



US Army Corps
of Engineers
North Pacific Division

Salmon Passage Notes

Snake and Columbia River Fish Programs

September 1992

Hatchery vs. Wild Salmon

Lewis and Clark opened the eyes of the nation to vast economic opportunities in the Northwest. In their journals they recorded seeing awesome numbers of salmon, and noted the ways in which they were being utilized and even worshipped by the Native Americans. Soon the fish did not belong to the natives alone. Fishing had become big business for new settlers.

Commercial and sport fisheries were established and a new industry—salmon canning—entered the picture in 1866. By the mid-1880's regional leaders were becoming concerned about the threat overfishing posed to continued runs.

In 1894, an Oregon Fish and Game publication stated, "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."

In 1887, Congress directed the Corps of Engineers to investigate the condition of the salmon fisheries of the Columbia. In its 1888 report to Congress, the Corps noted "an enormous reduction in the numbers of spawning-fish, brought about through this fishing industry." A thriving gillnet industry, fish-wheels and other harvesting techniques were severely depleting the fish runs. At their peak, fish-wheels alone harvested more than one million pounds of salmon per year. Also cited as a factor in fish run reductions was "...stream pollution."

The report concluded "...enough is known to show that hatcheries and a weekly closed season should be established without delay."

By the time construction began on Bonneville Dam in 1933, the extent of depletion of the runs was not yet known. When Bonneville was completed in 1938, its built-in fish ladders went into operation and more accurate counting of returning adult salmon became possible. The region was shocked to learn just how greatly the runs, once estimated between 11 to 16 million strong, had been decimated. Fewer than one-half million salmon passed over Bonneville in that first year of operation.

More than 100 years after the first alarms were raised, the threats to the Northwest salmon runs continue. Today the blame is shared by dams, habitat destruction, navigation, irrigation, the fishing industry—commercial, sport and tribal--and the general encroachments of civilization. Even hatcheries, created to increase fish populations, are considered by some to be harming the remaining wild fish runs.

The first Oregon hatchery was built on the Clackamas River in 1877 by a commercial canning group to increase the numbers of fish available for harvest. State and federal interests took over fish propagation in 1890. Their goal was still to produce more fish to support commercial fisheries. By 1900, 15 Washington hatcheries augmented existing fisheries. In more recent times, facilities were built to mitigate for losses caused by construction or other environmental changes resulting from development.

Today, there are some 64 hatcheries and 29 satellite facilities raising salmon and steelhead for release in the Columbia system. Production is approaching 200 million fish annually and supports the bulk of the total annual adult production of 2.5 to 3 million salmon and steelhead. According to U. S. Fish and Wildlife Service estimates (1987), hatchery fish comprise over 95 percent of the coho, 70 percent of the spring chinook, about 80 percent of the summer chinook, over 50 percent of the fall chinook, and about 70 percent of the steelhead produced in the basin.

State and federal hatcheries are authorized primarily under provisions of the Mitchell Act (Public Law 75-502), enacted on May 11, 1938, and amended in 1946, and the Lower Snake River Fish and Wildlife Compensation Plan. The Mitchell Act originally funded lower Columbia River hatcheries to offset, or in response to, changes related to construction of Bonneville and Grand Coulee dams and other human activities adversely affecting fish. The Lower Snake River Fish and Wildlife Compensation Plan was authorized by the Water Resources Development Act of 1976 to mitigate impacts to fish and wildlife attributed to

construction of the four lower Snake River locks and dams. Among other things, the Plan called for the Corps of Engineers to construct 10 chinook salmon and steelhead hatcheries in Idaho, Oregon and Washington. Costs of these hatcheries are being repaid to the U. S. Treasury, with interest, from revenues collected from sales of electricity generated at federal hydro-projects.

Production from Plan hatcheries is designed to return 58,700 spring/summer chinook, 55,100 steelhead and 18,300 fall chinook to the impacted area. The Clearwater Fish Hatchery in Idaho, the final and largest hatchery constructed under the Plan, has been completed and was dedicated August 22.

