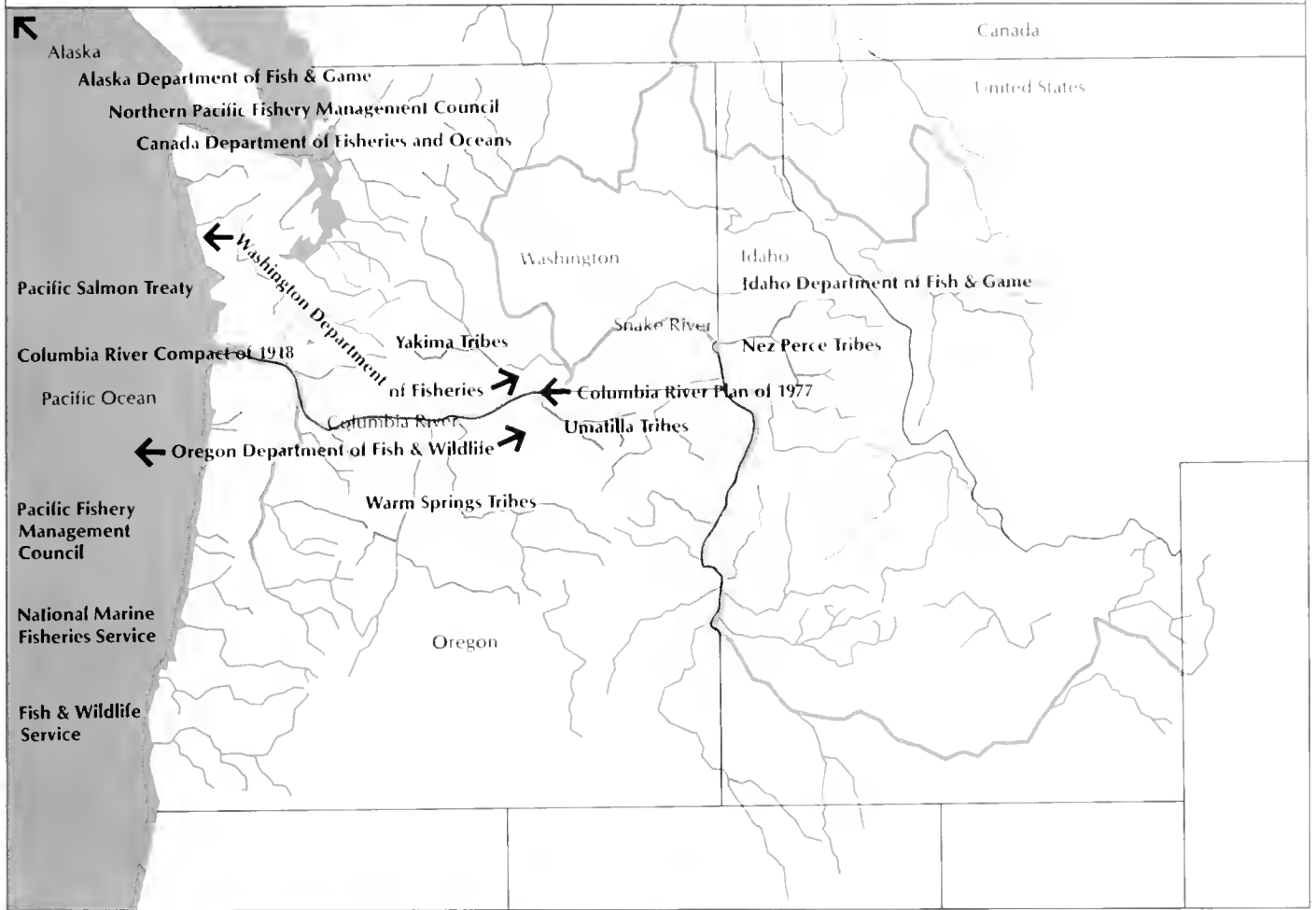
The U.S. Army Corps of Engineers, responsible for building and operating most of the Columbia's federal dams has another duty: to help fish migrate past the dams.

The Corps had already built fish ladders for upstream passage of adult fish. Under the Program, the Corps is building screens and bypass systems as well to guide young salmon and steelhead away from turbines as they migrate downstream. The Corps must consider the Program whenever it makes decisions that affect fish. Eventually, ratepayers repay the federal Treasury for dollars borrowed to make any major fish expenditures by the Corps.

