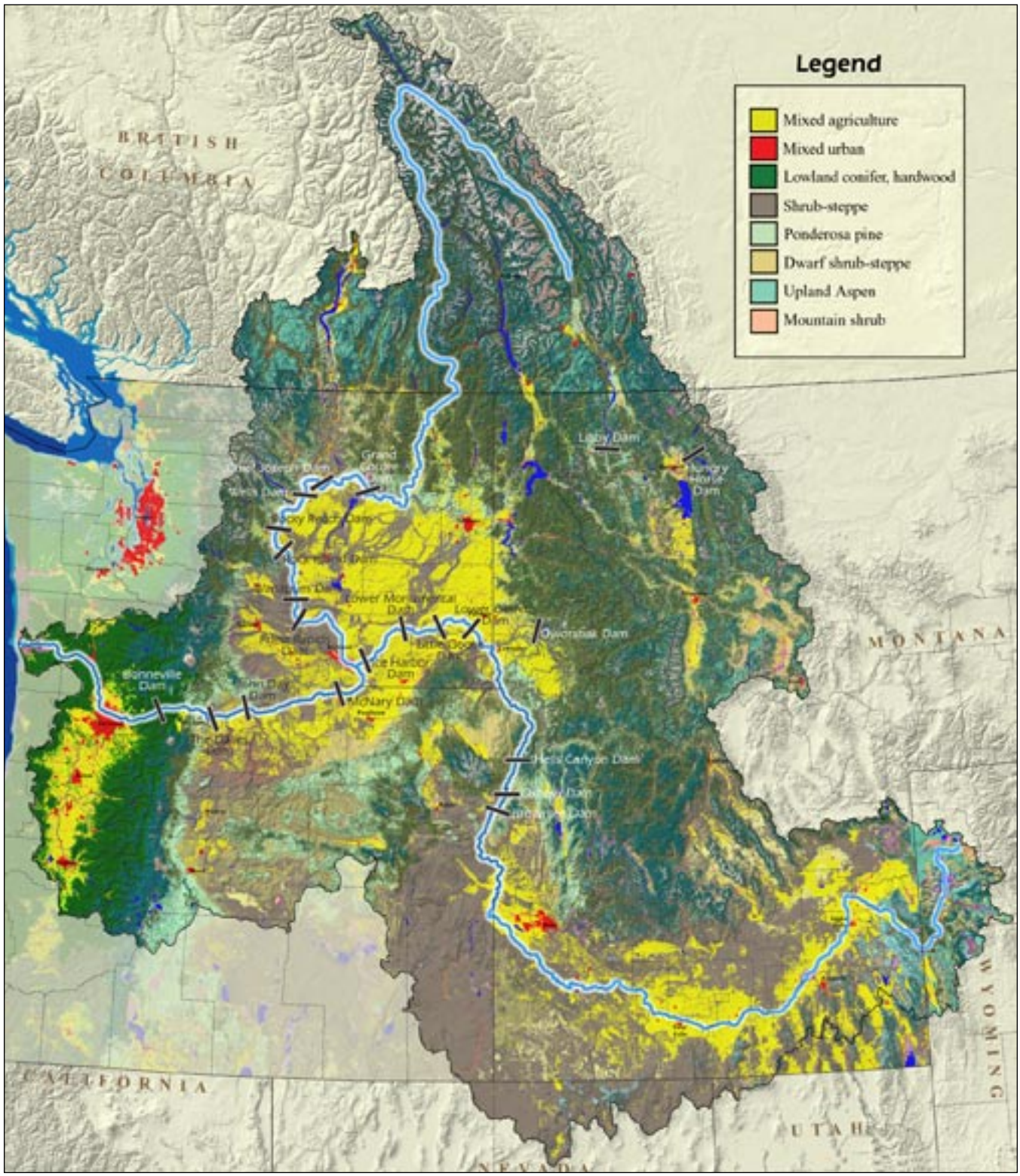
NORTHWEST POWER AND CONSERVATION COUNCIL

COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM

Twenty Years of Progress

The Columbia River Basin



The Columbia and Snake rivers shown on this map are significant to the Council's fish and wildlife program and have been highlighted for illustrative purposes.


