



# Proposed hydro operations use latest research to support fish recovery

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The federal agencies that manage the Federal Columbia River Power System – the U.S. Army Corps of Engineers, the Bureau of Reclamation and the Bonneville Power Administration – have proposed a comprehensive set of actions to help Columbia River Basin salmon and steelhead listed under the Endangered Species Act. In its biological opinion (BiOp) for the FCRPS, NOAA Fisheries evaluated the action agencies' proposal and added some additional items to establish a set of actions known as a "Reasonable and Prudent Alternative" (RPA). The BiOp concludes that, with the RPA, ESA-listed Columbia River Basin fish will be on a trend toward recovery.

**W**ith the benefit of new research and the best available science, the federal agencies who manage the FCRPS will implement an expanded program of hydro actions to support recovery of Columbia River Basin salmon and steelhead.

The new approach responds to federal court decisions and specifies operations and improvements at each of the 14 federal dams that are uniquely designed to improve fish survival.

- For juvenile fish, we have adopted new, higher performance standards for fish survival through the dams – an average of 96 percent survival for spring Chinook and steelhead and 93 percent survival for summer migrants. The plan includes assessing whether these standards are met and making changes as necessary to meet them.
- For adult fish, the plan includes actions and commitments to maintain current high survivals through the hydro system to meet adult performance standards.
- The plan includes assessing in-river juvenile performance through the hydro system.

The action agencies are committed to achieving these performance standards based on the most current science and latest research on flows, spill and transport.

## **Spill amounts based on fish survival**

Since the 1980s, the federal hydro operators have spilled water over the dams during the juvenile fish migration in the spring and summer to help fish in the river pass dams safely. We used research results to refine spill levels as more information became known; for example, some spill increases juvenile fish survival, but more spill is not necessarily better for the fish.

Using this information, we will tailor operations at each dam to meet performance standards and increase survival based on migration paths, the timing of migration and the needs of the fish passing through the dams.

We are timing summer spill to the fish migration, spilling on the Columbia and Snake based on when juvenile fall Chinook are present. More spill will be provided and tested at Bonneville Dam in the summer and John Day Dam in the spring.



## Spill improvements from 2004 BiOp to 2008 operations

Dam	Spring	Summer
Bonneville	from 75 kcfs* day and gas cap spill at night to 100 kcfs 24 hr/day	from 75 kcfs day/gas cap night to 85 kcfs day/gas cap night
The Dalles	no change	no change
John Day	From no spill day and 60% night to evaluate 24 hour spill with RSW	no change/evaluate RSW
McNary	from 12 hr/day spill to 24 hr/day with RSW	from no spill to 24 hr/day spill with RSW
Ice Harbor	no change	no change
Lower Monumental	no change/evaluate RSW in 2008	from no spill to 24 hr/day spill, plan to test RSW in 2008
Little Goose	from 12 hr/day spill to 24 hr/day spill with RSW	from no spill to 24 hr/day spill with RSW
Lower Granite	no change	from no spill to 24 hr/day spill with RSW

<sup>1</sup> Fish spill operations and planning dates may be adjusted (increased or decreased) for research purposes or through the adaptive management process to better match juvenile out migration timing, and/or to achieve or maintain performance standards.

\* kcfs = thousand cubic feet per second

### Structural improvements to help fish pass dams safely

We have made significant improvements to provide surface passage routes at the dams. Surface passage routes are considerably more efficient than traditional spill. More fish use surface passage per volume of flow, and more efficient spill generally reduces total dissolved gas in the river.

Surface passage routes also decrease the amount of time smolts spend in dam forebays where they can be vulnerable to predators.

Federal engineers and biologists are developing new technologies to provide more surface-oriented passage for fish over the dams, such as spillway weirs installed at Lower Granite and Ice Harbor dams and the corner collector at Bonneville Dam.

We will make the following passage improvements at the dams to meet fish performance standards:

- Removable spillway weir (RSW) installed at Lower Monumental Dam (2008).
- Temporary spillway weirs installed at McNary Dam (2007); John Day Dam (2008); and Little Goose Dam (2009).

- Evaluating other surface passage improvements at Bonneville first powerhouse (sluiceway) and second powerhouse (behavioral guidance device).
- New spillwall at The Dalles Dam.

### Fish transportation plans based on survival research

There is a critical balance between leaving juvenile fish to migrate in the river versus transporting them around the dams.

For example, some stocks – such as Chinook salmon – do better migrating in-river early in April. On the other hand, survival rates for Snake River steelhead are better with transport. In low flow years, when the rivers have less water, migration conditions in-river are poor, and fish do better when they are transported down river.

Research also shows a strong correlation between how soon fish arrive in the estuary after their trip down the river and their ability to survive as they enter the ocean, which affects the optimal timing and use of transportation.

We will maximize transportation in conditions when the best currently available scientific information shows higher adult returns expected for those fish compared to those that migrated in-river.



Depending on real time conditions and further research, we will further refine spill and transportation strategies to meet performance standards and increase overall fish survival.

### **Operating the FCRPS to provide flows and water quality**

Each year, the action agencies coordinate water storage and releases from upstream reservoirs to augment flows downstream, with the goal of improving conditions for migration of juvenile salmon and steelhead. The BiOp approach designates specific water from storage reservoirs to be used for fish flows, as well as rules for water use.

- Dworshak Dam on the Clearwater River has a temperature control system that allows operators to release cold water from deep within the reservoir. This water helps keep downstream rivers cool – which can be a vital aid to salmon and other temperature-sensitive fish.
- Water from Canadian reservoirs provided through mutual agreements can be used under the plan, along with Montana operations

designed to balance the needs of salmon with resident fish such as the endangered Kootenai white sturgeon and bull trout.

- Dry water year strategies are laid out, and additional studies of dry year operations will be implemented.

### **What's the status of fish passage today?**

Over the last two decades, fish passage at the eight federal dams on the lower Columbia and Snake rivers has improved dramatically.

- Adult migration rates and travel time are similar to levels before the Columbia and Snake River dams were completed.
- Juvenile survival is 95 to 98 percent for fish passing through the RSW fish slides at Lower Granite and Ice Harbor dams and nearly 100 percent through the similar “corner collector” at Bonneville Dam.