The U.S. Bureau of Reclamation also builds and operates federal dams. It was created primarily to irrigate land and make it arable for people. Now it must be concerned as well with fish. Dams, canals and ditches that have made valleys bloom have had a disastrous effect on migrating fish.



Multiple Jurisdictions Within The Northwest



The Council has estimated that Columbia River fish runs once ranged between 11 and 16 million fish each year.

Salmon leaps a ladder in eastern Washington
(J. Orsborn)



The Bureau, in accordance with the Program, has repaired fish ladders and installed barriers to keep fish out of dead-end canals. In other areas, the Bureau has altered dam operations to improve fish survival.

Non-Federal Dam Operators and FERC

Private and publicly-owned utilities that have designed and built their own dams on the Columbia system also have responsibilities for fish and wildlife. For the most part, they must pay for fish projects taking place at their own dams. In some cases, they share the costs of building new fish ladders and hatcheries with Bonneville. The Federal Energy Regulatory Commission, too, has new duties under the Act. FERC had its beginnings in the 1920 Federal Water Power Act. It was created to issue licenses for non-Federal hydroelectric projects. It now must consult with fish and wildlife agencies and tribes and coordinate its actions with other federal operating and regulating agencies. And it must take the Program into account when making decisions on hydropower activities.

Federal and State Land Managers

Because many of the Program's measures, such as habitat improvements, are destined to

(continued on page 12)

