



US Army Corps
of Engineers
North Pacific Division

Salmon Passage Notes

Snake and Columbia River Fish Programs

July 1994

EMERGENCY SPILL PROGRAM FOR FISH

In an effort to increase the survival of listed juvenile Snake River spring/summer chinook salmon, the National Marine Fisheries Service requested the Corps to begin spilling water for fish at all eight of its lower Columbia and Snake River dams. The May 9 request went beyond spill measures in the 1993 and 1994-98 Biological Opinions.

Juvenile salmon that have been rearing in upstream areas for a year or so, migrate in the spring and summer months past the dams to the ocean, where they will live for 2 to 4 years. The fish traverse the dams by a number of means. Juveniles that are deflected away from turbine intakes by submerged screens, go through a bypass channel and are either released back into the river or collected and transported downriver via barge or truck.

Those that are not deflected at the intakes go through the turbines. When water is spilled over the spillways instead of through the turbines, the juvenile fish are diverted away from the turbine intake areas and over the spillway.

Passage over the spillways is considered to be one of the lowest mortality options for getting the fish past dams. However, spill has its own associated risks

to the fish because spilling water entrains nitrogen gas when the water plunges deep into the spillway basins. When the gas concentration gets too high, it can result in "gas bubble trauma" caused by air bubbles forming in the fishes' circulatory systems. Gas bubble trauma can harm juveniles and adult salmon returning upriver to spawn. Dissolved gas introduced by spill tends to accumulate in the river as it flows past each dam that is spilling.

The federal agencies have been spilling certain amounts of water for fish every year since a long-term Spill Agreement was signed by Bonneville Power Administration, the fisheries agencies and Tribes, and others in the region in 1989. But it has been Corps policy (as stated in the annual Fish Passage Plan) to try to keep gas supersaturation levels to less than 110 percent, the level set by Oregon and Washington state water quality standards.

With the NMFS request for more spill, Oregon and Washington granted temporary waivers of their standards, within certain limits, not to exceed 120 percent gas saturation. The waivers required monitoring of the effects on juvenile and adult salmon.

On May 27 NMFS called for a one-third decrease in spill, out of concern over the high incidence of gas bubble signs observed during internal examination of migrating juvenile hatchery steelhead.

The emergency spill program started May 10 and ended June 20. The program was very controversial. Some argued that the risk of gas bubble trauma for juveniles and adults was too great, especially considering the low adult returns (20,132 spring chinook were counted at Bonneville Dam as compared to a ten-year average of 86,933) and historic information on the effects of high levels of spill and nitrogen supersaturation. Others said that the low adult returns dictated that everything possible be tried to assist juveniles downriver and that the effects of supersaturation were overstated.

What do we know about the effects of the emergency spill so far? Although there was a high incidence of gas bubble signs in hatchery steelhead that were examined internally, the significance of this on ultimate survival of the fish that traveled in-river versus those that were transported in barges or trucks remains uncertain. The spill program was not pre-planned to include collection of research data to estimate adult fish return rates.

A panel of spill experts was convened by NMFS June 21-22 to review the biological data concerning dissolved gas effects on fish. Their report has been released to the public. Although there is a lot of uncertainty concerning the potential biological effects, the report states:

The panel believes the existing standard of 110 percent will adequately protect fish on purely biological grounds. Effects above 110 percent are uncertain but in the direction of damage. More recent reviews suggest that more stringent levels of TDG [total dissolved gas] are advisable for full protection. Further development of information for gas supersaturation criteria is needed for detailed balancing of TDG conditions and availability of water for outmigration. [Report and Recommendations, Panel on Gas Bubble Disease, NMFS, pg. 7]

The panel's review and other information is currently being assessed by the states and federal agencies in order to determine a spill plan for the summer outmigration of juvenile salmon.



The scene at all eight lower Snake and Columbia river dams was similar to this one at John Day during an emergency spill program ordered by the National Marine Fisheries Service in May.

CORPS/NMFS HEAR COMMENTS AT REGIONAL PUBLIC MEETINGS

The Corps and the National Marine Fisheries Service held a series of public meetings throughout the region in May. The meetings provided information and an opportunity for public comment on Columbia River System Configuration Study (SCS) Phase I results and on the Lower Snake River Biological Drawdown Test Draft Environmental Impact Statement (DEIS).