The nation's largest regional effort
to protect and enhance
our natural resources.

Introduction

The Columbia River Basin Fish and Wildlife Program is unique in the nation. The Northwest Power and Conservation Council (known until 2003 as the Northwest Power Planning Council) created the program in November 1982 in response to direction in the Northwest Power Act of 1980, the law that authorized the states of Idaho, Montana, Oregon and Washington to create the Council. The Act directs the Council to mitigate the impacts of Columbia River Basin hydropower dams on fish and wildlife by protecting and enhancing the affected species and their habitat, including the mainstem of the Columbia River and its major tributaries.

The fish and wildlife program establishes goals, objectives and strategies for mitigation. Projects that implement the program are vetted through the Independent Scientific Review Panel and the Columbia Basin Fish and Wildlife Authority, as well as the Council itself. Following these reviews, the Council recommends projects to the Bonneville Power Administration, which provides funding.

Since 1982, funding for the Council's direct program, which does not include the cost of installing fish passage facilities at the major hydropower dams on the Columbia and Snake rivers, amounts to about $1.16 billion. Bonneville also spent $1.03 billion on fixed expenses, which primarily is debt service on federal bonds issued to pay for capital investments at the dams, and $634 million to reimburse the federal Treasury for the power share of other federal agency efforts to protect, mitigate and enhance fish and wildlife affected by hydropower, primarily to improve fish passage at the federal dams and construct and operate federal hatcheries. Power purchases ($2.31 billion) and forgone revenues ($1.29 billion) and other lesser expenditures bring the total since 1982 to $6.45 billion (see Figure 1).

> ***Council Fact:***
>
> *Impressive numbers of adult salmon and steelhead have been returning to the Columbia River Basin in recent years.*

Impressive numbers of adult salmon and steelhead have been returning to the Columbia River Basin in recent years. While no single factor can be credited for the increased run sizes, improved ocean conditions likely are one cause. Ocean conditions today are similar to conditions in the

Figure 1. BPA Fish and Wildlife Cumulative Expenditures 1978-2002

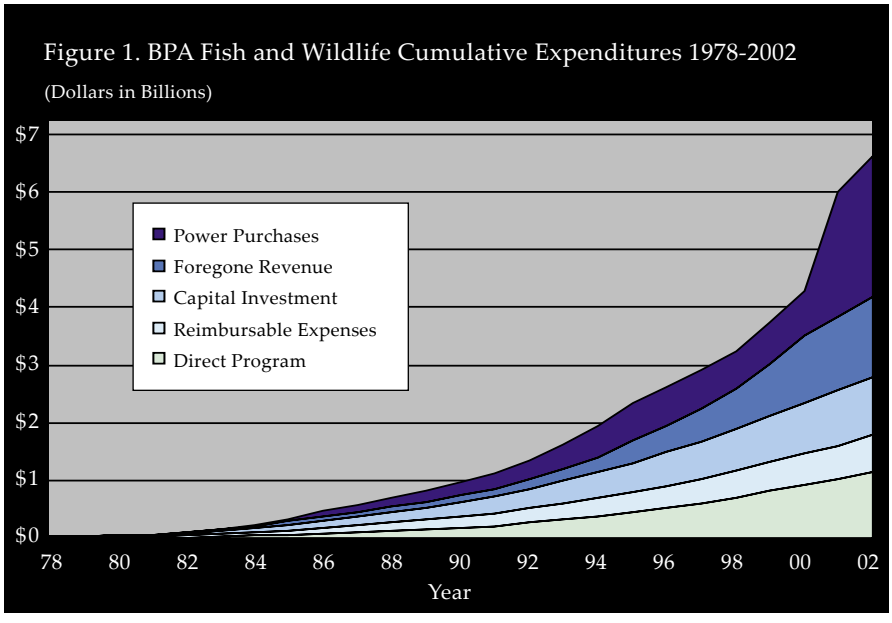


Figure 2. Adult Salmon and Steelhead Counts at Bonneville Dam on the Columbia River, 1938-2003

(Fish in Thousands)

1950s, which was a period of cool water temperatures in the north Pacific. But salmon and steelhead returns today are far higher than in the 1950s. Other factors, then, such as the habitat, hatchery and hydropower improvements accomplished through the Council's program, likely also are contributing to the increased success.