Another major hatchery constructed by the Corps to provide mitigation for a specific project is Dworshak National Fish Hatchery in Idaho. Construction of Dworshak Dam and Reservoir blocked the migration path of North Fork Clearwater River steelhead.

Though the Corps constructed a number of hatcheries in the Northwest it does not operate or manage any of them. State and most federal hatcheries are managed and operated by the Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game, and the Washington departments of Fisheries and Wildlife. States receive operating funds for the federal hatcheries through the National Marine Fisheries and U. S. Fish and Wildlife services. USFWS also operates 13 hatcheries in the basin.

Today the benefits of hatchery production are being questioned. Opponents say "inferior" hatchery fish are further reducing wild runs, by competing for food, spreading disease and creating harvest opportunities in which wild fish are taken along with the hatchery fish (mixed harvest).

There is also a question whether hatchery fish are as genetically equipped for survival as wild stocks that have gone through a natural selection process. Unlike wild fish who have had time to become stream smart, hatchery fish are new to the natural environment when released, and must immediately learn to fear predators and deal with other threats

Hatchery continued...

and dangers of the wild. Often they have only one chance to learn to fear and escape a predator.

Another concern is that wild (natural) fish are taken for hatchery brood stock, reducing natural production and--depending on management practices--affecting the genetic integrity of both groups.

A higher percentage of wild fish do survive to maturity from the migratory juvenile (smolt) stage to adult. Survival from egg to smolt, however, is higher for hatchery fish because of the care taken of the eggs. Generally, hatcheries produce more returning adults per spawning female than do wild populations because more eggs survive to the juvenile stage.

On the plus side, more commercial and sports catches are possible because hatchery fish are in the equation. Wild fish alone would not support the industry. Recreational opportunities mean enjoyment for residents and tourist dollars for the region.

Some charge that harvests of mixed fisheries (wild and hatchery) are depleting wild fish. Harvest levels based on total fish, they contend, make quotas too high. Because the percentage of returning hatchery fish is higher than the percentage of wild fish, critics argue that a greater number of wild fish are taken than is reasonable to assure their survival.

For example, to sustain a hypothetical run of 4,000 hatchery fish and 1,000 wild fish, a return of 500 spawning adults in each category would be needed. If a 75 percent harvest were authorized, there would still be 1,000 hatchery adults after the harvest, but only 250 wild adults--half the number needed to sustain the wild population.

Today, hatchery and harvest management criteria are changing to address many of those issues. Endangered Species Act listings and the wild-versus-hatchery conflict have the region analyzing where the hatchery program has been, where it is going, and whether or not it is meeting identified goals.

“Often they have only one chance to learn to fear and escape a predator.”

Phase three of the Northwest Power Planning Council’s Columbia River Basin Fish and Wildlife Program amendment process is

seeking to address a number of issues, including fish production, both in the wild and in hatcheries, and improvement of spawning and rearing habitat.

The use of native stocks in hatchery programs has increased and greater emphasis is placed on retaining, as much as possible, the genetic characteristics of the stock from which the broodstock was obtained. Avoided are practices that would result in selective breeding or inbreeding. The goal is to mimic the genetic diversity of existing natural runs.

There are three basic hatchery operational concepts. In the first, fish are reared in the hatchery and then released into a the stream that feeds the hatchery. Fish handled in this way will return to the hatchery to spawn.