The SCS examines physical changes that can be made to the Corps' eight lower Columbia and Snake River dams to improve salmon migration conditions at the dams. Phase I of the study provides preliminary estimates of cost, scheduling, technical feasibility, and environmental, economic and social effects of various alternatives; Phase II will provide further analysis of the most promising alternatives. (Please see the April 1994 Salmon Passage Notes for additional information.)

At the public meetings, the Corps and NMFS provided a panel of technical experts to help field questions from the audience concerning the biological drawdown test options. The Northwest Power Planning Council attended to listen in on public reaction to both studies.

One measure addressed in the SCS Phase I report that piqued interest from many who testified at the meetings was the concept of surface collection of juvenile fish at the dams. Such a system would collect or deflect migrating juvenile salmon within 30 to 50 feet of the water's surface, closer to where the juveniles typically travel. Screened bypass systems now in place collect the fish after they have sounded some 70 to 100 feet below the surface to the turbine intake area—an experience that some biologists believe may delay or stress the migrants.

A number of people at the meetings wanted to see emphasis on improving the Juvenile Fish Transportation Program. Many said that there should be more emphasis on harvest control.

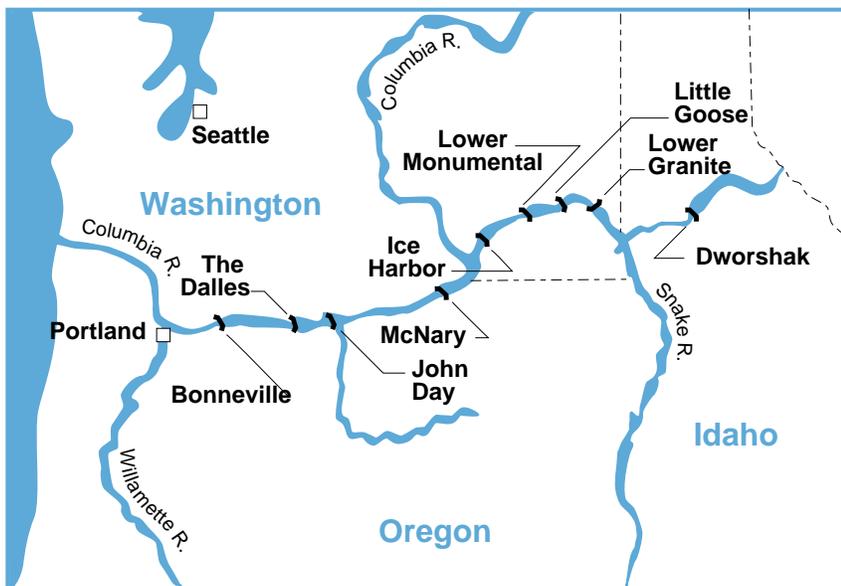
Where To From Here?

The comment period on the biological drawdown test EIS closed June 13. The Corps and NMFS expect a final EIS by the end of the year, with a decision on whether and what kind of testing will occur. Several factors are weighing on the decision.

First, can a test as now designed provide useful information on whether salmon survival is aided by reservoir drawdown? If ongoing NMFS baseline survival studies show significant reservoir-related mortality occurs in salmon smolts under non-drawdown circumstances, then a drawdown test may provide information on whether drawdowns can reduce reservoir mortality. However, if the NMFS studies show low reservoir mortality under normal reservoir operation, then a one-reservoir drawdown test may not be able to demonstrate improved survival. Preliminary results of the baseline study in 1994, expected to be available by late summer, will therefore be an important factor in final decisions.

Another factor is how successful will the gatewell fish removal system be. A prototype tank system to remove juvenile fish from the gatewells during drawdown testing is currently being evaluated. The preferred alternative in the DEIS incorporates this type of system.

In response to several requests, the comment period on the SCS Phase I was extended to July 15. The process for deciding which alternatives to take into further study under Phase II will include consideration of public comment, Northwest Power Planning Council recommendations and its rule-making process on mainstem survival measures, and NMFS input concerning Endangered Species Act considerations, including Recovery Team Recommendations. The final Phase I report is expected by September. In the meantime the Corps is proceeding on the development of a plan of action to test surface collection and continuing advance planning and design of a John Day Minimum Operation Pool operation.



The draft EIS for a biological drawdown test of one or more of the four lower Snake River projects was jointly prepared by NMFS and the Corps. The primary purpose of such a test would be to collect biological data on the effects of drawdown on juvenile salmon during migration.

