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MEMORANDUM

TO: Erick Van Dyke

FROM: Michele DeHart

DATE: July 28, 2015

SUBJECT: Request to review NOAA documents dated July 22, 2015

In response to your request we have reviewed two memoranda from NOAA Fisheries: *Recommended Operations for adult sockeye at Lower Granite and Little Goose Dams*, and *Analysis of Emergency Sockeye Operation at Little Goose Dam*. Based on our review we conclude that:

- We agree with NOAA's statement that "Hot temperatures are negatively impacting adult migrating salmon and steelhead in both the mainstem Snake and Columbia Rivers as well as in the tributaries."
- We disagree with NOAA's recommendation to operate Unit 1 as the priority unit through the rest of the summer.
- Staff recommendation to continue operation of Unit 1 at Lower Granite Dam and to terminate spill operation at Little Goose Dam to increase adult sockeye dam passage are impossible to evaluate using available data.
- Daily adult counts are likely inaccurate at the current low numbers with the visual counting operation in place where 10 minutes of every hour in a 16-hour period are not counted.
- Data provided for the impact on juvenile survival suggest the number of juveniles impacted is very low. These numbers are based on incorrect assumptions and survival estimates based on acoustic tagging studies that have been heavily criticized for technical issues.

- In addition, NOAA’s recommendation for emergency operations is narrow and only focuses on actions that may impact juvenile survival.

We agree with NOAA’s statement that “Hot temperatures are negatively impacting adult migrating salmon and steelhead in both the mainstem Snake and Columbia Rivers as well as in the tributaries.”

There is no doubt that hot temperatures are negatively impacting adult migrating salmon and steelhead throughout the Columbia Basin. Reports of dead salmon, fish in deteriorated conditions, and fish delaying in cool water areas are occurring on a daily basis throughout the system. The FPC estimated that the conversion rate of PIT-tagged adult sockeye between Ice Harbor and Lower Granite dams was significantly lower (0.36 through July 14th) than observed in the previous seven years that estimates were available. This is much lower than what had been observed over the previous seven years and even lower than what was observed in 2013, the last time a significant adult passage issue for sockeye adults in the Lower Snake River was observed (Table 1).

Table 1. PIT-tag conversion rates (IHR to LGR) of sockeye adults detected at Ice Harbor Dam (2015 is preliminary and is adjusted for travel time between projects).

Year	Conversion Rate (IHR to LGR)
2008	0.93
2009	1.00
2010	0.91
2011	0.95
2012	0.91
2013	0.70
2014	0.94
2015	0.36

We disagree with NOAA’s recommendation to operate Unit 1 as the priority unit through the rest of the summer.

NOAA fisheries states that Dworshak operations, cooler air temperatures, the use of pumps to lower ladder temperatures, and the operation of Unit 1 have contributed to the passage of adult sockeye at Lower Granite Dam. All of these factors occurred simultaneously and, consequently, it is impossible to attribute a passage improvement to the operation of Unit 1. In spite of this, NOAA continues Unit 1 operation through the entire summer. The operation of Unit 1, a fixed blade unit, requires a higher flow through the turbine and provides a lower level of spill. This represents a reduction in juvenile passage protection from the amount specified in the 2015 Fish Operations Plan. While there are variations allowed under a declared fish emergency, the data are not presently available to show that Unit 1 operation is required for adult sockeye passage.

Following is a graph (Figure 1) of the ladder temperatures at Lower Granite (distributed by the COE), ambient air temperatures, and the adult sockeye passage counts at the project. The graph notes the project operations: Operation 1 - Unit 2 Priority/RSW on (9 days of data), Operation 2 - Unit 2 priority/RSW Off (4 days of data), and Operation 3 - Unit 1 Priority/RSW Off (7 days of data). At this time no analyses have been conducted beyond visual inspection. However, to note from the graph, comparing Operation 1 to Operation 3 shows similar variability in adult counts. Operation 2 may have had the lowest counts, but the operation occurred only for four days during which high ladder temperatures were observed. Given the visual relation between ladder temperatures and adult passage numbers, it is not appropriate to conclude that Unit 1 operation has been a factor affecting adult passage.