Beginning in 2000, above-average returns of salmon to the river were sustained for three years in a row, setting records in 2001 for many different salmon species. In 2003, tribal fishers were allowed to set gillnets in the river during the summer run of chinook salmon for the first time in 38 years. The higher returns have been a boon for recreational fishing as well: In 2001, an estimated 176,000 angler trips were recorded for the run of spring chinook.

The Columbia River Basin Fish and Wildlife Program contributes to rebuilding fish and wildlife populations in each of the four broad areas of impact — the so-called Four Hs: hydropower, habitat, hatcheries and harvest. Here is a brief look at the Council's efforts in these areas.

Photo: U.S. Fish and Wildlife Service

Dams created reservoirs that inundated thousands of acres of mule deer habitat. Through the program, habitat is purchased to mitigate the losses.

Hydropower

The fish and wildlife program initiated improvements in fish passage at dams including increased flows to help juvenile fish migrate between the dams, construction of juvenile fish bypass facilities at the dams and a coordinated program of spilling water over dams for the benefit of fish that don't go through bypass facilities.

To boost flows between the dams, the 1982 program created the water budget, which is an amount of water reserved in upriver storage reservoirs in winter and then released in the spring and early summer to help boost river flows at the time when juvenile salmon and steelhead are migrating to the ocean. In subsequent revisions of the program, the Council increased the size of the water budget from its initial 3.45 million acre-feet to about 12 million acre-feet, when that amount of water is available. The current federal biological opinions establish flow standards that accomplish the same purpose as the water budget. The average is between six million and eight million acre-feet per year.

> ***Council Fact:***
>
> *The program causes water to be stored in winter and released in the spring to boost flows between the dams when juvenile salmon and steelhead are migrating to the ocean.*

The 1982 program also called for installation of juvenile fish bypass facilities at the mainstem dams and for water spills at the dams to pass juvenile fish while the facilities were under construction. In 1984 the Council amended the program to call on the U.S. Army Corps of Engineers, the federal agency that owns and operates the dams, to develop coordinated interim juvenile fish passage plans, including spill, while it developed solutions to fish passage problems at five dams on the lower Snake and Columbia rivers. In later years the

Photo: Bonneville Power Administration

Fish ladders like this one at John Day Dam help adult salmon, steelhead and other anadromous fish return upriver to spawn.

Council established standards for fish passage efficiency and fish survival at the dams through the use of mechanical bypass facilities and spill. The current version of the program, amended in 2003 with specific recommendations for the mainstem dams, calls for dam-by-dam studies to determine the most efficient level of bypass spill in order to maximize passage efficiency and fish survival and preserve water for hydropower generation when it is not needed for spill.

Photo: Lyle Gilbreath

Fish ladders were crowded with record and near-record returns of adult salmon and steelhead at Bonneville Dam during the fall of 2003.

Juvenile fish bypass facilities have been improved or installed at seven of the eight dams on the lower Snake and Columbia rivers.

These bypass facilities and other measures have improved the survival of juvenile fish to the point that survival today is as high, or higher, through the eight dams than it was in the 1960s when only four dams were in place, according to NOAA Fisheries. Only The Dalles Dam does not have screens or a bypass system, but its ice and trash sluiceway has been used effectively for juvenile fish passage, and screens and a bypass system are being designed. Screens and bypass systems have been studied or tested at the five mid-Columbia dams owned by public utility districts.