Another public comment repeatedly made in the meetings was to scrap the biological drawdown test. Most people were either not in favor of drawdowns at all, including any drawdown tests, or they were in favor of bypassing a test and going straight to a permanent drawdown condition.

RECOVERY TEAM SUBMITS RECOMMENDATIONS

A team composed of respected fisheries biologists and other disciplines, chaired by Dr. Donald Bevan of the University of Washington, has submitted its final recommendations for a comprehensive recovery plan for listed salmon runs to the National Marine Fisheries Service.

The recommendations were provided to NMFS in mid-June following extensive regional peer review. The Recovery Team's recommendations will be considered by NMFS for inclusion in a NMFS proposed Recovery Plan to be circulated for regional review and comments later this year. Some major recommendations of the Recovery Team are:

- *Put NMFS in control of listed and non-listed Columbia and Snake River salmon and steelhead.*
- *Appoint a five-member Salmon Oversight Committee to advise NMFS and oversee their recovery efforts.*
- *Improve efforts to restore and protect critical spawning and rearing habitat.*
- *Improve and continue the juvenile transportation program as long as it continues to be safer for juvenile salmon than in-river migration.*
- *Continue to look at ways to modify the dams and improve screens, bypass systems and fish ladders to improve survival of both juveniles and adults migrating through the system.*
- *Look at the possibility of capturing returning adults—particularly ones that are impaired by sickness or injury—and transporting them to spawning areas or taking their spawn artificially. “Each adult is priceless,” says Bevan.*
- *Buy out fishers to eliminate gill-net fishing in the Columbia River and reduce sport and commercial ocean salmon fishing.*
- *Limit hatchery production to reduce environmental and genetic impacts on wild salmon.*
- *Expand the captive-breeding program for Snake River sockeye.*
- *Continue to evaluate drawdown of Snake River reservoirs.*
- *Release more water for flow augmentation in summer, and a little less in spring, to aid migrating fall chinook.*

Bevan briefed the Northwest Power Planning Council on the salmon recovery plan recommendations June 22. Introducing the plan, he pointed out that “You shouldn’t be too optimistic that we’ll see things turn around in the next few years.”

“There are two major things that we have not been able to change: conditions in the ocean and the continued drought in the Snake River Basin,” Bevan added, referring to the warming El Nino currents

in the Pacific Ocean and a decade of below-normal precipitation. He said both have seriously jeopardized the salmon.

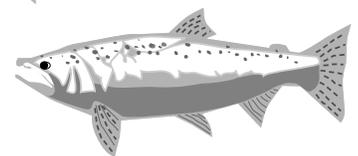
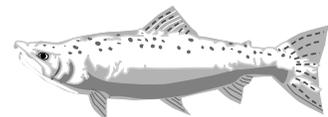
Though we can’t do anything about nature, we can try to do something about human-caused problems, he said. He pointed out that there is a lot we don’t know. For example—the water budget. “Is it important? Yes. Do we know how best to use it? Well,...no,” Bevan said.

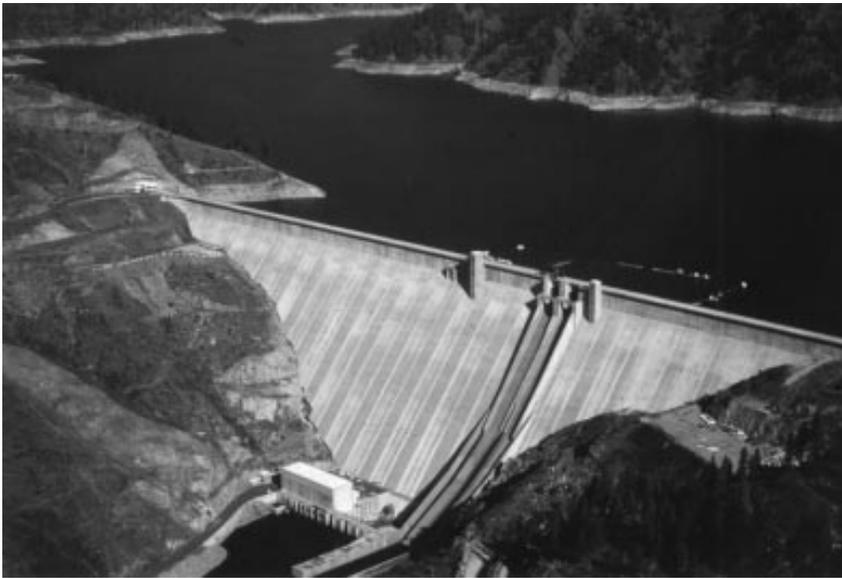
Bevan also had an answer for critics who say the plan doesn’t call for drastic changes in dam operations. “Those who say that it’s just perpetuating the status quo haven’t read the plan,” he remarked.