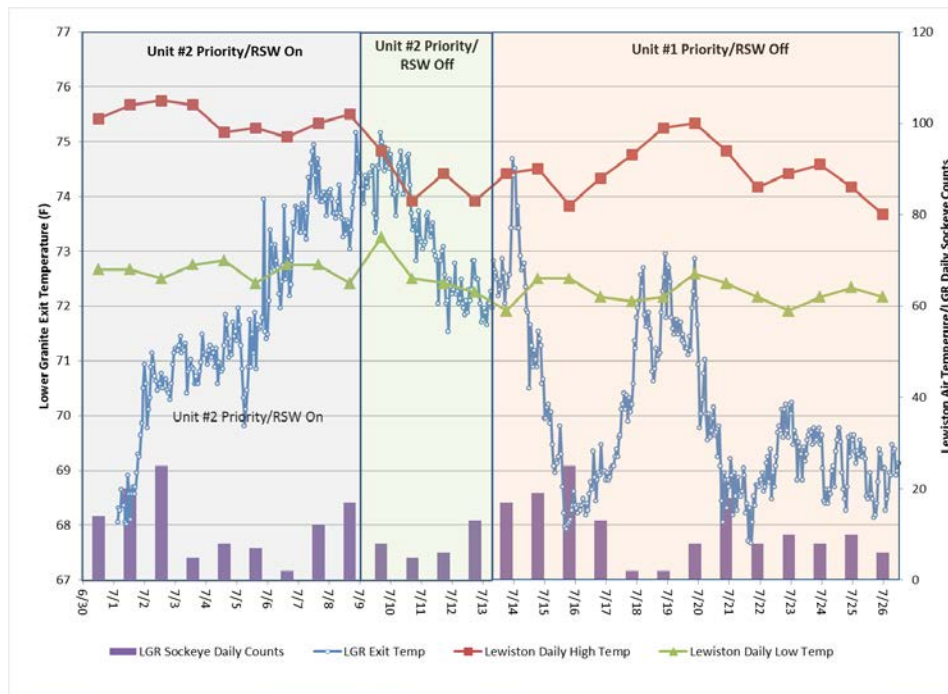


Figure 1. Lower Granite Dam fish ladder exit temperatures from June 30, 2015, through July 26, 2015, along with Lewiston, Idaho, daily minimum and maximum air temperatures and daily Lower Granite adult sockeye dam counts.

Given the inability to relate Unit 1 operation to adult sockeye, it would be more prudent to return to Unit 2 operation to restore juvenile fish passage protection, or to develop an actual operation using Unit 1 that would allow for a systematic and meaningful evaluation.

Staff recommendation to continue operation of Unit 1 at Lower Granite Dam and to terminate spill operation at Little Goose Dam to increase adult sockeye dam passage are impossible to evaluate using available data.

The following table (Table 2) shows the annual counts for sockeye at Snake River projects since 2005. The data show considerable variation of the counts among the projects, with no associated trend among years. In some years the counts at Lower Granite and Little Goose far exceed the

number passing at Ice Harbor Dam (e.g., 2008–2011, 2013, 2014). In other years sockeye counts are lower at Little Goose Dam than Lower Granite Dam (e.g., 2005, 2007, 2009, 2012). These discrepancies are likely due to ladder reascension, fallback, or counting error associated with the current visual observations. The data suggest that using dam counts to calculate conversion rates or to assess the impairment of passage between projects is likely not accurate.

Table 2. Annual counts for sockeye at Snake River projects since 2005 and 2015 counts to-date.

Year	IHR	LMN	LGS	LGR
2005	18	18	13	18
2006	48	17	26	17
2007	55	44	37	52
2008	539	722	594	909
2009	867	1162	1061	1219
2010	1302	1652	1658	2201
2011	1141	1395	1436	1502
2012	453	486	453	470
2013	895	1014	996	757
2014	2392	2805	2811	2786
2015	951	833	539	368

Daily adult counts are likely inaccurate at the current low numbers with the visual counting operation in place where 10 minutes of every hour in a 16-hour period are not counted.

The current visual counting operation could easily provide inaccurate estimates of passage at the current low numbers. Adult ladder counts are derived from visual observations of the ladder for 16 hours per day. During that time the counters take a 10-minute break every hour, which amounts to 2.7 hours out of 16 that observations are not collected (consequently, the COE expands the hourly count by a factor of 1.2). At high ladder counts this practice and the expansion is less likely an issue. However, with daily counts ranging between 0 and 12 it means that they are observing less than one fish per hour. Consequently, the probability that missing one fish during a non-counting period, or missing a fish falling back in the ladder and double counting on re-ascension, could have a large impact. Therefore, the probability is that the counts among days are likely more similar than represented. At Little Goose Dam the adult counts for sockeye were 10 and 12 on the non-spill days and 0 and 8 on the spill days. Given the counting strategy, these two project operations did not provide evidence of different adult passage numbers.

