

From: NMFS
To: Technical Management Team
Subject: Dalles Spill (revised)
Date: May 20, 2005

Problem: Recently, the spill levels at The Dalles Dam have not been meeting the required BIOP 40% level due to spill gate limitations at the project. It is recognized that maintaining a constant 40% spillway discharge given natural flow variability and other hydrologic influences is not always possible. However, considerable variations in either direction from 40% for extended periods of time are considered detrimental to passing juvenile salmon. Overspill causes deteriorating tailrace egress conditions, exposing more spill passed juveniles to predator habitat in the islands and shallow reefs below the project. Underspill causes more fish to be routed to the powerhouse with about 60% of these passing through the turbines which have been shown to have relatively poor passage survival (~80 – 85 % range). For example, reducing spill from 40% to 30% results in an increase in turbine passage of approximately 10% of daily juvenile project passage. Two alternatives were considered to improve the survival of juvenile migrants in the lower Columbia River given the lower anticipated survival due to providing less than 40% spill at The Dalles.

Alternative 1.

Twenty-four hour spill at John Day Dam is one way to offset the effects of underspill at The Dalles Dam. The current BiOp spill program limits nighttime spill to 60% due to degrading outfall and powerhouse tailrace egress conditions. However, additional spill provided during the daytime is possible and has been considered in the past. Studies conducted at John Day in 1999, 2000 and 2002 showed that 24 hour spill with day spill in the 30% range would pass juvenile chinook salmon with high survival. The 24 hour spill condition increased chinook spill passage efficiency, decreased forebay residence time (8 to 10 hours) and slightly increased overall dam passage survival. Unfortunately, while steelhead smaller than about 200 mm (mostly wild fish) passed, larger steelhead did not respond as well to the 24 hour spill condition, with only less than 10% of the daily passage occurring during the daytime hours in 1999. Also, steelhead showed a slightly lower spillway survival during the day in 2002, possibly as a result of the lower numbers of fish encountering the same large number of predators in the tailrace. We believe that if we could get steelhead to pass during the day, their survival levels would be no different than for chinook. Based on observations at John Day, 30% day spill may be at or below the lower threshold needed to pass larger migrants like steelhead (through deep spill gates). If this is true then spill levels in the 40 to 45 % range should be sufficient and would maintain good powerhouse and bypass egress conditions and improve spillway tailrace egress conditions. Minimizing forebay delay has the potential to greatly increase survival of fish arriving at John Day Dam. Twenty-four hour spill has been shown to decrease forebay residence time at several projects including John Day, McNary, Ice Harbor, Lower Monumental and Lower Granite dams. Survival studies conducted at Ice Harbor, and Lower Monumental have shown forebay survival

improvements for fish arriving at the project with spill vs. without spill in the 5 to 15% range.

In summary, 24 hour spill at the 40% or higher level at John Day Dam has the potential to improve survival of arriving juvenile salmonid migrants by reducing forebay delay and increasing spillway passage. This survival improvement would help offset decreased survival as a result of underspill at The Dalles Dam. This offset is positive but not quantifiable given the short duration of the proposed action and the lack of any existing survival study at this project.

Alternative 2.

The alternative of increasing transportation at McNary Dam was also considered as an alternative to provide a survival benefit. The data available on spring transport at McNary Dam are preliminary. Transportation studies at McNary Dam began for spring Chinook in 2002 and for steelhead in 2003. Thus we presently have only two years of preliminary data for spring Chinook and one year of data for steelhead. Given this limited data set, the NOAA *Effects* paper had little discussion of McNary transport. Their discussion was limited to a conclusion that, "Combined with the higher survival to Bonneville Dam for fish left in the river at McNary Dam, a spring transportation program at McNary Dam likely provides only marginal benefits (at best) to Snake River stocks."

- The data currently available for spring Chinook are for juveniles which passed McNary Dam in 2002 and returned as adults after spending two years in the ocean. The transport to inriver (T/I) ratio for these fish is 0.99, indicating no benefit from transportation.
- For steelhead the data set are limited to juveniles which passed McNary Dam in 2003 and returned as adults after spending one year in the ocean. The T/I for these fish is 0.92 indicating no benefit from transportation.
- In summary, the preliminary information available does not suggest transportation from McNary Dam provides a survival benefit.