When asked about the chances that NMFS would adopt the plan intact, Bevan indicated that the agency’s review conclusions so far were compatible with the Recovery Team’s and that he expected the plan to suffer only minor changes. “NMFS has assured me that if they make changes, they will back them with science,” he said. NMFS economists will put a price tag on all of the recommendations, he added.

Bevan was somewhat critical of this spring’s so-called emergency spill program. Indicating that NMFS had not consulted with the Recovery Team on the spill program, he said that it “...wasn’t designed as an experiment. Had it been, there would have been pit tags in barges and in the river.” [Marking salmon so they could be tracked and identified when they return as adults would have helped compare survival rates of transported fish to spilled fish. —ed]

Bevan was also critical of the Corps of Engineers for not moving quickly enough to install pit tag monitors at all its dams. “I think they are finally getting the message,” he said, referring to recent efforts of the Bonneville Power Administration and the Corps to accelerate design and identify funding to accomplish this needed installation.





Dworshak Reservoir level is expected to drop 110 feet below full pool in order for the federal operating agencies to meet a National Marine Fisheries Service request for higher Snake River flows in July to help juvenile fall chinook.

NMFS REQUEST FOR MORE WATER WILL LOWER DWORSHAK RESERVOIR

On June 9, the Corps, Bonneville Power Administration and Bureau of Reclamation received a written request from NMFS to provide more water to help juvenile fall chinook salmon migrate downriver. NMFS is expecting the largest number of young fall chinook salmon to migrate down the Snake River since 1982, due to the number of adults (742) that returned to spawn last year.

To meet the 40 to 45 thousand cubic feet per second (kcfs) flow NMFS is requesting for the lower Snake River during July, it will likely be necessary to draft Dworshak Reservoir in Idaho to an elevation of about 1,490 feet mean sea level by the end of July. (The Corps had planned to operate Dworshak at no lower than 1,520 feet.) Full pool is at elevation 1,600 feet.

The NMFS Biological Opinion for 1994 calls for flows of 50 kcfs in the lower Snake River between June 21 and July 31. But snowpack and precipitation amounts have been low this year, and flows in the river are expected to average only 38 kcfs throughout most of July without additional flow augmentation water.

At elevation 1,490, only two boat ramps out of five in the reservoir are operable, and these are at the dam and require long backdowns. There would also be more pronounced adverse effects on cultural resources, resident fish, wildlife and water quality (gas supersaturation rates are expected to increase in the Clearwater River from water releases at Dworshak). The likelihood that Dworshak reservoir would refill to full next year is significantly diminished by the additional drafting.

NMFS believes the risks are worth the potential for improved survival for this year's expected strong outmigration of wild Snake River fall chinook juveniles.

The Columbia River will also be tapped for more water. The current forecast of 135 kcfs in July at McNary Dam is short of the 160 kcfs called for in the Biological Opinion. By taking additional water from non-treaty storage and reducing the amount pumped into Banks Lake, the federal agencies are hopeful that flow can be increased to a revised July target flow of 150 kcfs.

Should forecasts of flow rates continue to decline, more water may have to be taken from other reservoirs in order to support 150 kcfs at McNary.

OCEAN EFFECTS ON SALMON

The May/June issue of the Northwest Power Planning Council's Northwest Energy News has an article by John Harrison that will be of interest to some readers. We have received a number of inquiries about the effects of ocean conditions on salmon populations.

Northwest Energy News features an article on current research concerning ocean effects on fish. Apparently, the bony ridges on fish scales can be "read" like tree rings: when close together they indicate a year of slow growth, and when far apart, rapid growth. The abundance or scarcity of scales that accumulate in the ocean sediment add another clue to environmental conditions. In addition, good records of harvest numbers and fish scales are available back to 1910. Researchers can combine this information with weather records to form theories as to how fish populations respond to changes in atmospheric conditions.