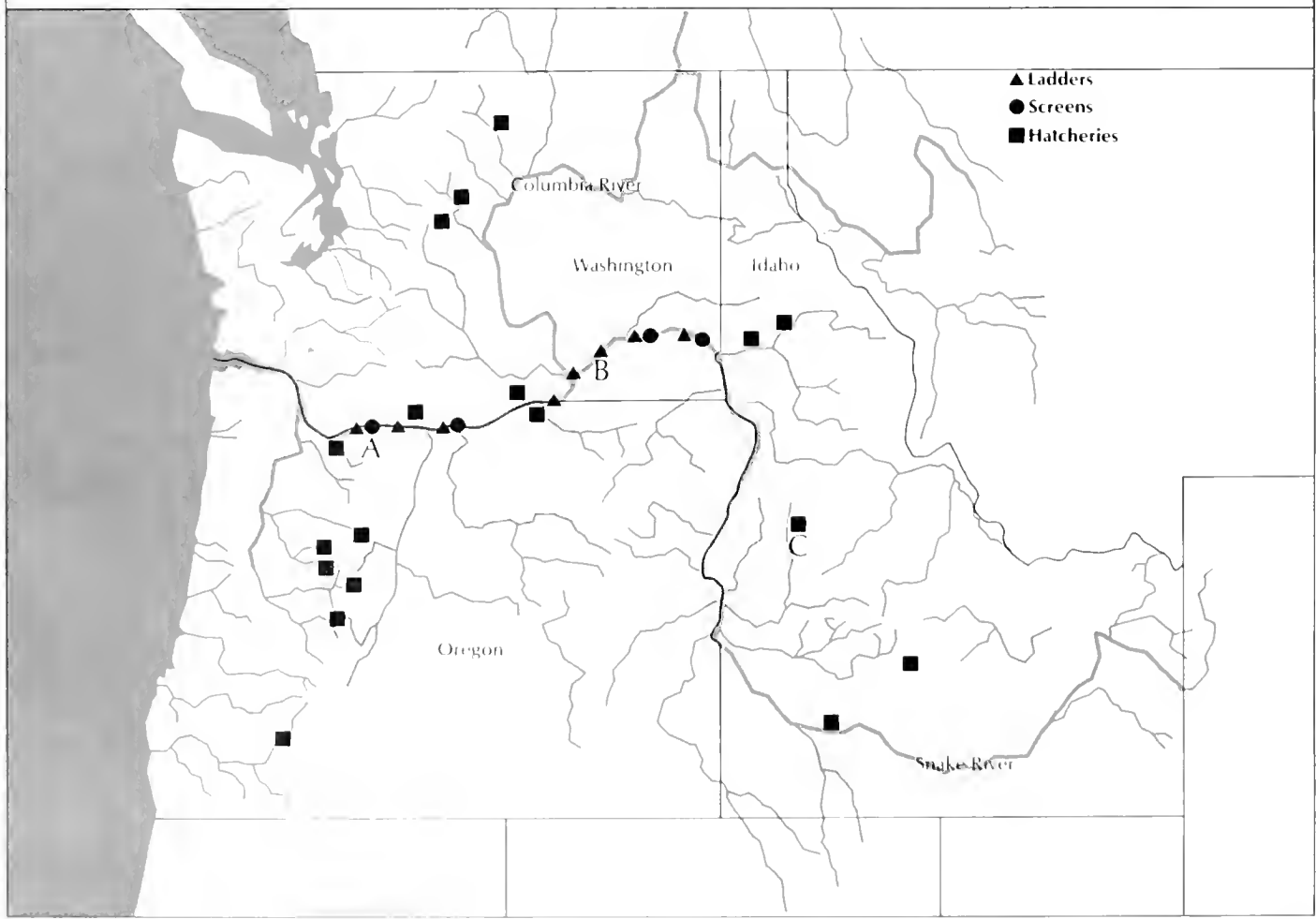


Fish screens are designed to guide fish away from dam turbines.
 Installing travelling screens at Bonneville Dam (Corps of Engineers)



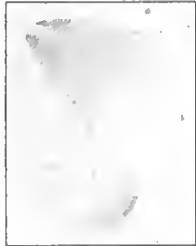
Fish ladders at one of the eight federal dams salmon must pass to reach Idaho spawning grounds.
 Lower Monumental Dam (Bonneville Power Administration)

Ratepayer-Supported Dams & Hatcheries on the Columbia River



Hatcheries play an important role in sustaining salmon runs.

McCall National Fish Hatchery
(U.S. Fish & Wildlife Service)



For The Dams

Columbia Basin Fish Facilities Supported by Pacific Northwest Ratepayers Through Repayments to the Federal Treasury

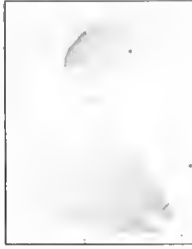
Name	Location	Type	In-Service Date	Managing Agency
Bonneville Dam	Oregon-Washington	Ladders/Screens	1938	Corps of Engineers
Bonneville Hatchery	Oregon	Hatchery	1909	Oregon Fish & Wildlife
Clearwater (planned)	Idaho	Hatchery	1987	Idaho Fish & Game
Dworshak	Idaho	Hatchery	1982	U.S. Fish & Wildlife
Entiat	Washington	Hatchery	1941	U.S. Fish & Wildlife
Hagerman	Idaho	Hatchery	1984	U.S. Fish & Wildlife
Ice Harbor	Washington	Ladder	1961	Corps of Engineers
Irrigon	Oregon	Hatchery	1985	Oregon Fish & Wildlife
John Day Dam	Oregon-Washington	Ladders/Screens	1968	Corps of Engineers
Leaburg	Oregon	Hatchery	1953	Oregon Fish & Wildlife
Leavenworth	Washington	Hatchery	1940	U.S. Fish & Wildlife
Little Goose Dam	Washington	Ladder/Screens	1970	Corps of Engineers
Looking Glass	Idaho	Hatchery	1982	Idaho Fish & Game
Lost Creek	Oregon	Hatchery	1973	Oregon Fish & Wildlife
Lower Granite Dam	Columbia R.	Ladder/Screens	1975	Corps of Engineers
Lower Monumental Dam	Washington	Ladder	1969	Corps of Engineers
Lyons Ferry	Washington	Hatchery	1983	Wash. Dept. Fish
Magic Valley	Idaho	Hatchery	1986	Idaho Fish & Game
Marion Forks	Oregon	Hatchery	1950	Oregon Fish & Wildlife
McCall	Idaho	Hatchery	1981	Idaho Fish & Game
McKenzie	Oregon	Hatchery	1902	Oregon Fish & Wildlife
McNary Dam	Oregon-Washington	Ladders/Screens	1953	Corps of Engineers
Oakridge	Oregon	Hatchery	1955	Oregon Fish & Wildlife
Sawtooth	Idaho	Hatchery	1984	Idaho Fish & Game
South Santiam	Oregon	Hatchery	1923	Oregon Fish & Wildlife
Spring Creek	Oregon	Hatchery	1901	U.S. Fish & Wildlife
The Dalles Dam	Oregon-Washington	Ladders	1957	Corps of Engineers
Winthrop	Washington	Hatchery	1940	U.S. Fish & Wildlife

In The Field

The Program includes some 250 measures to rebuild fish and wildlife populations. Those measures, grouped into broad categories, address the following:

- Downstream migration of young salmon and steelhead past the dams, including -
 - manipulating the river flows to provide more water during peak migration months of April, May and June
 - constructing fish screens and other bypass facilities to keep young fish away from turbines
 - using barges and trucks to carry young fish past the dams and release them downstream
- Upstream migration of mature salmon and steelhead toward their spawning sites.
- Propagation of hatchery-bred salmon and steelhead, and how they interact with wild fish.
- Non-migratory game fish, and how their lives near the reservoirs are affected by the operation of dams.
- Wildlife, and how to compensate for habitat altered or flooded by dam reservoirs.

