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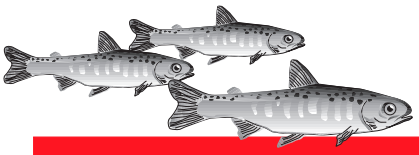
Walla Walla District

Lower Snake River Juvenile Salmon Migration Feasibility Study



JUNE 1998 NEWSLETTER NO. 3

The U.S. Army Corps of Engineers (Corps) is conducting a feasibility study of ways to improve juvenile salmon migration through the hydropower system on the lower Snake River. The study focuses on how the lower Snake River dams can be changed to improve survival and recovery prospects for Snake River salmon stocks listed under the Endangered Species Act.

Study Update

Pete Poolman is the Study Manager for the Lower Snake River Feasibility Study

Our challenges are significant. We are now more than a year into the study. Interest is building in the region, as we move closer to a 1999 recommendation on the best alternative action for configuration and operation of the Lower Snake River Projects. Our public involvement program is broadening in response to citizen concerns regarding the study. We have held six Roundtable Workshops, and have taken several regional economic workgroup meetings to affected communities. Public response to meetings in Lewiston, Clarkston, and the Tri-Cities has been impressive. Issues have been centered primarily around the economic effects of drawdown mitigation and the biological effectiveness of the study alternatives.

The Corps is coordinating daily with as many as five federal agencies, the affected tribes, and several state agencies on study process issues. The continuing dialogue is very encouraging as the region grapples with development of a decision process that will lead to a recommendation to improve juvenile salmon migration. The region has now seen initial results from the Plan for Analyzing and Testing Hypotheses (PATH) workgroup. Information from that workgroup continues to express the biological uncertainty associated with the effects of the alternative actions being considered. However, the process has helped us to better recognize the effects humans have on this lifecycle, the complexity of the salmon lifecycle, and the difficulties we will likely face in future decisions.

Engineering analysis is well under way. The Corps presented initial information on structural requirements for implementing drawdown in the lower Snake at a Roundtable Workshop in Portland, Oregon earlier this year. Results from this workshop are being refined and are scheduled to be wrapped up this fall. Testing of the prototype surface bypass collector (SBC) and behavioral guidance structure (BGS) is under way. Major system improvements and engineering, biological, water quality, sediment engineering, and economic analyses continue.

I wish to thank all the team members for their continued commitment to quality and perseverance in keeping the study on track and on schedule.

Join Us for the Next Roundtable Workshop

When: Wednesday, July 15, 1998
1-5 p.m.

Where: Boise, Idaho
Boise State University
Student Union Building
Jordan B. Ballroom

Featured Topics:

- Study Overview
- PATH Process/Salmon Modeling
- Flow Augmentation
- Economic Analysis

The public is invited to attend.

Regional Coordination Update

Coordination Efforts

In cooperation with the Bonneville Power Administration (BPA), the Bureau of Reclamation (BoR), and the Environmental Protection Agency (EPA), the Corps is working with the following groups to gather input and foster understanding:

- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- Northwest Power Planning Council
- Native American tribes
- State agencies in Washington, Oregon, and Idaho
- Stakeholders.

As part of its regional coordination efforts, the Corps has established a variety of technical workgroups to examine study issues from diverse perspectives. These workgroups and other briefings and meetings with interested parties are planned throughout the study process.

Roundtable Workshop Review

The March 18 Roundtable Workshop in Richland, Washington, featured an overview of the study process by Greg Graham, Corps Project Manager; a summary of the sedimentation analysis being conducted in conjunction with the feasibility study, by Gene Spangrude, Corps Hydrologic Engineer; a presentation of regional PATH preliminary findings for spring summer chinook salmon, by Chris Pinney, Corps Fishery Biologist (see page 4); and an overview of the surface bypass collection (SBC) structure and options, by Brayton Willis, Corps Project Manager for the SBC program.

This meeting was the sixth in a series of Regional Roundtable Workshops being sponsored by the Corps to ensure an opportunity for participation in the study by groups and individuals not involved in other forums. More than 85 people participated in the March workshop.