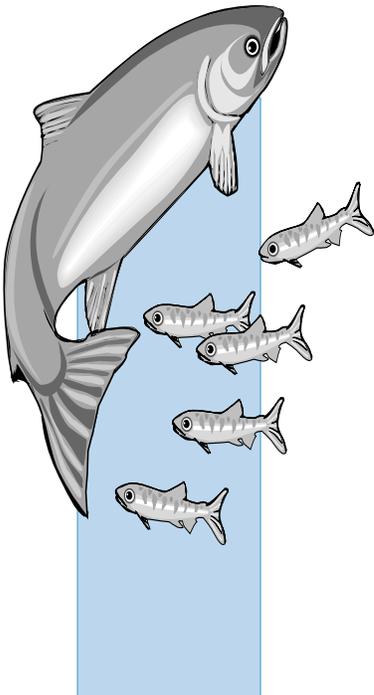
Another practice is called supplementation where the intent is to increase depressed naturally-producing stocks. Hatchery fish are “outplanted” at specific locations or river reaches where enhancement is needed. Rather than returning to the hatchery, adults return to the selected habitat areas to spawn naturally.

The third concept involves hatchery satellites or acclimation ponds at selected locations where a fishery is desired or where stream conditions are more favorable when the fish return as adults. Fish from hatcheries are moved to a satellite or acclimation pond and released. As adults, these fish will return to the satellite or pond to spawn. Eggs from these fish are taken to the hatchery to produce the next generation.

The reasons for building hatcheries and the way they are managed have evolved as the human population has grown and resource needs have changed. The debate over the performance of hatcheries and their future role is far from over. The next few years are likely to be the most important period in the history of salmon resource development in the Columbia River Basin. Though hatcheries are not the total solution, they may be part of the solution.

Fisheries experts expect efforts to integrate natural and artificial production into a comprehensive fish production program will continue and even intensify. Fishery managers will also need to take a broader view and consider the unique management problems posed by domestic and international fisheries outside the Basin. A more focused and intensive research effort and application of results is needed to improve the control of fish diseases, reduce mainstem mortality and increase hatchery and wild production. There is also a need for increased sharing of expertise and coordination between all hatchery managers--Washington, Oregon, Idaho and federal--so all will be working under similar guidelines and toward common and regional goals.

Editor’s note: This article was adapted from an original article submitted by Dawn Edwards of Portland District’s Public Affairs Office.



Special Interests File Suits

Industry and environmental groups have filed lawsuits claiming that, in implementing the 1992 plan for operating the Columbia River system, the National Marine Fisheries Service, Bonneville Power Administration, Corps of Engineers, Bureau of Reclamation, and other involved federal agencies did not satisfy the comprehensive assessment and consultation requirements of the Endangered Species Act.

Environmental and fishery groups, represented by the Seattle-based Sierra Club Legal Defense Fund, allege that the government did not alter 1992 hydropower operations of the Columbia system sufficiently to assure survival of threatened and endangered salmon.

In addition, they say NMFS and the federal operating agencies used a “biologically and legally unsound concept of ‘jeopardy’” and limited their consultation to a single year of river operations rather than considering long-term effects on the listed species.

Industry and user groups also filed claims saying that the 1992 plan relies too heavily on augmenting stream flows to improve salmon survival and that the NMFS is failing to adequately protect Snake River salmon by not limiting harvest and other activities that adversely affect their survival.

The Pacific Northwest Generating Cooperative, a group of 29 rural electric cooperatives with 750,000 customers in eight Western states, seeks, among other things, an injunction requiring consultation on activities likely to affect the listed salmon species to include the effects of harvest regulations, habitat management and hatchery practices.

Another group, Direct Service Industries, consisting of aluminum, titanium and chemical manufacturers in Oregon, Washington and Montana, filed a similar suit seeking consultation on harvest, land management and hatchery operations.

The group also filed to intervene in the Sierra Club Legal Defense Fund suit. They contend that the decision to provide increased summer flows and additional spill, intended to flush young fish downstream, is not supported by the best scientific evidence available.

The Sierra Club Legal Defense Fund has also filed a notice of intent to sue the U. S. Forest Service claiming that it has failed to protect the habitat of the threatened chinook salmon on the Umatilla and Wallowa-Whitman national forests in Eastern Oregon and Washington.