The projects funded by Bonneville — and the ratepayers — are based on these measures.



Fish and Wildlife Expenditures in the Pacific Northwest

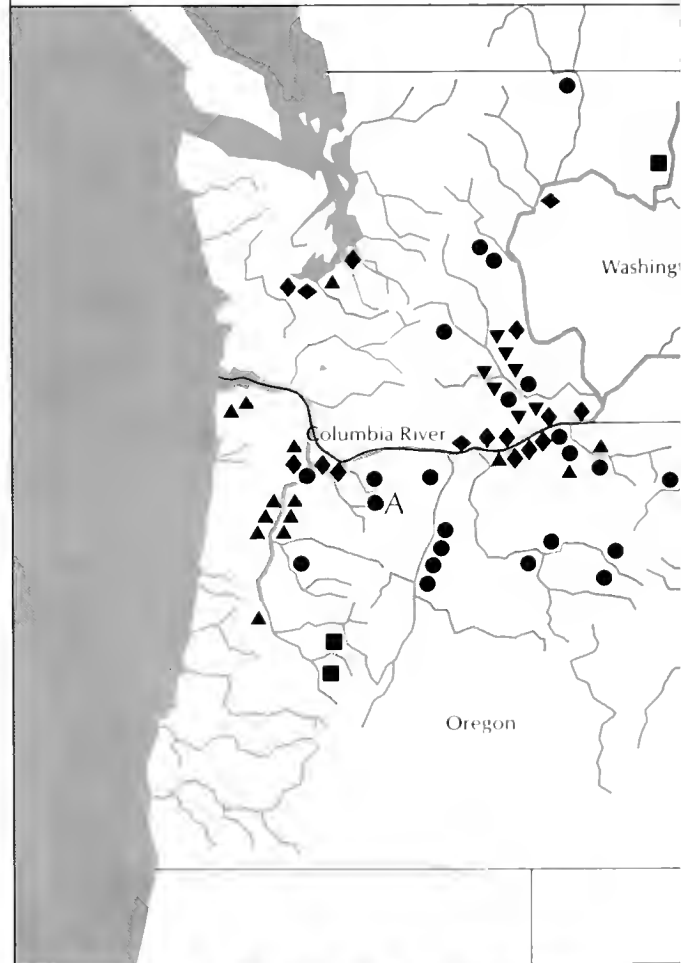
Fiscal Year 1985 ¹

Bonneville Power Administration	\$117.5 M ²
Bureau of Land Management	2.3
Bureau of Reclamation	4.3
Corps of Engineers	44.5
Idaho Department of Fish and Game	14.3
Montana Department of Fish, Wildlife & Parks	14.4
National Marine Fisheries Service	10.7
Oregon Department of Fish and Wildlife	22.8
Tribes	10.3
U.S. Fish and Wildlife Service	16.4
U.S. Forest Service	7.9
Washington Department of Fisheries	20.9
Washington Department of Game	18.7
Total	\$305.0 M

¹ per each agency's records. State agency dollars shown do not include funds from federal agencies, such as Bonneville.

² an average. Bonneville dollars come from rates. Dollars shown for all other groups come solely from taxes or fees.

Location of BPA Fish & Wildlife Projects



Creating new places for salmon to spawn, Mount Hood National Forest, Oregon.

Log weir construction (N Christmas)





Where the Ratepayers' Money Goes

Item	Average Annual Cost (in millions)
Repayments to the U.S. Treasury.	\$35-50
Power Losses.	\$40-60
The Program.	\$25
Total	\$100 - 135

Since 1937, ratepayers — through Bonneville — have been paying back the federal Treasury a growing amount — now nearly half a billion dollars — spent to build some 20 fish ladders, screens and hatcheries at several Columbia River dams. Repayments include about \$20 million each year for the money the Corps of Engineers, the Bureau of Reclamation and the U.S. Fish and Wildlife Service spend to operate and maintain those facilities.

Power Losses. \$40-60

Bonneville also foregoes power revenues to spill water at dams or to increase flows through the reservoirs for young fish. This figure varies according to how much water is available and how much hydroelectric power is worth.

