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MEMORANDUM

TO: Erick VanDyke, ODFW

FROM: Erin Cooper

DATE: September 11, 2015

RE: SRWG evaluation of performance testing at Bonneville Dam

On July 29, 2015, I attended a meeting of SRWG regarding performance testing at Bonneville Dam. Gary Fredricks (NOAA) provided a list of questions to direct the discussion of what years and operations will be considered having met performance standards. The answers to these questions will determine what additional performance tests will be required at Bonneville Dam, and what operations those tests will be conducted under. At your request, I have summarized responses to these questions using the discussion at the meeting, as well as additional documentation and analyses provided since the start of acoustic tagging at Bonneville Dam.

Not all documentation for this meeting was made available to SRWG members who called into the meeting, rather than attending in person. However, using draft and final reports from performance testing, I have been able to respond to most of the questions presented to SRWG.

1. *What are the final results for the 2010, 2011, and 2012 studies? There are several versions of survival and standard errors in the documents that have been prepared.*

This comment refers to a document, compiled by the COE, which was distributed to a subset of SRWG members and, according to SRWG members at the meeting, contained multiple errors when compared to the final reports. Although I did not see this document and a copy has not been made available, I have used the official final reports of performance testing to provide the following summary:

| Species | Year | Single-Release | Adjusted Survival | Precision |
|---------------------|----------------------|----------------|-------------------|--------------|
| Yearling Chinook | 2010 | 0.9519 | NA | 0.0040 |
| Yearling Chinook | 2011 (full season)* | 0.9584 | 0.9597 | 0.0176 |
| Yearling Chinook | 2011 (early season)* | 0.9569 | 1.0086 | 0.0042 |
| Yearling Chinook | 2011 (late season)* | 0.9807 | 1.0023 | 0.0447 |
| Steelhead | 2010 | 0.9450 | NA | 0.0043 |
| Steelhead | 2011 (full season)* | 0.9491 | 0.9647 | 0.0212 |
| Steelhead | 2011 (early season)* | 0.9527 | 0.9755 | 0.0180 |
| Steelhead | 2011 (late season)* | Not Provided | Not Provided | Not Provided |
| Subyearling Chinook | 2010 | 0.9580 | NA | 0.0055 |
| Subyearling Chinook | 2012 | 0.9694 | 0.9739 | 0.0069 |

*In 2011, spill levels exceeded target operations in the second part of the study. The early season, when operations were within FOP plans, ran from April 30 – May 13. The late season ran from May 14 – May 31.

There is a need for transparency in this process, and the COE should not distribute information for review to only a subset of SRWG. In addition, all information should be checked for accuracy prior to distribution if it is being used as part of the decision-making process.

2. *Are any of the 2010 single release estimates acceptable for performance standards, particularly the subyearling estimate (since it was above the standard)?*

The 2010 survival studies at Bonneville Dam were not conducted as performance tests, but were instead intended as a pilot study for compliance testing in 2011. Outlined in the 2010 report are a number of constraints that keep 2010 operations from being directly comparable to later passage seasons, including the fact that (1) flows were not accurately measured through non-turbine passage routes, and (2) sluiceway gates were not fully functional. Additionally, the Corner Collector, which spills 5 Kcfs, was not fully functional because the adjacent turbine (Unit 11) was not operational during the 2010 passage season. Therefore, Bonneville operations and passage conditions during 2010 are not representative of subsequent testing or future operations and should not be included as part of the decision-making process regarding performance testing.

If the 2010 results are accepted for subyearling Chinook, in spite of the shortcomings described above, then results from yearling Chinook and steelhead must be considered a failure, since those single release estimates did not meet the survival standard. However, a serious shortcoming of the performance standards testing program is that requirements for projects that fail performance testing are unclear. Gary Fredricks (NOAA) stated that projects should be required to make improvements for fish passage if standards are not met. However, multiple tests have failed to meet performance standards throughout the system and have resulted only in repeated testing in an attempt to meet the standards with desired operations.

3. *The steelhead estimate from 2011 was slightly under the standard, can it be accepted?*

Steelhead survival estimates provided for the full testing period and the early testing period meet the performance standards. However, *yearling Chinook* estimates in 2011 are below the standards (I believe this is what Gary Fredricks intended to reference in this question and what I will respond to).

The performance standards, as written, are clear that a concrete survival of 0.96 is required to meet the standard. No language has been proposed, or accepted, on what would constitute “slightly under” the standard such that it should still be considered as an achieved standard.

The study design for measuring dam passage survival includes a number of weaknesses, including size constraints on tagging, artificial inflation of survival rates when tailrace mortality is high, and the exclusion of delayed mortality associated with dam passage (Appendix A). Given that performance tests as conducted are likely inflating survival estimates, fisheries managers should be as conservative as possible when accepting results that do not meet the standards.

4. *The 2011 standard errors for both steelhead and yearling Chinook exceeded the 0.015 limit, does this disqualify both from consideration?*

Again, given the weaknesses and concern regarding the performance standards testing, accepting estimates that do not meet the stated criteria is not appropriate. In 2012, the precision of the steelhead survival estimate exceeded the 0.015 limit. However, PNNL and the COE proposed that the standard be accepted as met regardless, because the point estimate of survival was high (>100%). In contrast, the point estimate of survival for yearling Chinook in 2011 did not meet the point estimate standard for survival, and the steelhead estimate was only slightly above the minimum standard. These low point estimates, combined with high uncertainty, do not meet a reasonable standard for acceptance.