Feasibility Study Goals and Pathways

The Corps is conducting this feasibility study at the request of National Marine Fisheries Service (NMFS). In their 1995 Biological Opinion, they directed the Corps to conduct a feasibility study to look at drawdown on the lower Snake River and to look at alternatives to drawdown. Furthermore, they requested that a decision or recommendation be made in 1999. The Corps has made a commitment to NMFS and the region to do this work and meet the 1999 recommendation date.

The ultimate goal of the study is to improve survival for listed Snake River anadromous salmon stocks as they migrate downstream through the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor Dams on the lower Snake River.

To comply with the National Environmental Policy Act and the 1995 Biological Opinion issued by NMFS, the Corps is gathering public and interagency input to define and evaluate three courses of action (pathways) for improving juvenile salmon survival during migration through the hydropower system, and will provide a final recommendation to Congress in 1999. Congress will review the recommendations, appropriate funding, and authorize a course of action.

Individual pathways and their alternatives will be discussed in each newsletter; see page 3 of this newsletter for a summary of one component of the major system improvements. An overview of the three pathways under consideration is provided here.

Existing System

Ocean-going juvenile salmon pass the dams through turbines, fish bypass systems, or over the spillways. In accordance with the 1995 Biological Opinion issued by NMFS for operation of the Federal Columbia River Power System, the Corps also implements flow augmentation and increased spill measures to assist migration. Screens are used to guide most fish away from turbines and into a bypass system. The young salmon are then routed back to the river or into barges or trucks for transport downriver. The Biological Opinion allows approximately 50 percent of the smolts to be transported. This system is constantly being evaluated and improved by scientists and engineers. Ongoing improvements include longer screens, additional barges, and flow deflectors on spillways.

Major System Improvements

These improvements are aimed at increasing the effectiveness and efficiency in how salmon smolts are bypassed around dams. They include construction of surface bypass collection systems (fish bypass systems that divert fish nearer the water's surface than current systems), fish guidance improvements, turbine modifications, structural changes to reduce harmful dissolved gas levels from spillways, and possible operational changes such as modifying river flows and spills. These improvements could be used with the juvenile fish transportation system or in-river juvenile migration.

Natural River Drawdown

Four of the existing Snake River reservoirs would be permanently lowered to a natural free-flowing condition by removing a section of each dam's earthen embankment, creating a 140-mile free-flowing river. This would eliminate existing reservoir-related and dam passage mortality at the four lower Snake River dams as well as speed the downriver migration of juvenile salmon. (The juvenile salmon would, however, still have to pass the four lower Columbia River dams to reach the ocean.) Commercial navigation and hydropower production would cease. Irrigation and recreation opportunities would be affected and ongoing wildlife compensation efforts would be impacted as well.

Roadmap to the Pathways: Major System Improvements Part I

Engineers and scientists are designing and testing several prototype components to improve juvenile salmon migration past the lower Snake River dams through major system improvements. One of these projects, the Lower Granite surface bypass collection (SBC) system, involves two major components: 1) the simulated Wells intake (SWI); and 2) the behavioral guidance structure (BGS). Additional aspects of the major system improvements pathway, such as turbine improvements and gas abatement measures, will be discussed in future newsletters.

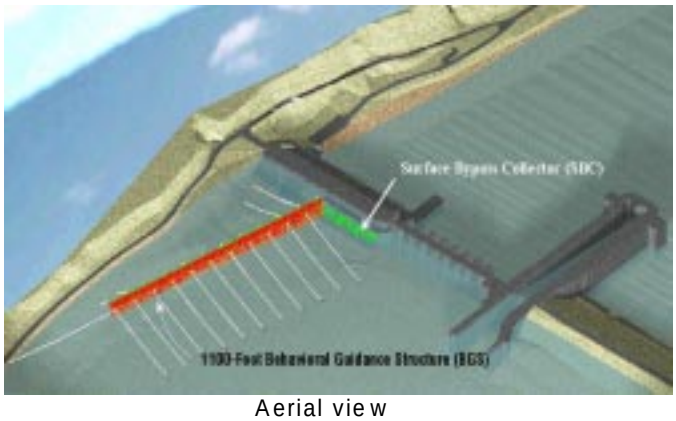
SBC System Overview

With current passage systems, salmon must dive down deep toward the turbine intake, before being guided vertically up by submerged screens into a bypass channel. The fish are subjected to high velocities and pressure changes, and also tend to delay in the forebay upstream of the dam. SBC systems take advantage of the natural behavior of juvenile salmon to stay near the surface of the water, eliminating potential hazards from turbine intakes or forebay delays.

