

Section 6

ADULT SALMON MIGRATION

Mainstem Columbia and Snake river hydroelectric projects and some tributary projects are physical barriers to adult salmon and steelhead migrating from the ocean to spawning areas upstream. To solve this problem, adult fish passage facilities have been constructed at 13 mainstem dams on the Snake and Columbia rivers. Water flows and spill guidelines also have been adopted to provide unimpeded passage and maximum attraction of fish to the fishway entrances.

However, at some adult passage facilities, there are still problems that result in delayed passage and mortality. For example, flow and spill conditions intended to assist juvenile migrants at some dams tend to discourage upstream fish migration, mask the flows that attract fish to the fishway or induce fallback so that fish must relocate and re-ascend the ladder. These conditions may also increase total dissolved gas in the water to levels lethal to both fish and fish food organisms.

In addition, inadequacies in certain mainstem adult passage facilities and in the operation and maintenance of these facilities create passage delays or otherwise reduce the success of adult fish passage. Losses and delays of returning adult salmon and steelhead at each dam due to upstream migration problems can be significant and have a cumulative effect. Reducing these passage mortalities could increase significantly the number of adult salmon available for harvest and escapement.

The Council has adopted a number of measures to improve adult migrant survival. The Council calls on the Corps of Engineers to implement all spill and operating criteria for

mainstem adult fish passage facilities and to make needed improvements. In addition, the Council calls on the Corps to leave juvenile fish screens installed for a longer period to provide protection for adult salmon that fall back through the powerhouse. The Council also recommends adding project biologists to routinely inspect fish passage facilities at mainstem Corps dams. The Corps should conduct various evaluations and studies to improve the effectiveness of passage facilities and, ultimately, the survival of adult salmon and steelhead.

In addition, the fish and wildlife agencies and tribes pointed out that some disease problems in migrating salmon and steelhead may be caused or intensified by their concentration at fish ladders. The Council maintains that this problem warrants further research and calls for research on fish disease at passage facilities.

6.1 IMPROVE ADULT SALMON SURVIVAL

6.1A Mainstem Operations and Facilities

Corps of Engineers and National Marine Fisheries Service

6.1A.1 Adhere to all existing fishway operating and spill criteria. The fish passage committee (Section 5.3B.14) should evaluate and the Corps should implement needed improvements in criteria jointly with fishery managers:

- operate all fishways according to agreed-upon criteria;

- minimize power peaking, establish ramping rates for daily flow operations and eliminate zero-flow operations;
 - operate spillways and turbines to enhance fish passage;
 - reduce fish ladder water temperatures;
 - install additional auxiliary water systems for attraction flow and improve entrances and exits of existing ladders.
- 6.1A.2 Complete the evaluation of all mainstem adult passage facilities, the need for new facilities, the effectiveness of entrance attraction flows and fishway hydraulics by December 1, 1996. Make facility improvements as necessary. Provide and install, as necessary, back-up parts, attraction water pumps or fish turbines at each dam for use in the event of failure of these systems.
- 6.1A.3 When adult fallback is a documented problem, keep fish screens in place at each dam beyond the juvenile migration period as indicated in the fishway operating criteria developed with the fishery managers. This is subject to the need for annual screen maintenance.
- 6.1A.4 As determined by the fish passage committee (Section 5.3B.14), the Corps should continue to upgrade existing adult fish passage facilities, including:
- automate control systems;
 - place staff gauges (flow measuring devices) in areas that are accessible for both reading and cleaning;
 - provide velocity meters in areas of known low velocity in the collection channels;
- construct additional adult ladders at Lower Granite and Little Goose dams by 1999;
 - provide increased attraction water for fish ladder collection channels and entrances by 1997;
 - modify adult collection channel at McNary Dam by 1996;
 - construct adult collection channel extensions at Lower Granite and Little Goose dams by 1998;
 - complete adult fishway modifications and improvements at Bonneville Dam by 1997, and
 - investigate covering existing ladders.
- 6.1A.5 Provide an adequate number of trained staff to regularly inspect both adult and juvenile fish passage facilities at each of the eight federal mainstem dams on a frequent basis throughout the fish passage season to ensure all fish facilities are operating according to agreed-upon criteria.

6.1B Adult Salmon Research

Corps of Engineers

- 6.1B.1 Evaluate the effects of shad population increases on adult salmon passage at mainstem dams. Include in the evaluation the feasibility of selective shad removal in adult ladders. Report results to the Council by November 1994.
- 6.1B.2 Evaluate potential methods for decreasing water temperature in mainstem fish ladders and apply where appropriate.
- 6.1B.3 Evaluate the effects on adult salmon passage of zero nighttime flow conditions in the lower Snake River. Report results to the Council.