And just before press time, still another Portland-based group, the Public Power Council, which represents consumer-owned utilities in the Northwest, filed a lawsuit claiming the government has not done enough to protect threatened and endangered salmon and challenging the consultation process as it relates to salmon harvest,

habitat and hatcheries.

We in the Corps would much rather the litigants, instead of suing, would have continued to work with the involved agencies and the region in fashioning a balanced and regionally acceptable solution to the salmon problem.

Now that the litigation has begun, there likely will be more suits and countersuits which can only hinder, not help, the salmon-recovery process.

Study Update

Public Meetings Held

In July, the Corps held a series of public meetings across the region to inform the public of some of our actions and studies for improving salmon migration conditions. Topics discussed in the presentation/workshop forums included: preliminary results of the March drawdown test of Lower Granite and Little Goose reservoirs; the Corps' intent to prepare a supplement to the 1992 Options Analysis Environmental Impact Statement (EIS); and, the alternatives to be evaluated under the System Configuration Study (SCS).

The meetings were well attended. We heard a number of concerns from the public about costs of measures to modify dams and system operation, equitable distribution of the sacrifices that may be necessary to improve salmon survival, and the importance of determining the biological effectiveness of the various alternatives before pursuing costly changes. The Corps was able to share some preliminary conceptual designs for SCS alternatives and to present slides of the drawdown test.

System Configuration Study and Drawdown

The SCS phase one reconnaissance level study efforts are underway at the Walla Walla, Portland, and Seattle Districts. An interim report will be available in December for review by the Northwest Power Planning Council and the public.

The draft report of findings of the March test drawdown of Lower Granite reservoir is expected to be completed in early fall and available for public review. Our April *Salmon Passage Notes* reported it would be out in June. That date proved to be unrealistic given the enormous quantities of physical and environmental data that were collected and the number of various agencies and contractors that were (and are) involved in the test and data analysis.

Delays have occurred as a result of complications in data analysis. Dramatic changes in Snake River flows due to spill tests that were conducted during the drawdown complicated analysis of water quality and water velocity and other data. Additional efforts in analyzing this data will result in a more accurate understanding of the effects of drawdown on dissolved gas supersaturation, water velocity, resident fish and other test objectives.

Supplemental EIS

The Corps is producing a Supplemental EIS to address the operation of the Federal Columbia River Power System for 1993 and future years. In January the Corps released the final 1992 Columbia River Salmon Flow Measures Options Analysis EIS. That document analyzed effects of various alternative operation changes and water management options for 1992 operations, for dams and reservoirs on the lower Columbia and Snake rivers, to improve salmon migration conditions.

The Corps is preparing the Supplemental EIS with Bonneville Power Administration, Bureau of Reclamation and the National Marine Fisheries Service (NMFS) as cooperating agencies.

It will address water management activities for 1993 and future years until results of several ongoing

studies including SCS, System Operation Review and the salmon recovery plan to be issued by NMFS may be incorporated into a longterm water management plan. A draft of the Supplemental EIS will be available for public review in late October. A series of public meetings will follow.

Meetings and Reports Information

We will keep you posted as further information becomes available on public meeting times and locations. To be placed on a mailing list for a specific report, call 509-522-6944 and leave your name and address, and the report you are interested in.