A SBC prototype structure was constructed and installed at Lower Granite Dam in 1996. The SBC test structure is 375 feet long with a series of vertical slots that are located in front of one-half of the powerhouse. The SBC prototype system collects surface-oriented fish and directs them through the vertical slots into a collection structure where they are passed downstream of the dam through a low volume spillway. Depending on regional goals for fish passage, the system can either keep fish in the river, transport them past remaining dams, or use a combination of these methods. Currently, large numbers of fish are passed over the spillways with huge volumes of water, whereas a permanent SBC may be able to pass the same number of juvenile fish with a small percentage of the river flow. The SBC system will have substantial benefits in reducing potentially lethal dissolved gas, by passing more fish per unit volume of water, than the spillway does.

SBC with the SWI Component

Initial tests in 1996 and 1997 demonstrated the concept of SBC was valid, but improved performance levels were desired. Based on lessons learned from earlier tests, the SBC was modified by adding the SWI component in 1998. The turbine intake was altered to draw water from the bottom of the reservoir pool, so the water near the surface is calmer and the fish are less influenced by turbine flows. This allows juvenile fish more opportunity to discover and enter the SBC.



Aerial view

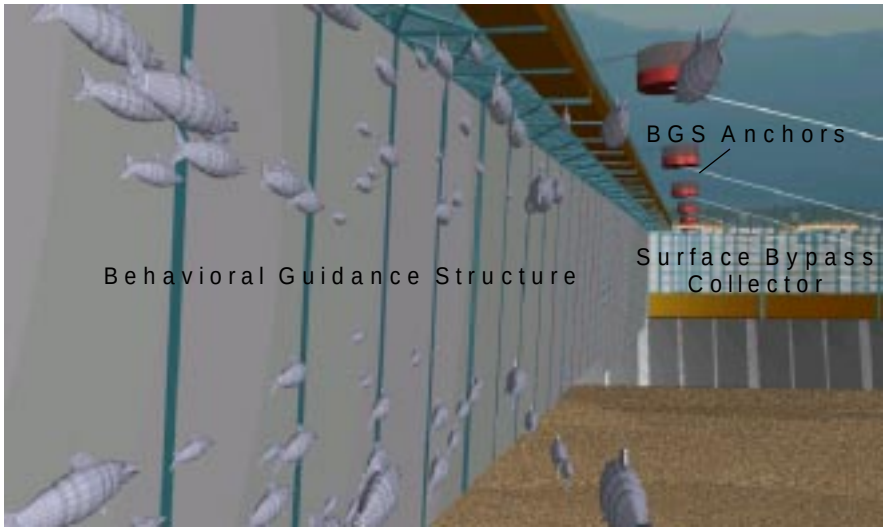
Data from the 1998 spring tests are still being analyzed. Preliminary results are encouraging and suggest that the modification of the turbine intakes has substantially increased the percentage of fish entering the SBC. Preliminary data indicate that higher percentages may be achieved by operating turbines at lower operating ranges.

"The spring test taught us that you can positively affect SBC success by changing the turbine intake hydraulics, and we also learned that the influence of the turbines and the spillway at higher flows is a major factor in determining the performance of the SBC," said Kevin Crum, Corps Technical Manager. "For a permanent system, we would need to offset the influences of turbines and the spillway at higher flows."