One thing the research seems to indicate so far is that shifts in ocean temperature regimes can have profound effects for ocean dwellers. Researchers are studying effects of the change in ocean winds and currents since 1977 that accompanied shifts in the Northern Hemisphere's atmosphere and repeated "El Nino" ocean-warming events. The resulting warmer waters off the coasts of Oregon and Washington seem to have attracted warm water fish, including predator fish, far north of their usual waters.

Research from biologist William Percy of Oregon State University suggests that when ocean climates shift, upwelling of nutrient-rich cold water is slowed significantly. This means less food production near the surface where fish live.

Since the changes of 1977, salmon production on the coasts of California, Oregon and Washington has declined, while production has increased in Alaska.

The article quotes Ted Bottiger of the Council as reminding us that "we can't do anything about ocean conditions, and so we need to do whatever we can to address . . . [and] improve conditions in the freshwater habitat." Bob Francis, a researcher at University of Washington's School of Fisheries advises that managers must be aware of the potential effects of ocean conditions when making management decisions for other aspects of the salmon life-cycle.

For a copy of the May/June Northwest Energy News call the Council's Portland office at 503-222-5161.

FEDS' FISH EFFORTS: "STATUS QUO" SAYS DISTRICT COURT JUDGE MARSH

In a March 28, 1994 decision in the Oregon District Court, Judge Malcolm Marsh found fault with the federal process for the Biological Opinion on planned operation of the Federal Columbia River Power System for 1993. The Biological Opinion found that the operations proposed by the Bonneville Power Administration, Corps of Engineers and Bureau of Reclamation for the system would not jeopardize the continued existence of Snake River salmon species listed under the Endangered Species Act. These include the endangered Snake River sockeye salmon and the threatened spring/summer and fall chinook salmon species.

In summing up the judge said that "NMFS has clearly made an effort to create a rational, reasoned process for determining how the action agencies are doing in their efforts to save the listed salmon species. But the process is seriously, 'significantly,' flawed because it is too heavily geared towards a status quo that has allowed all forms of river activity to proceed in a deficit situation—that is, relatively small steps, minor improvements and adjustments—when the situation literally cries out for a major overhaul."

The Judge found that in making its "no jeopardy" determination National Marine Fisheries Service had acted arbitrarily and capriciously in choosing the 1986-1990 baseline period against which to measure whether expected results of future planned measures would help to stabilize or restore salmon runs. He said the agency failed to consider such influences as drought conditions and low run numbers of that period in establishing the baseline.

Also, Judge Marsh said that in using the results of various regional computer model runs to predict effects of the proposed operation on the stabilization of the species, NMFS failed to consider the "extinction vortex"—when fish numbers are so low that simply maintaining that number may constitute a continued threat to a species' existence.

Finally, the judge found the Endangered Species Act consultation process to be inadequate, particularly where it was not demonstrated that information submitted by state and Tribal agencies on the model results was adequately considered.

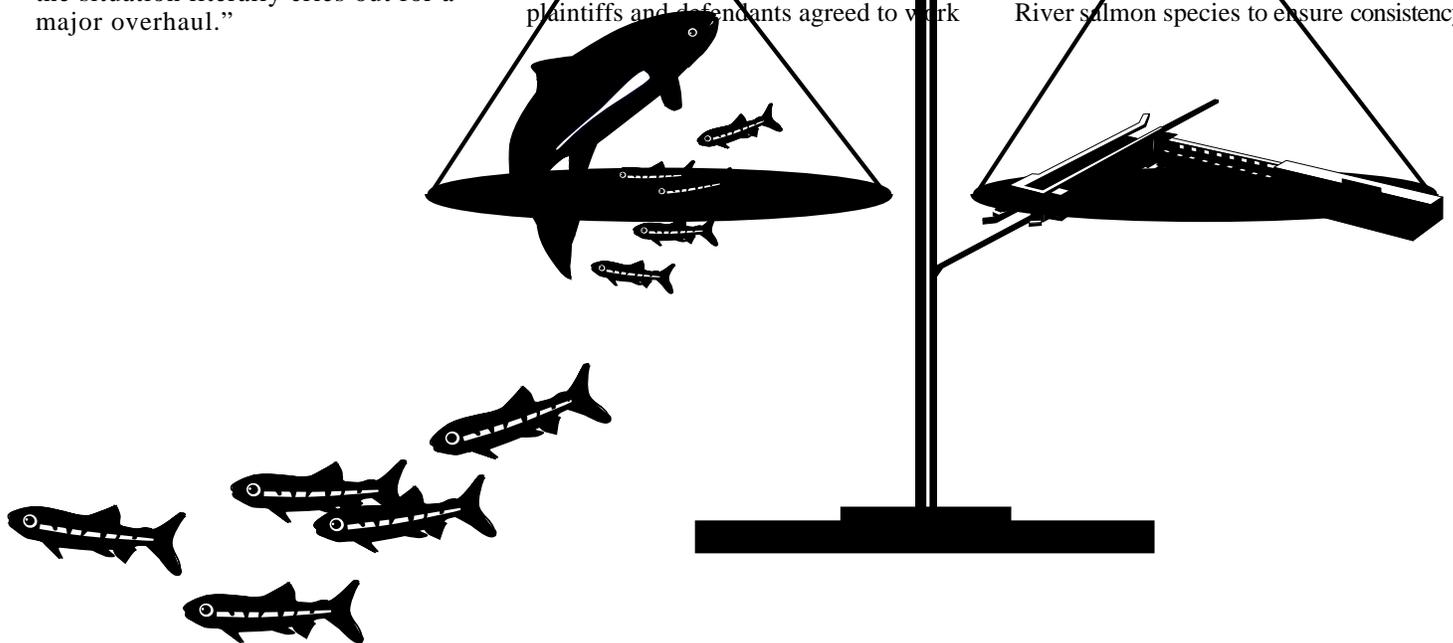
Since the 1993 season was over plaintiffs and defendants agreed to work