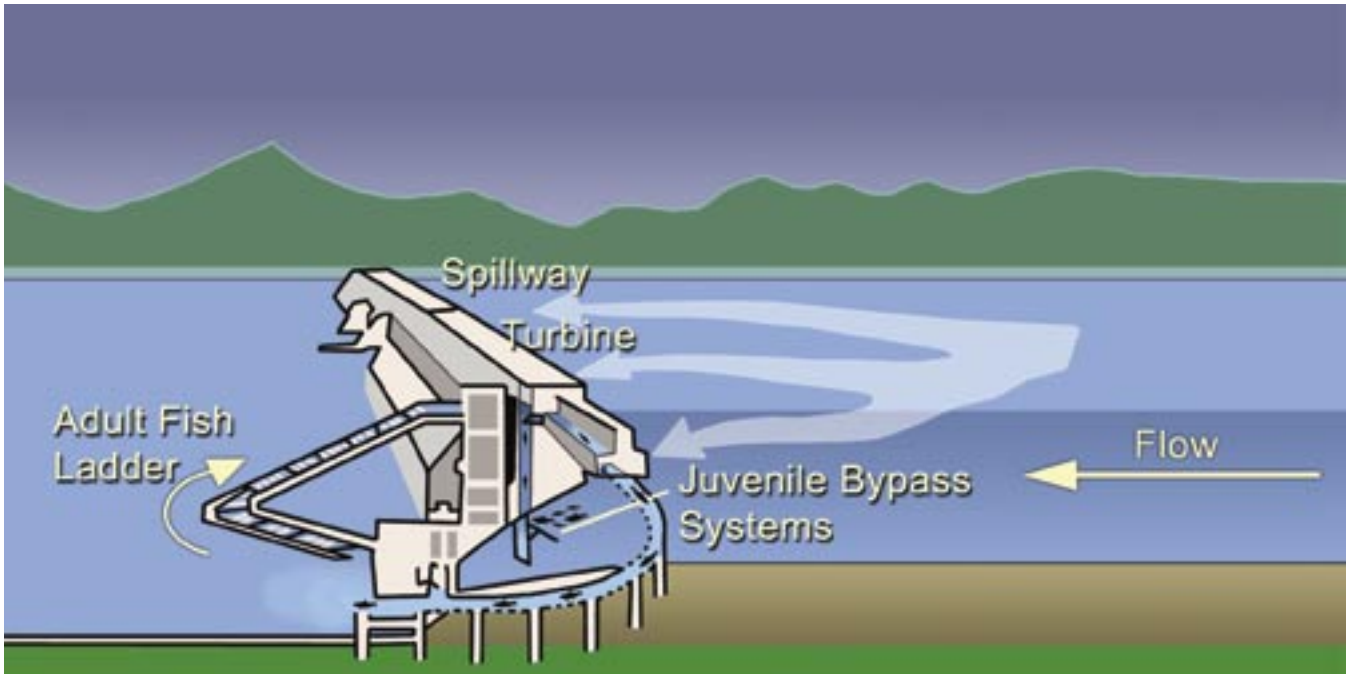
Recently, surface bypass technology, which means passing fish over a dam close to the surface of the river rather than forcing the fish to dive 40 feet or so to the level of the spillway, has been tested at Lower Granite Dam and will be tested at Bonneville Dam. This technology has promise for passing juvenile fish effectively with less water than spillway passage.

The program also provided funding for efforts to reduce predation on salmon and steelhead. Reservoirs behind dams provide ideal breeding habitat for predator fish such as northern pikeminnow. The program funded a multi-year project that successfully reduced pikeminnow populations through a bounty reward fishery. The program also funded an effort to reduce predation by birds, particularly Caspian terns in the Columbia River estuary.

The program recognizes that dam operations also affect resident fish (these do not migrate to the ocean) and wildlife.

Through the program, the Council directed the Corps of Engineers, which operates Libby Dam, and the Bureau of Reclamation, which operates Hungry Horse Dam, to provide habitat conditions in the reservoirs above the dams and the rivers below them that are necessary to restore populations of native fish to self-sustaining levels capable of supporting harvest. Both dams are in Montana, where there are no salmon. These dam operations include improving the seasonal pattern and stability of river discharges and reservoir conditions. The Council also directed the Bureau to operate Grand Coulee Dam in a manner that provides conditions necessary to protect spawning and rearing habitat for fish in and adjacent to Lake Roosevelt in order to build fish populations to levels capable of supporting harvest consistent with the goals of the Spokane and Colville tribes. The program includes other measures to protect and enhance resident fish and wildlife affected by the construction and operation of dams elsewhere in the Columbia River Basin and also recognizes that for some species, such as waterfowl, the creation of reservoirs and the inundation of shoreline areas increased wildlife habitat.