The SBC with the BGS Component

While the SBC/SWI affects the vertical distribution of fish being diverted throughout the water column, the goal of the BGS is to affect the horizontal distribution. The BGS is a steel wall that is 80 feet deep sloping to 55 feet deep at the upstream end to conform to the contour of the reservoir bottom. It is an 1,100-foot-long floating structure, oriented at the end of the SBC, and angled upstream toward the shoreline. The structure is designed to simulate the natural shoreline and guide fish toward the SBC by taking advantage of their natural tendency to follow the shore.

Preliminary data from the spring test indicate that the BGS was successful in guiding more than half of the fish away from the south half of the powerhouse. The upper end of the BGS has a 125-foot-wide gap between the structure and the shoreline to allow for unobstructed adult salmon passage upstream. The gap would be closed in a permanent system by modifying the upstream end of the fish ladder, further increasing the effectiveness of the BGS. A permanent system will consider guiding fish to a smaller-scale SBC and/or directly to the spillway, to allow fish managers to alter passage routes to maximize fish survival.



Underwater view

FOCUS ISSUE

Plan for Analyzing and Testing Hypotheses (PATH) Preliminary Findings for Spring-Summer Chinook Salmon

The Plan for Analyzing and Testing Hypotheses (PATH) is one regional tool the Corps is using to evaluate the potential of each of the three pathways and their various alternatives to improve juvenile salmon migration. PATH is implemented through a workgroup of regional fishery biologists using qualitative and quantitative analysis to measure the effects on the listed salmon stocks under numerous river and salmon management alternatives. The results will provide one measure of ecological effectiveness for comparison of the pathways and their alternatives.

The PATH workgroup has existed since 1993, and was established as a regional forum funded by Bonneville Power Administration and National Marine Fisheries Service to fulfill the following objectives in this region:

- Determine overall level of support for key alternative hypotheses from existing information;
- Propose other hypotheses/model improvements more consistent with these data;
- Assess ability to distinguish among competing hypotheses from future information;
- Advise institutions on research, monitoring and adaptive management experiments to maximize learning; and
- Advise agencies on management actions to restore abundance of endangered salmon stocks to self-sustaining levels.

The PATH process has been revised over time in response to improvements in both information and analytical methods, as well as changing management questions like those posed by the feasibility study. The framework is intended to provide guidance to the development of regional programs that would ensure persistence and eventually recover depressed salmon stocks to self-sustaining levels. It is also meant to provide a structure for an adaptive learning approach to development and implementation of a regional salmonid recovery program. The PATH process takes a lifecycle approach to developing this framework to encompass potential delayed effects of stressors of processes in one life stage on subsequent life stages.

The mathematical models used by the PATH workgroup compile research and monitoring data (retrospective analysis) from known actions and outcomes to analyze hypothetical actions and predict their effects (prospective analysis). The success of a model depends on the quality of the existing data, the thoroughness of the data in addressing all possible variables, the corrections that have been made to account for data shortfalls, and the assumptions that are made regarding the hypothetical actions and the existing conditions at the time the actions are taken.

PATH has completed preliminary retrospective and prospective analyses for four alternatives on spring chinook salmon. A similar preliminary analysis for fall chinook salmon will be complete in mid-July.

Study Milestones

☑ = *Task already completed*

- ☑ **Notice of Intent ..... June 1995**
- ☑ **Scoping Meetings ..... July 1995**
- ☑ **Interim Status Report ..... December 1996**
- ☑ **Regional Roundtable Workshops Initiated ..... April 1997**
- ☑ **First Set of Public Information Meetings ..... September 1997**
- ☐ **Second Set of Public Information Meetings ..... November 1998**
- ☐ **Technical Analysis Complete (Economics, Engineering, Biological, etc.) ..... January 1999**
- ☐ **Distribute Draft Environmental Impact Statement ..... April 1999**
- ☐ **Public Review of Draft Environmental Impact Statement ..... May/June 1999**
- ☐ **Distribute Final Environmental Impact Statement ..... October 1999**
- ☐ **Public Review of Final Environmental Impact Statement ..... November/December 1999**
- ☐ **Sign Record of Decision ..... June 2000**

Commonly Asked Questions

Question:

A lot of sediment has been deposited upstream of Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams since they were constructed. What would happen to all of this deposited sediment if the four dams were breached under the Natural River Drawdown Pathway?

