# FISH PASSAGE CENTER

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**MEMORANDUM**

TO: Charlie Morrill, WDFW
Erick Van Dyke, ODFW

FROM: Michele DeHart

DATE: March 9, 2016

RE: Review of *Within-season indicators of fish condition related to differential delayed mortality*

In response to your request, we have reviewed the proposal *Within-season indicators of fish condition related to differential delayed mortality* submitted by Anderson and Gosselin. Although the proposal outlines a number of goals and objectives, the details of how the data collected will achieve those goals are noticeably lacking. Without specific hypotheses to be tested, detailed provision of analytical methods and how data will be incorporated into existing or new models, this proposal cannot be considered a complete study plan. However, despite the vagueness of the study plan, several weaknesses of the study proposal became apparent during our review.

The primary focus of this proposal is to research the current transportation system. However, the study design presents a low likelihood for useful management application. The proposal recognizes that the effectiveness of transportation is relative to the environmental conditions within the FCRPS and suggests that the current transportation system could be modified to improve survival of transported fish. No emphasis on modifications to the in-river environment is included, despite current information which strongly indicates that major gains in survival rates could be achieved through increased spill and other management changes to in-river conditions. The management focus on potential adjustments to transportation without considering the in-river environment is unlikely to lead to meaningful survival increases of Snake River salmon and steelhead.

Below is a summary of our concerns regarding this proposal:

- The proposed sampling schedule uses a combination of dams, including LGR/LGO, IHR/MCN, and BON, as sampling sites. Given the potential of collecting fish from different points of origin and differing lengths of time spent migrating in-river, it is impossible to determine how general seasonal patterns of fish condition, or the significance of energetic reserves, can be accurately determined as outlined in the proposal.

- The proposed measurements of $D$ ($SAR_T/SAR_R$) will be biased relative to the entire outmigration population, because the "run-of-river" fish (group R) will be composed only of fish that are bypassed. Bypassed and collected fish have been shown to have lower SARs compared to fish passing over the spillway (Tuomikoski et al. 2010, Chapter 7).

- The management inferences do not address potential effects on other species such as sockeye. Hatchery Chinook is the only group included in this study. Transport to in-river ratios (TIRs) for hatchery spring/summer Chinook are generally higher than those of wild Chinook (Smith 2013). The baseline measurements in this study are inappropriate for making decisions about the entire transportation program as a management action. It is important to emphasize that this study cannot provide information regarding the prevailing management question of the impact of the smolt transportation program on wild Chinook.

- Identification of the causes of delayed mortality between transported and in-river migrants will not result from the implementation of this proposal due to the fact that all sampled fish will have experienced at least one juvenile bypass system. The negative impacts of bypass at one or more dams will be incorrectly groups with smolts that migrate in-river without bypass passage. This proposal ignores the possibility that passage through a juvenile bypass system itself may cause delayed mortality.

- The reduced sampling recommendation in the revised proposal results in less statistical power to distinguish differences in condition between samples or on a fine temporal scale. Rather, the stated goal is to document a season-long decline in fish condition. This seasonal decline is already well established in the Columbia Basin (Congleton et al. 2005). The proposed work is unlikely to add additional understanding or refinement of results of previously completed studies.

- The calculation of seasonal SARs generates wide confidence intervals (Smith 2013), particularly when there are few adult returns. Given the limited sample sizes discussed above, it is dubious whether the condition samples will be able to distinguish any significant season-wide impact of condition on adult returns.

- Studies from 2005–2011 have collected smolts at Lower Granite Dam and released them at Ice Harbor to study the potential management strategy of early release of transported fish (Marsh 2012, 2015), as cited in the proposal. Although not all the results have been made available for analysis, it is important to acknowledge that these releases compare

only fish that have been tagged, trucked, and released into various parts of the hydro-system and have not been compared to the standard transported or in-river migrant. The results of these studies of early release of transported fish below Ice Harbor were obviously not adequately compelling to implement this strategy as a transportation management option.

- The primary stated goal of this proposal would result in a predictive model that would use fish condition at Lower Granite to initiate transportation at a determined optimal time, and would then transport smolts to different regions of the basin depending on their condition. The data collected in the proposal does not seem adequate to provide the level of precision required for that kind of management strategy. Seasonal TIR ratios estimated by Smith (2013) displayed wide confidence intervals. Adding to the complexity of their model by adding a predicted fish condition variable could result in even more uncertainty, with a reduced chance of showing significant differences between transported and in-river seasonal SARs.

- The discussion of expected results and applicability for all three strategies included in this proposal is unconvincing. Strategy A proposes that inter-annual differences in environmental conditions can provide a baseline to determine if transportation is an overall benefit to fish. Strategy B proposes that these data will provide an in-season basis for adaptive management. Strategy C proposes early season smolt transportation through early season short haul transportation. The study design outlined in this proposal will not provide the data to evaluate these strategies, and so will not provide any insight into management strategies.

In conclusion, the study design outlined in this proposal will not fulfill its stated goals; will not add to the current body of knowledge on outmigration conditions or the transportation program; will not generate data that will support conclusions or modeling efforts regarding the condition of juvenile downstream migrants comprising the run-at-large; and will require the lethal sampling of fish without a probable transportation program application or any other fish passage management application.

**Literature Cited**

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