5. *The 2012 subyearling Chinook estimate was above the standard, however, spill levels were far above the target operation (average near 150 kcfs), can this result be accepted and at what future operation?*

The 2012 NOAA report *Federal Columbia River power system juvenile dam passage performance standard and metrics* contains a clear outline of how to proceed when test operations differ from the planned operations:

“To ensure future spill levels provide expected performance over the long run, mean actual spill levels during the two successful test years will be compared to the targeted spill levels at each dam. If the difference between targeted and mean actual spill is within a variance of 5 percent (absolute) or 5 kcfs for Snake River projects and 10 kcfs for Columbia projects that spill at a flat rate, then mean target spill levels will not be adjusted. If after a second year of otherwise successful testing, actual spill is greater than this criteria, the AAs with NOAA Fisheries concurrence, may elect to accept the highest actual spill level minus 5% (or 5 kcfs for Snake River dams and 10 kcfs for Columbia River dams) *OR* an average of the two actual spill levels under which the two successful tests were conducted as the new target spill level to attain juvenile performance standards. Alternatively, to be determined on a case by case basis, the AAs with NOAA Fisheries concurrence may elect to either conduct additional testing at the original target spill level or adjust future target spill levels by the amount exceeding the acceptable variance as stated above.”

Given the procedures outlined by NOAA, the operations accepted after performance testing will depend on whether results from 2010 are accepted. In 2010, actual operations exceeded planned spill levels during part of the testing period.

6. *If results of any year of testing are accepted as passing, does rejection of other results from that same year of testing (same methods) constitute a failure to meet the standards for those species? (e.g., 2010 acceptance of subyearling estimate and rejection of yearling and steelhead estimates.)*

Yes, see above (#2).

7. *Do any failures to meet standards in past tests require reconsideration of the Bonneville Project configuration for juvenile fish passage?*

Performance testing at Bonneville Dam has failed to meet performance standards for yearling Chinook and Steelhead in every year of testing. Rather than simply retesting, all options for juvenile survival, including increased spill, should be considered to maximize juvenile survival and increase adult returns. As described in the 2012 NOAA report *Federal Columbia River power system juvenile dam passage performance standard and metrics*, performance testing should clarify the need for operational and configuration improvements.

8. *Do the Action Agencies anticipate averaging test results across projects to meet the standards and how will this be accomplished?*

Although averaging performance standards results has been repeatedly discussed in SRWG, a specific methodology for this has not been proposed. It is unclear if the averaging of survival estimates would occur across dams and/or years, and how precision estimates would be incorporated into that average.

Yearling Chinook survival has not met the standard at Bonneville Dam in either 2010 (single release) or in 2011 (adjusted survival) so it is unclear how averaging survivals between years at Bonneville Dam would achieve any management goals. Similarly, the average of Steelhead survival between 2010 and 2011 is 0.9549, which is below the standard of 0.96. The precision estimate from 2011 exceeds the standard, for both species, and so an average of point estimates of survival is an inappropriate way to manipulate the data.

Appendix A

FPC Memos and Joint Technical Staff Memos Regarding Performance Testing

June 24, 2009 - <http://www.fpc.org/documents/memos/91-09.pdf>
July 29, 2010 - <http://www.fpc.org/documents/memos/93-10.pdf>
February 16, 2011 - <http://www.fpc.org/documents/memos/20-11.pdf>
March 24, 2011 - <http://www.fpc.org/documents/memos/37-11.pdf>
June 21, 2011 - <http://www.fpc.org/documents/memos/91-11.pdf>
February 15, 2012 - <http://www.fpc.org/documents/memos/11-12.pdf>
March 16, 2012 - <http://www.fpc.org/documents/memos/25-12.pdf>
March 23, 2012 - <http://www.fpc.org/documents/memos/31-12.pdf>
January 4, 2013 - <http://www.fpc.org/documents/memos/02-13.pdf>
February 11, 2013 - <http://www.fpc.org/documents/memos/15-13.pdf>
March 19, 2013 - <http://www.fpc.org/documents/memos/32-13.pdf>
March 22, 2013 - <http://www.fpc.org/documents/memos/44-13.pdf>
October 7, 2013 - <http://www.fpc.org/documents/memos/120-13.pdf>
December 3, 2013 - <http://www.fpc.org/documents/memos/138-13.pdf>
January 14, 2014 - <http://www.fpc.org/documents/memos/05-14.pdf>
January 21, 2014 - http://www.fpc.org/documents/joint_technical/07-14.pdf
January 27, 2014 - <http://www.fpc.org/documents/memos/10-14.pdf>
January 27, 2014 - http://www.fpc.org/documents/joint_technical/21-15.pdf
May 2, 2014 - <http://www.fpc.org/documents/memos/60-14.pdf>
February 3, 2015 - <http://www.fpc.org/documents/memos/25-15.pdf>
February 20, 2015 - <http://www.fpc.org/documents/memos/33-15.pdf>
February 20, 2015 - http://www.fpc.org/documents/joint_technical/34-15.pdf
June 8, 2015 - http://www.fpc.org/documents/memos/92-15_rev1.pdf
June 8, 2015 - http://www.fpc.org/documents/joint_technical/96-15.pdf