Expenditures in the mainstem Columbia and Snake rivers, not including fish passage facilities, lost hydropower income and power purchases in response to river operations to protect fish, such as spill, total more than $200 million since 1982.



This diagram shows how salmon and steelhead pass dams on the mainstem Columbia and Snake rivers.

Juvenile fish migrating downstream can pass over the spillway, through the turbines or via bypass facilities. Because turbine passage is the most lethal, screens are installed in front of the turbine entrances to deflect juvenile fish into the bypass facilities, which channel the fish safely around the dam. Adult fish are attracted to the falling water of the ladder. They climb up the ladder — like a gently inclining, water-filled stairway — and over the dam.

Habitat

The program recognizes that improved fish passage at dams is not sufficient by itself to restore fish and wildlife populations. Habitat improvements are needed, too.

This work includes installing screens at irrigation pumps and water diversions to deflect juvenile fish, revegetating streamsides in areas where fish spawn and rear, and purchasing land or easements as habitat for both fish and wildlife. Since 1982 more than 1,000 water diversions have been screened. Some of these diversions were screened for the first time.

Council Fact:

Through the program, habitat is acquired and set aside for the benefit of fish and wildlife.

At others aging screens were replaced. Hundreds of miles of streamside habitat have been fenced, revegetated and, where appropriate, recontoured and reconstructed to improve conditions for fish — both anadromous and resident.

Wildlife species ranging from birds to mammals to amphibians also were affected by the dams. Through the program, the Council identified wildlife losses due to construction of the dams and then called upon the region's fish and wildlife managers to use the losses as a starting point for wildlife mitigation agreements and measures. The program provides for substitute habitat away from the dams and reservoirs by setting aside and protecting land that is home to ecological communities

Photo: U.S. Fish and Wildlife Service

The program has funded the acquisition of thousands of acres of elk habitat, much of it as winter range near rivers.

similar to those that were affected by the dams. Through the program, 371,431 acres have been acquired, either through outright purchase or the purchase of easements, and set aside as wildlife habitat and managed by states and Indian tribes.

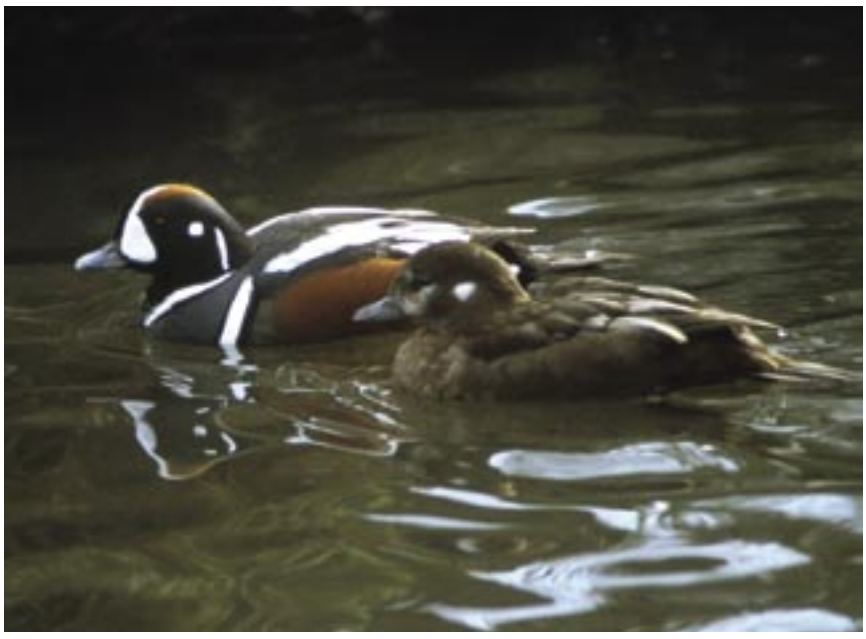
Also through the program, in 1989 the Council protected 44,000 miles of stream habitat from future hydropower development. The Federal Energy Regulatory Commission is required by law to account for these protected areas in determining whether to issue licenses for new hydropower dams.

Habitat and watershed expenditures through the program since 1982 total more than $450 million.

