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MEMORANDUM

To: Jason Sweet, BPA

Michele DeHart

From: Michele DeHart

Date: November 30, 2015

Re: Response to comments on the Draft CSS 2015 Annual Report

Attached, please find the Comparative Survival Study Oversight Committee responses to your comments on the draft 2015 Comparative Survival Study Annual Report. Thank you for reviewing our report and providing comments. As always, your comments help to keep us on track and aid in clarifying our report.

CSS Responses to BPA Comments on Draft CSS 2015 Report

BPA Comments on 2015 CSS study – 10/15/2015

Pg. 1 (23–30): How many years of fall Chinook data is available to the CSS? What about data from upper and mid-Columbia populations? Hatchery release locations are indicated for these ESUs in figures 1.2–1.5.

CSS Response: We updated the paragraph to include summary data for fall Chinook groups that are used in CSS.

Pg. 12 (28–30): Are there implications for how this could influence interpretation of future mainstem survival studies? Will the stock composition of PIT tagged fish arriving at Lower Granite be weighted differently from previous years?

CSS Response: By moving to higher tributary traps the goal is to replace fish marked at main-stem traps with fish marked higher up in the system so that their MPG of origin or even lower level geographic designation (tributary) can be identified. This shift, by itself, should not change the stock composition greatly. However, the goal is to make the marking representative of the entire population in an MPG and not just the most populous groups that would be most likely to be captured at a mainstem trap. As we move to this type of marking for wild fish, we can better assess the stock composition of PIT-tagged fish at a finer scale. It should not result in more wild spring Chinook marking in the Salmon River (for example), but it could improve our ability to identify tagged fish to a specific MPG within the Salmon River.

Pg. 23- Intro: The chapter could benefit from a more prominent statement of objectives in the introduction. What are some possible implications to management which could be affected by model results?

CSS Response: The opening paragraph has been revised to state that results can be used to guide how habitat actions can be targeted to reverse the degradation of habitats for increased productivity, to reverse habitat loss for increased productivity, and to raise spill levels for increased in-river survival.

Pg. 26 (14–31): This model uses an annual time period, with survival rates and environmental variables estimated over the whole brood year. While it is clear that a May PDO index and April Upwelling index are used, it isn't clear if the WTT and PITPH variable are estimated as a simple mean over a seasonal outmigration period, or reflect the dynamic run timing distribution of each of the populations. If PITPH and WTT are an average of multiple dams, at which dam is run timing reflected – a more upstream or downstream location? If it is impossible to reflect distinct run timing, what is the model sensitivity to using a seasonal average when a sharp change in flow rates occurred during the migration season, as was observed in spring of 2011?

CSS Response: Consistent with other peer-reviewed publications that have examined associations between environmental indices and survival (e.g., Burke et al. 2013, Rupp et al. 2012, Petrosky and Schaller 2010, Schaller et al. 2014), a set of environmental indices was used to characterize the average conditions experienced during the time of exposure to those conditions. For the WTT and PITPH indices, the time period of exposure was April 15–May 31, the period when the vast majority of spring/summer Chinook smolts migrate through the hydrosystem. The April Upwelling Index and the May PDO index were similarly used to characterize the average conditions experienced in the ocean during April and May, respectively. The WTT index was calculated as the sum of the project-specific average water transit times during the April 15–May 31 time period of exposure. The PITPH index was calculated as the sum of the project-specific average powerhouse passage probabilities during the April 15–May 31 time period of exposure (see Appendix J for more information). Available data indicates that run timing is similar for the six populations making up the Grande Ronde/Imnaha Major Population Group and that there is little year-to-year variation in run timing. Any within-season variability in WTT and PITPH during the April 15–May 31 time period is properly accounted for within the April 15–May 31 seasonal estimate, including the late-season increase in flow that occurred in 2011. Similarly, any daily variability in Upwelling and PDO is properly accounted for within the April and May monthly estimates, respectively.

Pg. 26: In the background materials that support the PITPH variable, Tuomikoski et al (2012) suggests that fish guidance efficiency (FGE) is assumed constant through the season. ("We assume that FGE remains relatively constant across flow and spill conditions. In support of this assumption, Moursund et al. (2006) found that FGE at McNary dam did not vary across spill levels ranging from 0% to 80%."). We suggest that this report should explore whether this assumption is valid at additional run-of-river dams, and compare and contrast results. A number of investigations conducted by the Corps, NOAA, and PNNL have estimated FGE and SPE under a range of flow levels and spill levels at other federal dams. NOAA's COMPASS model includes FGE and SPE estimated curves. Including similar FGE, SPE, and associated PITPH curves would be informative. This absence of this element limits its usefulness to regional agencies and resource managers.