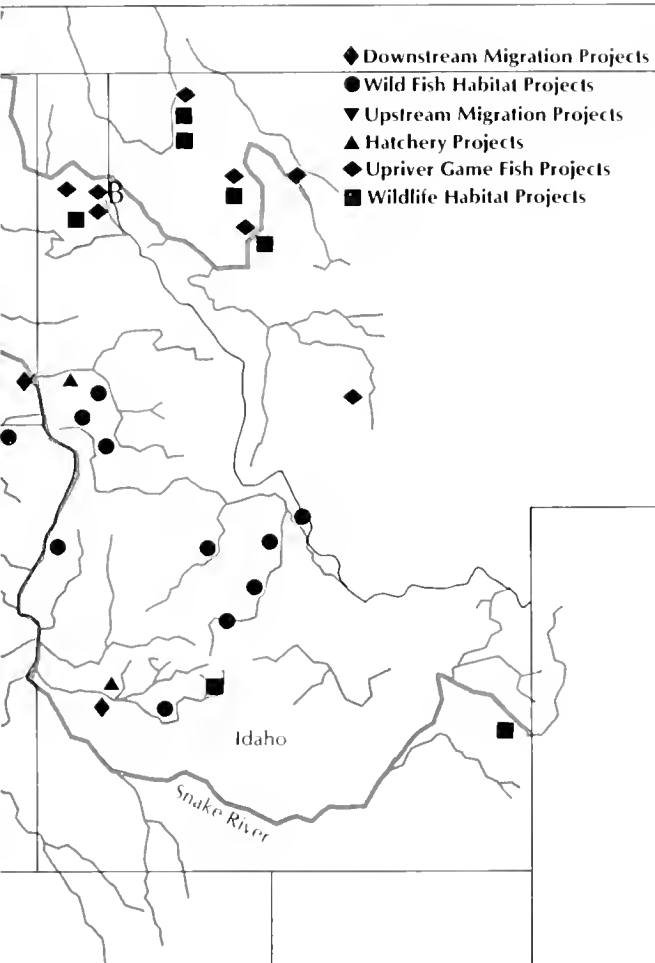
The Program. \$25

In addition, Bonneville is responsible for more than half the Program. Empowered under the Act to help fish and wildlife, Bonneville has spent more than \$83 million over the past five years on 253 fish and wildlife projects. In 1986 alone, some \$25 million was spent on 112 specific efforts.

Total \$100 - 135

In total, fish and wildlife is costing ratepayers an average of \$117.5 million a year or about 4 percent of Bonneville's total operating revenues.

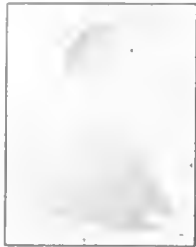
Projects, 1986



Building new hatcheries to boost the number of upriver game fish

Kokanee salmon eggs, Cabinet Gorge Hatchery, Sandpoint, Idaho (D. Johnson)





How Much The Program Cost Bonneville in 1986

Fish and Wildlife Projects

	Cost (in millions)
33 projects to find new or improve existing spawning and rearing habitat for wild fish	\$9.0
21 projects to improve hatchery production or build new hatcheries	4.6
14 projects to help young fish migrating downstream	4.6
19 projects to move adult fish upstream to spawning sites	3.1
12 projects to investigate hydro impacts on upriver game fish	2.6
13 projects to improve wildlife habitat	1.1
Total	\$25.0

Who Got the Money to Do the Work

Who	How Much (\$Millions)	Per Cent
Fish and Wildlife Agencies ¹	\$10.5M	42%
Indian Tribes	\$ 2.8	11%
Bureau of Reclamation	\$ 3.2	13%
U.S. Forest Service	\$ 1.8	7%
U.S. Army Corps of Engineers	\$ 2.0	8%
Universities: Oregon State University, University of Idaho, University of Washington, Washington State University	\$ 1.1	4%
Private Consultants	\$ 0.7	3%
Others (e.g. Public Utilities)	\$ 2.9	12%
Total	\$25.0M	100%

¹ Breakdown by individual fish and wildlife agencies:

National Marine Fisheries Service	\$ 2.2M
Oregon Dept. of Fish & Wildlife	2.6
Montana Dept. of Fish, Wildlife & Parks	1.6
U.S. Fish & Wildlife Service	1.5
Idaho Fish & Game	1.2
Pacific Marine Fisheries Commission	0.9
Washington Depts. Fish & Game	0.5
	\$10.5M

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be carried out on federal land, the appropriate land-management agencies become involved. The Bureau of Land Management, the National Park Service and the U.S. Forest Service each administers large sectors of the Columbia River Basin. In some cases, they directly or indirectly manage fish and wildlife. In each instance these agencies play a consulting and coordinating role in the Program. Occasionally, projects take place on lands governed by state agencies such as the Washington Department of Natural Resources.