Data provided for the impact on juvenile survival suggest the number of juveniles impacted is very low. These numbers are based on incorrect assumptions and survival estimates based on acoustic tagging studies that have been heavily criticized for technical issues.

The NOAA analysis relied on the passage index as a measure of the juvenile subyearling Chinook population currently migrating past Little Goose Dam. The passage index is not meant to be used as an estimate of the juvenile population. The passage index adjusts daily collection estimates for daily changes in spill proportions under the conservative assumption that the proportion of fish passing through spill will be close to the proportion of water being spilled. Therefore, estimates of fish guidance efficiency are not necessary for estimating a passage index. The passage index is meant to be used to assess juvenile passage timing and relative magnitude (i.e., assess increasing or decreasing trends in passage). Therefore, the use of the passage index for this analysis was not appropriate when trying to assess the impacts of the proposed LGS operations.

The 2012 and 2013 data presented in the NOAA analysis are from acoustic-tagged fish that were used for the performance standards testing conducted in these two years. These performance standards tests have received a great deal of criticism over the years. Among the many concerns from these tests is the representativeness of acoustic tagged fish to the run at large. For example, on January 14, 2014, the FPC provided a review of the 2013 LGS performance standard testing (FPC 2014). This review listed several specific concerns with the 2013 tests. Among those concerns was the high rejection rates that were observed among subyearling Chinook in the test. At 18%, the rejection rate observed in 2013 was among the highest observed for all performance standards tests to date. These high rejection rates indicate that the fish used in 2013 testing are likely not representative of the run at large and, therefore, results are likely not applicable. The NOAA analysis seems to ignore these concerns. Furthermore, the 2013 testing for subyearling Chinook took place from June 3 through July 6 of that year. Conditions during the 2013 test period were very different from what has been observed in 2015, particularly in terms of flows and temperatures (Figure 2).

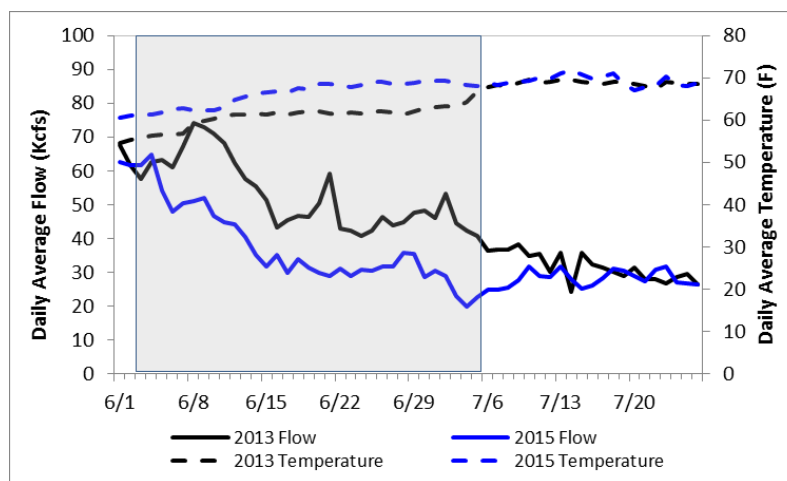


Figure 2. Daily average flow (Kcfs) and forebay temperature (°F) at Little Goose Dam, June–July 2013 versus 2015. Shaded area represents period of acoustic testing in 2013.

In addition, NOAA’s recommendation for emergency operations is narrow and only focuses on actions that may impact juvenile survival.

Some additional changes that might be considered for implementation to improve sockeye passage at projects without decreasing juvenile passage protection by decreasing spill, might include:

- 1) Cycling locks at the projects to allow adult sockeye an alternate route of passage upstream;
- 2) Securing additional pumps to allow adding cooler water drawn from deeper depths in the forebay to decrease ladder temperatures at Little Goose Dam;
- 3) Trapping seven days/week at Lower Granite ladder and/or extending trapping periods into the early afternoon when sockeye adults have been observed passing the project.
- 4) Initiating an emergency trap and haul operation at Ice Harbor Dam.

Literature Cited

FPC 2014 – Performance testing at LGS and LMN Dams for subyearling Chinook in 2013 (<http://www.fpc.org/documents/memos/05-14.pdf>).