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MEMORANDUM

TO: Charlie Morrill (WDFW)

FROM: Michele DeHart

DATE: September 10, 2018

RE: Review of “Factors Influencing Migration Depths and Spillway Passage Routes of Subyearling Fall Chinook Salmon”

At your request, we have reviewed “Factors Influencing Migration Depths and Spillway Passage Routes of Subyearling Fall Chinook Salmon” (Harnish et al. 2018). High summer temperatures in the Snake River prompted a proposal for a change in the Fish Passage Plan (FPP) that would establish new criteria for the removal of the surface passage weir at Little Goose Dam, with the intent of decreasing tailrace temperatures by moving colder, deeper water through the project. In general, this proposal would have resulted in an earlier closure than the current FPP criteria. At the time, fisheries managers expressed that the removal of surface passage could negatively impact out-migrating subyearling Chinook, as there was uncertainty regarding their depth distribution and subsequent passage through surface passage, traditional spill, and the powerhouse (2016 FPAC Notes [August 23](#)). To inform these management decisions, this analysis of existing data was requested by managers in 2017 (2017 FPAC Notes [July 11](#) and [July 25](#)).

Performance testing in 2012 and 2013 at Little Goose and Lower Monumental used acoustically-tagged fish to describe dam passage routes and survival as a requirement for the Biological Opinion. These data were not initially analyzed in a way that could describe the depth distribution and subsequent passage of juveniles through surface passage, other spill, and the powerhouse, so further analyses were requested. The results of this analysis have been used to inform surface passage operations during the subyearling Chinook migration in 2018.

The results of assessing subyearling Chinook approach and passage to the dam indicate that during the later part of the study, surface spill provides both the most used passage route and the route with the highest survival. This was true even during testing periods with higher temperatures, indicating that subyearling Chinook are not sounding as they approach the dam to access cooler, deeper water in the forebay. Rather, they are remaining near the surface and using surface spill to pass the dams.

We made comments on these studies in an FPC Memorandum ([January 14, 2014](#)) and as a Joint Technical Staff Memo ([January 21, 2014](#)). Overall, we have reservations about the use of acoustic tag data to calculate survival and describe the outmigration of salmonids (January 4, 2013). However, acoustic tagging from performance testing in 2012 and 2013 provide the best available data regarding subyearling Chinook distribution through passage routes and route-specific survival.

Our concerns about the use of these data for management decisions are summarized below.

- *Run Timing.* The studies used in this analysis followed tagged fish through the projects between June 4th and July 6th. This covered between 68.9% and 84.7% of the subyearling Chinook run. Summer operations continue through July and August and should equally protect juveniles not represented by the study period.
- *High Rejection Rates.* Tagging of subyearling Chinook in 2013 had the highest rejection rate of any performance evaluation at 18%. Most rejected fish were not included in tagging due to small size, although physical conditions such as descaling, injury, and disease also contributed to high rejection rates. The tagging effort does not include the entire run-at-large, and it is impossible to extrapolate the results on passage routes to fish not represented by the study.
- *High Temperatures not Included in Study.* Temperatures during the study period ranged from 54.6°F to 64.7°F in 2012 and 55.7°F to 66.9°F in 2013. In 2018, daily average forebay temperatures at Little Goose Dam exceeded 67°F starting on July 11th, 69°F on July 20th, and 70°F on August 4th. If out-migrating fish approach the dam at different depths when temperatures are higher, the results of the study will not be applicable to passage later in the season.