National Marine Fisheries Service

- 6.1B.4 Evaluate the effects of increased spill for juvenile salmon on adult salmon passage, particularly in the early morning hours. Investigate modifications to adult fish facilities or project operations to improve adult passage during spill operations. Report results to Council by 1997. Upon Council approval, implement needed measures to reduce the impact of spill operations on adult passage.

Corps of Engineers and Bonneville

- 6.1B.5 To improve the accuracy of the present adult fish counting procedures, evaluate the feasibility and benefits of using video-based or other automatic counting and species-recognition systems for monitoring adult fish passage at mainstem Columbia and Snake river dams. Report results to the Council. If approved by the Council, institute video-based counting of adult fish at appropriate locations.

Bonneville, Corps of Engineers and National Marine Fisheries Service

- 6.1B.6 Continue research and development on the feasibility of installing adult fish PIT-tag detectors in the adult fish passage facilities of mainstem dams, including consideration of the capability of removing selected fish stocks for transport. If feasible, develop installation schedule and install adult fish PIT-tag detectors in adult fish passage facilities of mainstem dams as soon as possible. Report results of research, installation schedule and progress on installation to the Council by February 1995 and annually thereafter.

- 6.1B.7 Fund studies to investigate diseases that occur at fish passage facilities. A number of diseases that affect adult fish have been associated with fish ladders and attraction facilities at existing dams. Studies are needed to document the extent to which these disease problems cause losses of fish.

Corps of Engineers, Bonneville and Fishery Managers

- 6.1B.8 Evaluate the extent and identify the causes of interdam adult salmon losses, including non-dam losses, and take action to address these causes, as necessary. Report results to the Council by January 1996.

6.1C Improve Flows for Naturally Spawning Fall Chinook

Vernita Bar

The Vernita Bar section of the Columbia River immediately below Priest Rapids Dam in the Hanford Reach is extremely valuable for natural production of fall chinook salmon. Significant declines in production have occurred since the 1970s. The fish and wildlife agencies have shown that increasing flows above the present 36,000 cubic-feet per second minimum flow level would provide increased spawning habitat.

Fish and Wildlife Agencies, Tribes and Grant County Public Utility District

- 6.1C.1 Comply with the flow plan for Vernita Bar incorporated into the Federal Energy Regulatory Commission license for Priest Rapids Dam.

- 6.1C.2 Evaluate the effectiveness of the improved flows for fish production at the Vernita Bar and report the results of this evaluation to the Council and the Federal Energy Regulatory Commission.

Below Hells Canyon

The last remaining free-flowing stretch of the mid-Snake River is below Hells Canyon Dam. The fish and wildlife agencies and tribes believe that this stretch could be improved for fall chinook salmon and steelhead spawning by establishing minimum flows and limits on river level fluctuations.

Bonneville and Idaho Power Company

- 6.1C.3 In consultation with the fish and wildlife agencies and tribes, fund studies to investigate the effects of establishing improved flows for fisheries production below Hells Canyon Dam, including a minimum flow for the spawning, incubation and rearing of salmon and steelhead, and of establishing limits on river level fluctuations. These studies shall also include estimates of power losses associated with improved flows.

6.1D Snake River Temperatures

Corps of Engineers, Bonneville, National Marine Fisheries Service and Other Parties

- 6.1D.1 If Dworshak Reservoir is above elevation 1,520 feet at the end of July, its use for temperature control evaluation will be addressed by the Fish Operations Executive Committee.

Relevant Parties

- 6.1D.2 Seek funding assistance for necessary modifications to recreational and commercial facilities to allow Dworshak Reservoir to operate at reduced levels to improve survival of fall chinook consistent with the mitigation provisions of this program (See Section 9).

Idaho Power Company and Federal Energy Regulatory Commission

- 6.1D.3 Annually, during September, draft 100,000 acre-feet from Brownlee Reservoir to help reduce Snake River water temperatures for adult fish passage (See Section 5.2A.10). In addition, pass 100,000 acre-feet of water from the Snake River Basin through the Hells Canyon hydropower complex. (See Section 5.2D.2)

Bonneville and Corps of Engineers, in Cooperation with Idaho Power Company and Other Interested Parties

- 6.1D.4 Continue to evaluate whether releasing cool water from both Dworshak Dam and the Hells Canyon Complex during August and September improves adult fall chinook survival. This evaluation should be consistent with the guidelines specified in Sections 6.1D.1 and 6.1D.3. The objective of this evaluation is to reduce water temperatures at Ice Harbor Dam by September 1 of each year, and to determine the effectiveness of these operations on adult fish survival and passage through the lower Snake River. Report results of this evaluation to the Council annually by December 31. Policy and technical guidance for determining the magnitude and timing of Snake River temperature control releases from Dworshak and Brownlee should be provided in a July meeting of

the Fish Operations Executive Committee.