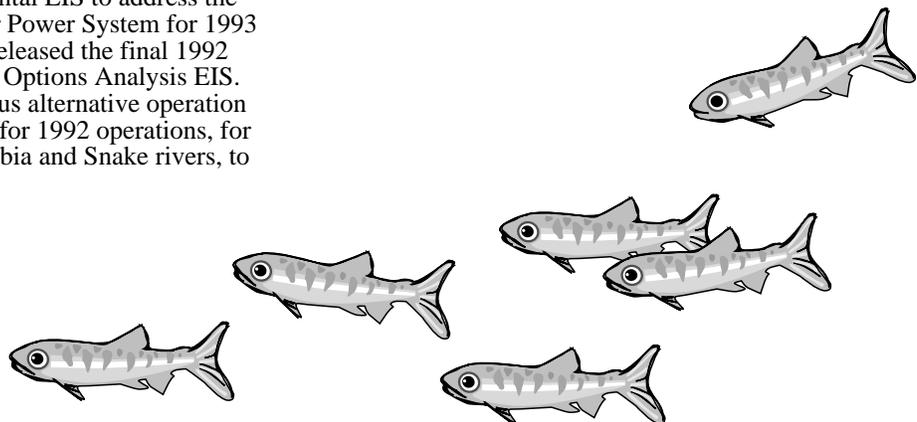
System Operation Review

The Columbia River System Operation Review (SOR) team has announced a series of public meetings in September to obtain public input on ten strategies being considered for full-scale analysis under that study. The SOR is a joint effort by the Corps, Bonneville Power Administration, and the Bureau of Reclamation to review multipurpose management of the Columbia River System and provide a strategy for system operation. For more information call the SOR Interagency Team at 1-800-622-4519 (230-3478 in Portland), or write to P.O. Box 2988, Portland, OR 97208-2988.

Fish Transport Tally

As of September 10, 1992, over 17.5 million juvenile salmon have been collected at Lower Granite, Little Goose and McNary dams and transported to below Bonneville Dam where they are returned to the river to complete their migration to the ocean on their own.

Though numbers of migrating fish get smaller toward the end of the migration season, the fishery agencies are calling for continued transport through the end of October at Lower Granite and Little Goose and through the end of December at McNary as some of the stragglers may be either threatened chinook or endangered sockeye salmon.



Corps to Present Research Results

The Corps of Engineers is holding its annual meeting to present research results of the Fish Passage Development and Evaluation Program (FPDEP).

The meeting will be held October 26 from 8:30 a.m. to 4 p.m. at the Portland District building, Robert Duncan Plaza, 333 SW 1st, 3rd floor Conference Center. The public is invited to attend.

The FPDEP has developed and coordinated biological and engineering research to improve anadromous fish passage activities at Corps dams since 1952. Research has resulted in refinements to adult fish passage facilities, development of the juvenile fish transportation program, and development of existing or planned juvenile fish bypass facilities at all eight of the Corps' lower Columbia and Snake river projects.

Current research includes studies of the condition of transported chinook, effectiveness of longer fish screens in diverting juveniles away from turbines, adult fish migration and project passage on the lower Snake River, juvenile fish passage survival, improved fish guidance efficiency (FGE) of bypass systems and improved fish transportation methods.

FPDEP study leaders will report on the status and results to date of research on the following topics. A question and answer period will follow each presentation.

1. Tests of prototype extended-length juvenile fish screens at McNary dam.
2. Underwater video observations of fish response to the McNary extended-length screens, standard-length screens and vertical barrier screens.
3. Evaluations of technologies for non-lethal measurement of fish guidance efficiency (FGE).
4. Evaluation of the new juvenile bypass system at Lower Monumental dam.
5. Evaluate Bacterial Kidney Disease levels in transported chinook salmon.
6. Evaluation of transport: Tongue Point release site study.
7. Improved fish collection, handling, and transportation techniques; scale analyses.
8. Evaluation of collection, holding, and transport facilities.

9. Evaluate factors affecting chinook salmon FGE.

10. Bonneville first powerhouse survival and project survival assessment

11. Bonneville first powerhouse FGE determination.

12. Adult fish migration on the lower Snake River (radio-tracking).

13. Adult fish passage evaluations at Little Goose and Lower Granite dams (electronic tunnels and radio-tracking studies).

FOR MORE INFORMATION contact: Rudd Turner, 503-326-3829, or John Ferguson, 503-326-6482.

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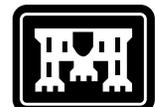
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