

DRAFT

September 24, 2014

FILE MEMORANDUM

FROM: Gary Fredricks

SUBJECT: A Review of The Dalles Dam 2014 Spill Test

High daily levels of adult passage in the fall of 2013 prompted the fish agencies and the Corps to suggest that some level of spill might be beneficial to adult passage by moving some of the east fish ladder passage to the less used north (spillway) ladder (File Memo: 2014, 4-15, TDA Split Flow FPP Change Request Form).

A test to evaluate the potential for moving passage was started on September 9, 2014, and ran for seven days through September 15. The spill period was from 0500 to 1700 each day. The pattern used was developed at the Corps' Engineer Research and Development Center in late August and consisted of 6 kcfs from Bay 1 and 4.5 kcfs each from bays 7 and 8. This pattern was slightly adjusted after the fourth day of testing to 4.5 kcfs from bay 1 and 7 and 6 kcfs from bay 8. A total spill level of approximately 15 kcfs was provided for each test day. The actual reported spill averaged 13.4 to 14.6 kcfs for the test period each day of the test (see Table 3).

Fish passage for each of the east and north ladders was monitored daily by Corps contractors. A primary metric for the test was the north ladder percentage of total passage. Table 1 presents the seven days of test data with seven days on either side for comparison.

Table 1. Percentage of North Ladder of total passage per day, before during and after the test. Test days are in **Bold**.

Date	Adult Chinook	Jack Chinook	Steelhead	Coho	All Species
9/2	4%	8%	11%	15%	6%
9/3	3%	5%	4%	11%	4%
9/4	2%	6%	3%	10%	3%
9/5	0%	1%	4%	14%	2%
9/6	2%	5%	3%	10%	3%
9/7	3%	6%	7%	15%	5%
9/8	6%	5%	7%	16%	7%
9/9	18%	17%	24%	31%	20%
9/10	17%	19%	14%	20%	17%
9/11	11%	15%	26%	32%	16%
9/12	11%	8%	17%	24%	15%
9/13	5%	4%	17%	23%	12%
9/14	8%	11%	19%	14%	12%
9/15	8%	7%	17%	19%	12%
9/16	4%	5%	5%	9%	5%
9/17	2%	6%	7%	12%	6%
9/18	3%	3%	4%	6%	4%
9/19	6%	11%	6%	8%	7%
9/20	6%	4%	8%	16%	8%
9/21	8%	13%	8%	8%	8%
9/22	5%	4%	10%	12%	7%

North ladder passage did respond to the 15 kcfs spill level with an initial shift of total project passage that averaged about 13% and ranged from 12% to 17% depending on species, with steelhead showing the greatest initial increase at 17%. There was discussion at the September 11 FPOM meeting of changing the pattern to a two bay pattern (bay 1 and 2 at 7.5 kcfs) if the early three bay pattern results held for the first four days of the test. Unfortunately, the percent shift dropped somewhat on the third day, particularly for Chinook, so the decision was to stick with the three bay pattern. This pattern was, however, modified slightly based on accounts from the project that the bay 1 flow may be too high. Bay 1 flow was reduced by one stop (4.5 kcfs) and this flow was shifted to bay 8. This shift appeared to have a negative effect on passage of Chinook and their numbers dropped somewhat for the remaining three days of the test.

The timing of the spill test did result in shifting fish away from the crowded east fish ladder during some of the highest passage days ever recorded at The Dalles Dam (Table 2).

Table 2. Fish numbers passing The Dalles Dam during the spill test by fish ladder and total. Test days are in **Bold**.

Date	Chinook		Steelhead		Coho		Total		
	East	North	East	North	East	North	East	North	Combined
9/8	29346	1897	3172	248	2208	414	34726	2559	37285
9/9	32796	7228	2393	756	3663	1625	38852	9609	48461
9/10	27490	5723	3955	654	4660	1191	36105	7568	43673
9/11	26183	3388	4267	1514	3715	1785	34165	6687	40852
9/12	15480	1903	6192	1296	4321	1364	25993	4563	30556
9/13	15831	859	7014	1446	5019	1536	27864	3841	31705
9/14	22521	2066	5902	1398	10388	1703	38811	5167	43978
9/15	21807	1766	4685	976	7122	1710	33614	4452	38066
9/16	20829	826	3831	190	7737	757	32397	1773	34170

Total dissolved gas was monitored through the Corps fixed monitoring site one mile downstream of The Dalles Dam spillway. Instantaneous TDG levels ranged from 104.9 to 106.6%. The spill period TDG data were as follows:

Table 3. Total dissolved gas for each day of the spill test.

Test Date	Daily High Instantaneous TDG (%)	Average Spill Period TDG (%)	Average Spill Level (kcfs)
September 9	105.5	104.0	13.5
September 10	105.4	103.7	13.8
September 11	105.4	103.4	13.5
September 12	105.8	104.2	13.4
September 13	104.9	103.4	14.1
September 14	106.6	104.4	14.6
September 14	106.2	104.7	14.2

The TDG level did not appear to change appreciably with the shift in the spill pattern, which occurred prior to the September 13 test. The TDG levels did not exceed the 110% Oregon and Washington standard.

In summary, the spill test did shift fish passage to the north ladder and reduced crowding in the east ladder at a time when the project was passing a record high number of adult salmon. While the test was successful, the total shift in passage fell a bit short of what we had hoped to achieve. The north ladder passed close to 40% of the project daily passage of adult Chinook during the last two weeks of the 2014 spill season. Of course, this was with an average of 52 kcfs spill but it does show that improved redistribution of fish is possible. Another test should be run in 2015 with either a modified spill pattern (perhaps the 2 bay pattern) or with an increased spill volume or both.