- 6.1D.5 Upgrade the COLTEMP¹ water temperature prediction model using the data and knowledge gained from all previous water temperature control operations and monitoring.
- 6.1D.6 Collect meteorological and hydrological data that will identify the effect of tributary watershed management and resulting inflow temperatures on mainstem Snake River water temperatures. Add to the existing water temperature data monitoring network. Include additional water temperature and velocity measurements from the lower Snake River.
- 6.1D.7 Conduct additional salmon and steelhead migration studies, and coordinate with ongoing fish migration and behavior studies, such as timing, movement, fallback, straying and other characteristics. Report results to the Council annually.
- 6.1D.8 Provide for coordinated data base management.

6.1E Mid-Columbia Dams

Mid-Columbia Public Utility Districts

- 6.1E.1 Subject to Federal Energy Regulatory Commission approval, evaluate adult fish passage at each mid-Columbia public utility district project to determine if losses are occurring at or between the dams. This study should include adult fish count evaluations and development

¹ COLTEMP is a Columbia River Basin water temperature model developed by the U.S. Army Corps of Engineers. It is used to predict water temperatures under alternative reservoir release strategies.

of a coordinated, comprehensive study plan with fishery managers to evaluate existing adult fish passage at all five mid-Columbia dams and reservoirs, including determination of optimum flows and development of spill configuration guidelines to improve upstream migration conditions. To the extent possible, such evaluations should be coordinated with similar adult fish passage studies being planned by the Corps of Engineers for the federal Columbia River mainstem projects. These evaluations also should complement the terms of existing Federal Energy Regulatory Commission Wells and Rock Island Settlement Agreements between Douglas and Chelan County public utility districts and fishery managers. Compile the results of such evaluations into a comprehensive report on adult fish passage at the five mid-Columbia public utility districts projects and submit the report to the Federal Energy Regulatory Commission, the Council and members of the three mid-Columbia coordinating committees.

Douglas County Public Utility District

- 6.1E.2 Based on results of adult fish passage research and in consultation with the Wells Coordinating Committee, identify and correct all adult fishway deficiencies at Wells Dam, including hydraulic problems in the junction pools, by 1996.

Chelan County Public Utility District

- 6.1E.3 Based on results of adult fish passage research and in consultation with the Mid-Columbia Coordinating Committee, identify and correct all adult fishway deficiencies at Rocky Reach Dam, including hydraulic problems in the junction pools, by 1996.

- 6.1E.4 At Rock Island Project, implement the operating criteria and adult fishway modifications provided in Section F, "Adult Fish Ladders" of the Settlement Agreement dated April 24, 1987, filed in the relicensing proceeding for Project 943 and FERC Docket Nos. E-9569, et al. Based on results of adult fish passage research and in consultation with the Rock Island Coordinating Committee, identify and correct all adult fishway deficiencies, including hydraulic problems in the junction pools and installation of additional pumps, by 1996.

Grant County Public Utility District

- 6.1E.5 Based on results of adult fish passage research and in consultation with the Mid-Columbia Coordinating Committee, identify and correct all adult fishway deficiencies by 1995 at Priest Rapids Dam and by 1996 at Wanapum Dam.

6.1F Maintenance Plans

Federal Project Operators and Regulators

- 6.1F.1 Develop a plan for repair and maintenance of any part of each dam relating to the passage of adult salmon and steelhead, including: 1) measures to be followed in the event that any such facility breaks, is washed out or ceases to operate; and 2) designation of an individual responsible for carrying out the plan. If any dam operator fails to comply with the plan, the Council will ask the person responsible for carrying out the plan to explain at a Council meeting the reasons for the non-compliance. The Council will decide upon appropriate action at that time.

6.1G Structural Modifications to Adult Fishways

Corps and Mid-Columbia Public Utility Districts

- 6.1G.1 By 1996, in consultation with fish managers, complete a structural analysis of all mainstem fishways. Make any needed immediate corrections to structural elements such as diffuser gratings and orifices. Eliminate point and non-point pollution sources correctable by minor structural modifications. Undertake a comprehensive evaluation of the impact of juvenile bypass systems on adults that fall back downstream through them.

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