together to address the judge's findings for the Biological Opinion on 1994-98 proposed operations.

An ongoing series of discussions between the defendants and plaintiffs has resulted in the formation of a technical team to develop information for use by NMFS in considering a revised jeopardy standard, and another team to describe potential "reasonable and prudent" actions for the federal agencies to consider in the Section 7 consultation process. The teams will seek input from technical experts from all interested parties.

A June 27, 1994, report advised Judge Marsh of progress made and agreements reached in meetings with plaintiffs in the case. The agencies stated they have advised the Court that they will "work cooperatively with all of the other parties to this litigation, and particularly with the sovereign states and treaty Indian tribes, rather than appealing the judgment and continuing to litigate the issues raised in the case."

NMFS anticipates completing a new Biological Opinion by January 9, 1995. This effort will be coordinated with the NMFS Recovery Plan for listed Snake River salmon species to ensure consistency.



TRANSPORT PEER REVIEW RELEASED

In January 1994 NMFS and US Fish and Wildlife Service in cooperation with state fish and wildlife agencies and treaty Indian tribes convened an independent peer review panel to study the scientific issues of transportation of juvenile salmon around hydroelectric projects in the Columbia River Basin. "Transportation of Juvenile Salmonids from Hydroelectric Projects in the Columbia River Basin" was published May 1994.

The peer review was conducted to shed additional light on the continuing controversy over whether the transport program helps salmon survival. The review covers lower Snake River transportation of juvenile salmon and steelhead.

The review seems to reflect the same dichotomy of view that regional parties hold with regard to the helpfulness or hindrance of barge and truck transport for declining salmon and steelhead runs.

The report states in its "Conclusions" section that "As presently conceived and implemented, transportation is unlikely to halt or prevent continued decline and

extirpation of listed species of salmon in the Snake River Basin."

However, the report also concludes, with respect to the primary effects of transportation:

1) it is more probable than not that transportation acts to improve relative survival of certain species of juvenile salmon originating in the Snake River Basin under certain hydroelectric operational scenarios and flow regimes

2) transportation is likely to act to improve relative survival, to the point of transportation, for steelhead and to a lesser degree spring/summer chinook

3) there is insufficient information to determine whether transportation is or is not likely to act to improve the survivals of sub-yearling migrating fall chinook and sockeye salmon originating in the Snake River Basin

4) the flow and operational scenarios that often provide positive effects on relative survival of transported salmon are those associated with below average flow years with little or no spill; however when river flow conditions have been very unfavorable, survivals to adult of both transported and untransported salmon have been too low to measure.

The report finds that the evidence is

not sufficient to either discount or support transportation as a primary or supporting method for salmon recovery in the Snake River.

FOR NEXT ISSUE

A review of the article titled "Dammed Salmon" that appeared in the Portland Oregon publication "Willamette Week" intended for this issue will appear in the next issue of Salmon Passage Notes.

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