CSS Response: We have provided a comprehensive list of Corps-funded studies at additional run-of-river dams that have examined FGE using hydroacoustic or telemetry methods in Appendix J of this report. Across a wide range of flow and spill operations, including comparisons between high-spill and zero-spill operations, results from those studies indicate that there is very little variability in FGE within a project, supporting the "relatively constant" assumption. Most estimates of FGE range from 80% to 90% (Appendix J). The PITPH index uses dam-specific functions of spill, flow, spillway weirs, and FGE at each dam to estimate the powerhouse passage probability at each dam (see Appendix J for more information). We have provided the coefficients for those functions in Appendix J, and provide examples how regional agencies and resource managers can use those functions to estimate powerhouse passage probabilities. It should be noted that our development of the PITPH variable was in response to specific requests by regional fishery managers to develop better methods for quantifying the effects of spill and spillway weirs on juvenile salmon and steelhead passage and survival. We believe that these functions provide accurate and useful tools for regional agencies and resource managers to predicting the expected effects of various environmental conditions on powerhouse passage proportions at all of the dams from Lower Granite through Bonneville.

Pg. 35 (6–9), and pg. 47 (8–11): Placing these management concerns in the introductory paragraphs to the chapter could help establish the need for this type of analysis. It would be helpful if general model findings could be compared and contrasted with other analyses, such as NOAA's COMPASS model.

CSS Response: The life-cycle model is being developed as a means to weigh the potential benefits of actions aimed at improving freshwater spawning and rearing survival versus actions aimed at improving mainstem survival. The model uses an empirically derived powerhouse passage index estimated from PIT tags instead of a value predicted using COMPASS. The PITPH index has relatively simple assumptions and ultimately provides an objective empirical estimate of powerhouse passage that can be imbedded directly into a life-cycle model. Being free of the burden of using COMPASS to estimate passage survival, the life-cycle model is more useful for comparative analysis of tributary versus hydro action benefits.

Pg. 46 Fig. 2.10: What is the historical PITPH period, 1968–1998?

CSS Response: Historical PITPH implies the entire period of brood years 1964 to 2008, or migration years 1966 to 2010. Fraction of historical implies that all years are reduced by the same fraction in simulations.

Pg. 49 (2–19): What are the actual estimates of current PITPH vs. historical? Have we already approached this 50% benchmark relative to pre-2006 operations? If not, where are we in reducing PITPH? Also, as noted above, what exactly is the historical baseline period that is referenced here?

CSS Response: Revised Figure 2.1 shows the actual historical values of PITPH. Using a fraction of PITPH for a simulation applies the fraction to each year, making every year a fraction of the historical value. If the fraction is 50%, this has the effect of reducing a PITPH value of 6 to 3 (roughly true of the late 1980s) or a value of 4 to 2, etc. (i.e., every year is simulated at half of the empirical value).

Pg. 75: It would be instructive if this section contrasted these findings with those of the COMPASS model and related analyses.

CSS Response: COMPASS predicts spill efficiency at given flow and spill conditions. Dam survival is predicted by applying fixed route of passage survivals to the fraction predicted to experience each route of passage for each dam. Total survival is calculated by multiplying all the dam survivals. Conversely, the life-cycle model predicts total hydrosystem survival from an empirical estimate of cumulative powerhouse passage across all dams. Results presented in the COMPASS user manual suggest that the two approaches predict similar ranges of total in-river survival.

Also, expressing the degree of change in survival associated with specific spill or WTT levels would round this section out nicely. Potentially large gains for modest improvements may be appealing. Alternatively small survival gains requiring large actions might not be compared to other 'H' options.

Pg. 137–141: When hatchery release sample sizes are relatively small, results can have…large confidence intervals. Could it be reasonable to also report a joint multi-hatchery SAR?

CSS Response: It is possible to improve precision of SAR estimates by aggregated groups of hatchery fish. However, similar to the goals for wild marking, hatchery marking aggregation is not ideal. Precision of the estimates is not the only consideration. We have documented considerable variability among hatcheries with regard to the relative performance of transport versus in-river SARs. The CSS is providing tags to the Nez Perce Tribe to mark two releases from Lyons Ferry Hatchery in 2015 and 2016. These releases will be at two acclimation facilities in the Snake River. Ideally, the CSS would like to release enough fish at each location so that aggregating would not be necessary. However, because of limited numbers of tags available, aggregation will be required to achieve near adequate sample size to detect a difference in route-specific SARs. At least these two groups are from the same hatchery and are released in locations only a short distance apart on the Snake River between Hells Canyon and Asotin.

Pg. 168 (12–19): Fall Chinook populations are exhibiting some of the highest returns of any species, exceeding 1 million in total, and they incur elevated harvest rates. In order to show the usefulness of SAR as an index for this species, perhaps a future report could explore the relationship between SAR and recruits/spawner or adult abundance.

CSS Response: The CSS will consider the possibility of this type of analysis for future reports.

Pg. 168 (22–23): How do these findings compare with NOAA's weekly transportation results? A discussion comparing and contrasting any differences would be informative.

CSS Response: The CSS data is available for comparison if NOAA or other parties are interested in making those comparisons.