Issues

Complex problems seldom lend themselves to easy solutions. No single approach can solve the problem of dwindling salmon and steel-head populations in the Columbia River Basin. Increasing fish production, providing safe passage during migration and managing harvest effectively are all needed. It is essential that these three approaches be integrated if they are to be most effective, and even, in some cases if they are to avoid doing more harm than good.

While all parties will agree on what needs to be done, it's the how and who that sometimes gets in the way of progress. What we have is a wide range of jurisdictions and interest groups and multiple species of salmon. What we don't have is easy answers. Many issues are still unresolved.

How Much are the Ratepayers Able and Willing to Pay?

Dams were built for many purposes. For example, water behind a dam can be used to produce electricity or to irrigate crops. How many fish are lost when water is held to keep boat ramps afloat? How many are lost when spring flows are held back to control floods? What about managing the river for barge traffic? Ratepayers are not supposed to pay for fish losses caused by all these other uses of hydroelectric dams.

Some fish biologists believe that the Columbia cannot tolerate a continuing decline in fish runs at any price. Yet when it comes to increasing fish runs, and how far to go, there are financial limits.

The Program represents "the largest effort at biological restoration in the world in terms of annual dollar inputs."² The Council estimates that the Program could end up costing as much as \$1 billion.

²Kai Lee, Northwest Power Planning Council member, 1985

Currently fish and wildlife costs each man, woman and child in the region between \$15 and \$20 per year. According to the Council, this represents about 4 percent of an average electric bill.

Bonneville must balance its fish and wildlife duties with its other duties to provide adequate and economical electricity and still be able to meet its obligations to the U.S. Treasury.

Revenue shortfalls related to declining oil and gas prices and a slump in the Northwest's economy in recent years have brought a new reality to decisions about how much Bonneville ratepayers can be expected to contribute in the future and at what pace.

Bonneville — Balancing Interests

Bonneville must balance eager proposals from the fish and wildlife agencies and the tribes, on one hand, and Northwest ratepayers, on the other hand, who must foot the bill. In this role, Bonneville has been described as something like an investor, with an eye toward a fair return — in terms of fish.

As the Program has grown, so has the need for hard evidence that each measure that the Council passes on to Bonneville relates to a specific biological goal and represents the most effective way to reach that goal.

According to the Act, Bonneville ratepayers should shoulder the financial burden only for damage caused by Federal hydro development in the Columbia River Basin. Not for overharvest. Not for industrial or agricultural pollution.

It's true Bonneville does fund a number of projects not directly connected to dams, for a few simple reasons. Bonneville cannot dismantle dams or drain reservoirs that have flooded spawning sites. It can, however, offset damage done by federal dams by, for example, improving spawning grounds elsewhere.

But the Act says that the Program is to add to, not replace, funding for fish projects that are the responsibility of other groups. Other groups cannot pass on their expenses to ratepayers.

How Do We Rebuild Fish Runs?

How should we rebuild fish runs? Should we release more hatchery fish or concentrate on boosting the numbers of wild fish?

Those living in the upper reaches of the Columbia River applaud the idea of rebuilding wild runs. Several towns in eastern Washington and Idaho have built their economy around a



healthy sport fishery. Indian tribes who live in those areas have complained of the loss of their treaty rights to salmon.

Putting More Fish in the Rivers. Bonneville is now working to open up or rehabilitate 1,000 miles of stream to increase natural production of salmon and steelhead and to put one-ninth of the Basin's habitat back into production. The Council estimates that this could increase the numbers of adult salmon and steelhead by about 500,000 a year.

But rebuilding habitat can be risky, considering all the manmade and natural hazards that lie between the outmigrating fingerling and the adult fish returning upstream. And the projected life span of habitat projects tends to be relatively short. They are subject to destructive floods every 20 years or so.

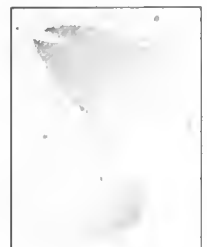
Producing More at the Hatcheries. Some argue, "Why not replace wild fish with hatchery fish?"