Photo: Kootenai Tribe of Idaho

Through the Council's program, the Kootenai Tribe of Idaho is working to rebuild white sturgeon populations in the Kootenai River.

Photo: U.S. Fish and Wildlife Service



Harlequin ducks benefit from habitat acquisitions through the program.

Hatcheries

Beginning in 1982 the program initiated extensive efforts to boost artificial production of salmon and steelhead, primarily through the experimental technique of supplementation, which means incubating fish in the protective environment of hatcheries, acclimating them to conditions they will face in the wild, and then releasing them into streams and rivers to rebuild naturally spawning populations. Although still being evaluated by the scientific community, supplementation is thought by many to help rebuild genetically distinct populations of fish and increase the diversity of life history types and species in order to sustain a system of populations in the face of environmental variation. This includes intensive rescue efforts for the weakest runs, such as Snake River sockeye salmon, which are raised to adulthood and spawned in the protective hatchery environment. The progeny of these few fish then are released into tributary lakes to attempt to re-establish naturally spawning populations. Supplementation techniques also include raising fish to release into streams to rebuild naturally spawning runs where none exists currently. There are major supplementation facilities for salmon and steelhead funded by Bonneville through the Council's program in Columbia and Snake river tributaries in Washington, Oregon and Idaho.

> ***Council Fact:***
>
> *The Council protected 44,000 miles of stream habitat from future hydroelectric development.*

In areas now blocked to salmon and steelhead passage, the program also initiated and continues to fund extensive hatchery production of non-ocean, or resident, species such as trout and kokanee to replace losses of these fish and also losses of salmon and steelhead.

The program directs the construction and operation of fish hatcheries to 1) complement habitat improvements by supplementing native fish populations up to the sustainable carrying capacity of the habitat with fish that are as similar as possible in genetics and behavior to wild native fish; and 2) replace lost salmon and steelhead in blocked areas. This is a shift in artificial production philosophy from traditional hatchery practices, which focused on replacing salmon and steelhead lost to construction of dams with sufficient numbers of

Photo: Bonneville Power Administration

The program supports changes in traditional hatchery practices so that fish are raised in a more natural environment, like this raceway painted in camouflage colors.

fish to supply commercial fisheries in the lower Columbia River. But the program does not discount the importance of fisheries. In fact, the Council is required by the Northwest Power Act to include measures in the program that complement the existing and future activities of the region's fish and wildlife agencies and Indian tribes, and these entities certainly have an interest in fisheries.

To this end, the program recognizes the value of hatchery production for the purpose of supporting fisheries — throughout the Columbia Basin, not just in the lower river. To reconcile these sometimes competing objectives — rebuilding naturally spawning runs and also providing fish for harvest — the program initiated a thorough review of artificial production at the request of Congress. A panel of experts appointed by the Council worked with the region's fish managers to identify and review the purposes of all fish hatcheries in the Columbia River Basin and suggest operational changes consistent with the goals and objectives of the fish managers for rebuilding runs, providing fish for harvest and preserving the genetic integrity of wild and naturally spawning fish. The Artificial Production Review and Evaluation was completed in September 2003.

The program also directs substantial investment toward propagating and rebuilding resident fish populations using native fish species, particularly in areas where dams blocked anadromous fish passage. In this way, resident fish are substituted for the lost anadromous populations. Resident fish substitution also includes providing an alternate source of harvest, such as a hatchery stock.

Artificial production expenditures through the program since 1982 total more than $350 million.

Photo: Barry Kovish

The goal of the program for salmon and steelhead is to increase the number of fish that spawn in the wild.

Harvest

While salmon and steelhead harvests are regulated by state fish and wildlife agencies and the federal court, the Council has addressed the impacts of harvest on weak salmon and steelhead populations. The Council proposed that harvest be reduced in order to protect weak stocks, which mix with more abundant stocks in the Columbia River.

Photo: Bonneville Power Administration

The program supports Indian fishing rights in the Columbia River. These tribal members are celebrating their catch in the reservoir behind Bonneville Dam.