Answer:

The lower Snake River downstream of Lewiston, Idaho, annually transports approximately 3 to 4 million cubic yards of new sediments that have been eroded from its drainage basin. Approximately 100 to 150 million cubic yards of this eroded sediment have been captured upstream of the four lower Snake River dams since the 1960s. One million cubic yards of sediment will cover one square mile of land to a depth of approximately one foot.

If the four lower Snake River dams are breached, approximately 50 percent of the previously deposited materials would likely be eroded and transported downstream by the Snake River within the first few years following dam breaching. The eroded materials would most likely be redeposited in Lake Wallula between the Snake River and Wallula Gap.

The coarsest sediments would be deposited first (closest to Ice Harbor Dam), with the sediment deposits becoming progressively finer as they are transported further downstream. All but the very finest sediments that stay suspended in the river would likely be deposited into Lake Wallula. The coarsest sediments (cobble material) deposited closest to Ice Harbor Dam would likely later be resuspended and carried further downstream during high flows to be deposited in Lake Wallula. It is unlikely that this sediment would be transported downstream of Lake Wallula past McNary Dam because flow velocities are much lower in Lake Wallula compared to the Lower Snake River. Sediment is most likely to be deposited where flow velocity is low. The very fine sediments that do not deposit in Lake Wallula would likely be carried downstream to the Columbia River estuary or the Pacific Ocean.

The 50 to 75 million cubic yards remaining along the shoreline upstream of the breached dams after the first few years could be subject to long-term erosion by wind and precipitation. It could eventually also be transported downstream by the Snake River and deposited in the same way as the earlier eroded sediment.

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For More Information

Informational Tools

Look for the Corps' traveling displays detailing project background, the study process, and the pathways being considered. Displays will be set up throughout the summer at the Hiram Chittenden Locks Visitor Center in Seattle, Washington, and at the Bonneville Dam Visitor Center in Cascade Locks, Oregon.

Traveling displays and an informational video are available to interested groups for events, conferences, and meetings. To request information, please contact Dave Dankel, Corps Public Involvement Coordinator, at 509-527-7288 or *dave.a.dankel@usace.army.mil* (e-mail).

You can also visit the Walla Walla District home page (*http://www.nww.usace.army.mil*) for updated project information and opportunities to be involved in the study process.

Study Team

Name	Study Team Role
Greg Graham	Project Manager - Corps
Pete Poolman	Study Manager - Corps
Lonnie Mettler	EIS Manager - Corps
Janet Smith	Attorney - Corps
David Dankel	Public Involvement Coordinator - Corps
Jeff Sedgwick	Study Management Assistant - Corps
Anneli Aston	EIS/Public Involvement Assistant - Corps
Ray Tracy	Cultural Resources - Corps
Lonnie Mettler	Wildlife, Non A-Fish ESA, CAR Manager - Corps
Rick Jones	A-Fish Coordinator, Resident Fish and Water Quality - Corps
Tim Wik	Surface Bypass Collection - Corps
Kevin Crum	Technical Manager, Surface Bypass Collection - Corps
Steve Tatro	Natural River Drawdown Engineering - Corps
Bruce Collison	Major System Improvements Engineering - Corps
Dennis Wagner	Chairman of the Drawdown Regional Economic Workgroup - Corps
Gina Trafton	Socioeconomic Technical Lead - Corps
Gary Ellis	Economist - Corps
Dave Reese	Hydrology, Hydraulics, Water Quality Analysis - Corps
Mary-Lou Socia	Cooperating Agency Representative - EPA
Bill Ryan	Cooperating Agency Representative - Air Quality Issues - EPA
Phil Thor	Cooperating Agency Representative, Hydroregs, DREW -BPA
Richard Prange	Cooperating Agency Representative, Upper Snake Considerations - BoR
Rich Rigby	Activity Manager, Analysis of Million Acre Feet - BoR
Kirby Gilbert	Project Manager - Foster Wheeler Environmental

To contact a member of the study team, call Dave Dankel at 509-527-7288.