Since the first hatchery was built in 1877, many fish managers have thought building hatcheries near the mouth of the Columbia was the best way to maintain salmon numbers: More fish could be produced. They could be more easily managed. And there would be fewer hazards.

As a result, the Columbia now holds 54 hatcheries and 40 satellite rearing facilities for salmon and steelhead. Altogether, they produce an estimated 80 percent of the 2.5 million salmon and steelhead that return to the Columbia River each year.

Ratepayers should shoulder the financial burden only for fish harmed by hydro development.

Steelhead in the reservoir below McNary Dam
(Washington Public Power Supply System)



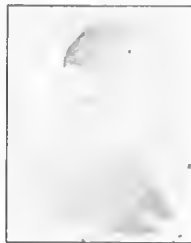
Yet some scientists fear that hatchery fish are not nearly as adept at survival as wild fish. In the wild, only the fittest survive. Wild fish pass on their proven resilience by breeding with other well-adapted individuals. For any species, its ability to adapt determines whether it will survive whatever nature — or man — throws at it.

Biologists are also concerned about timing hatchery releases with wild runs. When a particular stock of fish is ready to migrate, the hatchery will release all of them — several thousand — in a matter of a few hours. This sudden influx of hungry mouths can destroy the natural balance existing in the river. The hatchery fish compete with wild fish for food and can overwhelm them through sheer numbers.

Separating Fish Stocks. Fish managers have another concern. One estimate shows that more than half of the Columbia's naturally spawning chinook are caught by commercial fishermen off the Pacific coast between Alaska and northern California. When vessels troll for fish, they do not discriminate between the few wild fish and the plentiful hatchery stocks. Harvest levels are based in part on the number of hatchery fish available. As a result, naturally spawning salmon have been overharvested.

Some biologists call for limiting catches. Others are looking for ways to separate wild from hatchery fish.

Despite the problems, hatcheries have become indispensable to the Columbia River fishery. While wild salmon were losing habitat, more hatcheries were being built and more



Studying salmon diseases to increase the number of hatchery fish.

Newly hatched salmon, Leavenworth National Fish Hatchery, Washington (U.S. Fish & Wildlife Service)

hatchery fish were being released. And biologists often depend on using hatchery fish to stock reopened habitat until a new run can establish itself.

However, investments in steel and concrete must be balanced with investments in research. The simple fact remains that sturdier stocks, relatively free of disease, will mean a greater number of adult fish coming back up the river.

Under the Program, new hatcheries will have master plans. The plans offer an organized way to make sure dollars invested in hatcheries will be a good investment in fish.

The plans show that we now know that increasing the numbers of hatchery — and wild — fish is not enough. We have to get fish past the dams. And we have to regulate harvest more wisely.

How Do We Get The Fish Out To Sea?

Since salmon and steelhead migrate from shallow streams to the ocean and back to complete their life cycle, much of Program's emphasis is on getting fish safely past the dams. Improving fish ladders for adult salmon is not especially controversial. But getting young fish past the dams and out to sea is another matter.

One way is to increase water flow through the reservoirs when the fish need it most. Each spring, from April 15 to June 15, some 60 million young salmon and steelhead migrate out to sea. Reservoirs are deep and slow, quite unlike the fast-running river of old. Fishery managers use a "water budget" to move fish down the river more quickly.

Water that might have been used to generate power at other times of the year — when it could get a better price — is stored and released in the spring to speed young fish toward the ocean. In dry years, Bonneville could lose as much as \$60 million dollars to meet the needs of fish. In years of heavy snowpack and bountiful runoff the water budget will cost much less.

The Program has called on the Corps of Engineers to install new fish screens and bypass systems to steer young fish away from the potentially deadly turbines at the dams. Until screens are installed, the Program has directed operators of unscreened dams to spill water when a substantial number of fish reach the dam.

There is another way to help young salmon past the dams: collect them upstream and physically transport them, by truck or barge, to release points below Bonneville Dam.



What method works best? Again, opinions vary on this important question. In the meantime, the Program includes a combination of water budget, spill, transportation and dam-site construction as the relative merits of these projects get tested and sorted out.

Splitting Up The Salmon Runs: Who Gets How Much?

Salmon spawned in one state often are captured in the rivers of another state or in the ocean waters of another country. One study showed that almost three out of four of the Columbia's upriver chinook are caught by Canadian and Alaskan fishermen. Likewise, salmon from British Columbia's Fraser River often end up in the nets of U.S. fishermen.