To protect these stocks from overharvest and to provide fisheries at the same time, the program directs funding to an experimental program in the lower Columbia River in which salmon are raised in net pens in bays and sloughs. The fish are released from the pens and return to the bays and sloughs as adults, where they are harvested. This reduces fishing pressure in the main Columbia River, allowing the more depleted stocks to pass by on their way to spawning areas upstream. The program also paid for experiments with innovative gill nets designed to capture salmon and steelhead but not kill them. In this way, fishers can identify and release the protected, naturally spawning stocks and keep the more abundant hatchery fish.

In the future the program will address conflicts between harvest and fish conservation through subbasin plans, which will identify the purposes of artificial production programs and wildlife mitigation efforts and recommend harvest policies consistent with goals and objectives of the fish and wildlife agencies and Indian tribes and also account for the ecological carrying capacity of habitat within the subbasins.

Harvest-related expenditures through the program since 1982 total more than $35 million.

Photo: U.S. Army Corps of Engineers

Below Bonneville Dam, recreational fishers were almost shoulder to shoulder in the spring of 2003, when one of the largest spring chinook runs on record returned from the ocean.

Research

While the heart of the program is a set of actions to improve conditions for fish and wildlife, the program also recognizes that these efforts are based on scientific knowledge that is imperfect. Thus, the program directs funding toward improving scientific knowledge through research, monitoring and evaluation.

The program emphasizes monitoring and evaluation of project implementation to ensure that the effects of the actions are measured and analyzed. The results of this monitoring and evaluation will help the Council select the best projects to implement the program in the future.

Data management also is important. By investing in improved data management, the program supports the research, monitoring, and evaluation strategies by making the results readily available. Improved data management also will enhance public accountability of the program by making the results accessible not only to specialists, but also to the public at large.

Research and evaluation expenditures through the program since 1982 total more than $200 million.

Photo: Montana Department of Fish, Wildlife & Parks

Important shoreline habitat for bears was flooded by the construction and operation of dams and is replaced through acquisitions funded through the program.

An open, public process

The Council's fish and wildlife program is the region's program. The Council's process is open to all interested parties. Decisions are made in public, and public comments are crucial in helping the Council shape the program.

Through the planning and implementing of the program, diverse interests from around the Columbia River Basin, from local landowners to state and federal agencies and Indian tribes, have the opportunity to identify and address problems affecting fish and wildlife and to build a mitigation program that is consistent with goals and legal requirements for production, harvest and restoration. By addressing the impacts of hydropower on all fish and wildlife of the basin, the program incorporates actions that benefit both Endangered Species Act-listed and nonlisted fish and wildlife.

Fish and wildlife recovery can be a contentious undertaking, but the collaborative nature of the Council's program development and implementation brings potential litigants to the same table and provides the opportunity to work through areas of disagreement in an open, public process. The result is a scientifically credible mitigation effort that enjoys broad political and public support and is unique in the nation.

Photo: David Jensen

The Columbia River Gorge about 40 miles east of Portland, with Mount Adams in the distance.

Northwest Power and Conservation Council

November 2003

Photo: Rich Iwasaki

Seated left to right: Tom Karier, council vice chair, Washington and Judi Danielson, council chair, Idaho.
Standing left to right: Ed Bartlett, Montana; Melinda Eden, Oregon; John Hines, Montana; Frank L. (Larry) Cassidy, Jr., Washington; Jim Kempton, Idaho and Gene Derfler, Oregon.

Credits

Front and Back Cover Photos: David Jensen. Snake River at Robertson Ridge in Hells Canyon

Inset Cover Photo: Barry Kovish

Page 2: David Jensen, Grande Ronde River, Washington

Page 5: David Jensen, Sumac and Imnaha River

Page 11: Josh Kling, Sandy River

Twenty Years of Progress: 20th Anniversary Review of the Columbia River Basin Fish and Wildlife Program, Council Document 2003-20

Produced by the Public Affairs Division of the Northwest Power and Conservation Council, November 2003.

Meeting the Needs of People
Protecting Our Natural Heritage

Northwest Power and Conservation Council

851 S.W. Sixth Avenue
Suite 1100
Portland, Oregon 97204
Telephone: 503-222-5161
Toll free: 800-452-5161
Web site: www.nwcouncil.org
Council Document 2003-20