The U.S. and Canadian governments signed a Pacific Salmon Treaty in 1985 that begins to address that particular slice of the harvest issue. Fish management groups such as the Northern Pacific Fishery Management Council and Pacific Fishery Management Council have tried to allocate ocean catches. But the fundamental problem remains.

Why should one group invest in fish enhancement projects that end up enriching another group? Indian fishermen, commercial fishermen and sport fishermen are each anxious to preserve and enhance their share of the wealth.

According to one business news letter, the commercial salmon fishing industry pumps upwards of \$700 million into the Northwest economy each year, and sport fishermen contribute even more. Fishing is big business.

Over the years, tribes have filed many lawsuits to preserve their treaty rights to take fish "at all the usual and accustomed places" on the Columbia and its tributaries. In one major case, called U.S. vs. Oregon (as with a separate case in Washington), the court awarded the tribes up to 50 percent of the Columbia salmon and steelhead harvest. The lawsuit participants are now working on a new five-year plan to manage Columbia river fish. But questions remain.

Toward A Brighter Future

How can we ensure the salmon's survival and allow a fair share of fish for all? Most would agree that restrictions on harvest are necessary, but who will be the first to give up part of their share? Will the fish saved by one group only end up in the nets of another?

In spite of the problems, Bonneville, the Council and the other players are firmly com-



In the end it will be all citizens of the region who decide how much they are willing to sacrifice for the future of fish.

Brook trout wait in a pool below a barrier
(Montana Department of Fish, Wildlife & Parks)



mitted to rebuilding fish populations in the Columbia River. In addition to the salmon and steelhead runs under discussion here, upriver stocks of non-migratory fish are influenced by the operation of dams, as are birds and game animals whose habitat has been changed. The Program has an effect on their future. And it will have effects as well on human habitat and what it means to live in the Northwest.

The Act in its first few years has brought various interest groups together and provided, at its best, a kind of synergistic momentum toward improving fish runs. It is important to maintain this momentum, to resolve the big issues and to prevent the renewed effort for fish from lapsing toward inertia and bureaucratic squabbling.

Bonneville and others in the power business are now cast in the role of advocates of fish, still searching for the best way to carry out their duties under the Act.

Their dollars have laid a new foundation. The first cornerstone projects are underway. The recent returns of salmon have given us a hopeful signal of what tomorrow may bring.

But tough questions remain. In the end it will be all citizens of the region who decide how hard they are willing to work to build a future for the Columbia's fish.

For More Information

Other brochures. For more information on how plans are made and where the money goes, ask for:

Enhancing our Fish and Wildlife Resources.

An overview of over 100 Bonneville projects designed to protect salmon, steelhead and other game fish and improve habitat throughout the Columbia Basin. 16 pages.

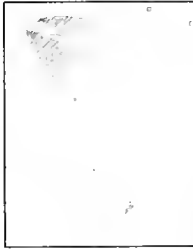
Fish and Wildlife Annual Project Summary.

Individual summaries of each of the fish and wildlife projects Bonneville has funded each year with a map showing the location of those projects. 60 pages.

For a copy of either document, call Bonneville's toll-free document request line: 800-841-5867 in Oregon, 800-624-9495 in other western states. You will reach a recording. Give your name, address and the name of the document(s) you want.

For a Presentation. Bonneville has speakers available to talk to your organization about Bonneville's fish and wildlife effort. To arrange a presentation, contact the Division of Fish and Wildlife or your nearest Bonneville Area or District office.

Other information. For general questions contact your nearest Bonneville Area or District Office, the Bonneville Division of Fish and Wildlife, or the Bonneville Public Involvement Office. Bonneville maintains a mailing list of people who want to keep abreast of the agency's fish and wildlife activities. If you want to be on that list, contact the Bonneville Division of Fish and Wildlife at the number listed.



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P.O. Box 3621
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(503) 230-4981

Bonneville Public Involvement Office
P.O. Box 12999
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(503) 230-3478
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Bonneville Area and District Offices:

Portland (503) 230-4552
Eugene (503) 687-6952
Seattle (206) 442-4130
Spokane (509) 456-2515
Missoula (406) 329-3060
Wenatchee (509) 662-4377
Walla Walla (509) 522-6226
Idaho Falls (208) 523-2706
Boise (208) 334-9137
Washington, D.C. (202) 252-5640

Council information. For more information on the Northwest Power Planning Council or a copy of the Columbia Basin Fish and Wildlife Program, contact:

Northwest Power Planning Council
850 SW Broadway, Suite 1100
Portland, Oregon 97205
(503) 222-5161
1-800-452-2324 (toll free in Oregon)
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