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Joint Technical Staff Memorandum



CRITFC IDFG ODFW USFWS WDFW

March 19, 2002

Mr. Rich Zabel
National Marine Fisheries Service
7600 Sand Point Way N.E.
Seattle, Washington 98115-0070

Dear Mr. Zabel:

The Columbia River Inter-Tribal Fish Commission, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U. S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife are submitting the following comments on the National Marine Fisheries Service (NMFS) draft report entitled, "Survival Estimates for the Passage of Spring Migrating Juvenile Salmonids Through Snake and Columbia River Dams and Reservoirs, 2001" (Zabel et al. 2001). The findings of the NMFS draft report were presented to the Implementation Team on February 13, 2002 and the Northwest Power Planning Council (NPPC) on February 5, 2002. Much of the material presented in the 2001 draft report was included in a report provided under contract to the NPPC entitled "Mainstem Passage Strategies in the Columbia River System: Transportation, Spill and Flow Augmentation" (Giorgi et al. 2002). These technical comments are specifically provided for your consideration in developing your final 2001 report, but to the degree that information from the report draft is reflected in the NPPC document and the presentations, these comments also apply. We have reviewed and concur with comments submitted by the Fish Passage Center (FPC) dated February 27, 2002. We are requesting that both sets of comments be appended to your final report along with a response explaining how the comments were addressed.

General Comments

The report and presentations draw conclusions about the benefits of spill and flow augmentation that could be easily misinterpreted without additional explanation. Readers unfamiliar with the data and methodologies could be misled without further discussion of limitations of the data and other caveats regarding the analyses. A majority of our comments relate to this point. Additional explanation and qualification of statements will serve to diffuse ongoing regional controversies related to flow and spill mitigation measures.

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Many of the statements in the draft appear to contradict each other. As an example, the report states that the benefits of spill are inconclusive, but in other parts of the report spill is recognized as beneficial and an important recovery measure. Additional explanation would clarify findings and would reduce these apparent contradictions.

Several Figures are almost impossible to interpret because they are too "data heavy". For example, note Figures 2 and 10. We suggest that the data be divided into two or three graphs.

The report needs to note the limitations of reach survival estimates. The fact that they have limited utility with respect to evaluating indirect and delayed mortality should be described in the text and in the final recommendation/conclusion section of the report.

While the report offers a gross description of operational and environmental conditions present during the survival studies, the report should direct the reader to specific data, reports or information where these conditions are better described.

While we agree that it is important to continue to obtain new information about direct juvenile salmon survival under recent operations and system configuration, we also believe that past data is important to consider for current management decisions. Past survival studies provide valuable information as to trends in survival and productivity that should be considered with more recent information.

With respect to the recommendations section, which really contains study conclusions and should be labeled as such, we find that some of the conclusions do not comport with the data and survival estimates contained in the report. This is a considerable problem. For example, conclusion/recommendation #4 states that "... [I]ittle mortality has been found in Lower Granite and other reservoirs". This statement is not correct when survival of individual release groups is considered. For example, the Lower Granite reservoir survival estimates presented in Table 26 indicate that hatchery chinook suffer about 11% mortality through Lower Granite reservoir. Further, even the pooled group survival estimates in Table 11 indicate that the McNary Dam to John Day Dam steelhead mortality was almost 15% - a very high rate compared to other reservoir survival estimates. Generalized conclusions of the data and analysis in the report that does not present the variability of the ranges of estimated salmon survivals is problematic for readers that do not have the background or time to consider the contents in the full report and creates a false impression with respect the actual results of the study.

A key issue not addressed in the conclusion and recommendations section is what are the critical study design assumptions and whether or not these assumptions (see Chapter Six in Burnham et al. 1987) in the study design have been met. Earlier in the report it is stated that generally the assumptions were met but how each one was met was not explicitly described in the report. This should be remedied for the final report.

Individual fishery agencies and tribes may provide more detailed comments regarding the draft report. The following comments should be considered in addition to specific fishery agencies' and tribes' comments.

Specific Comments

Benefits of Spill

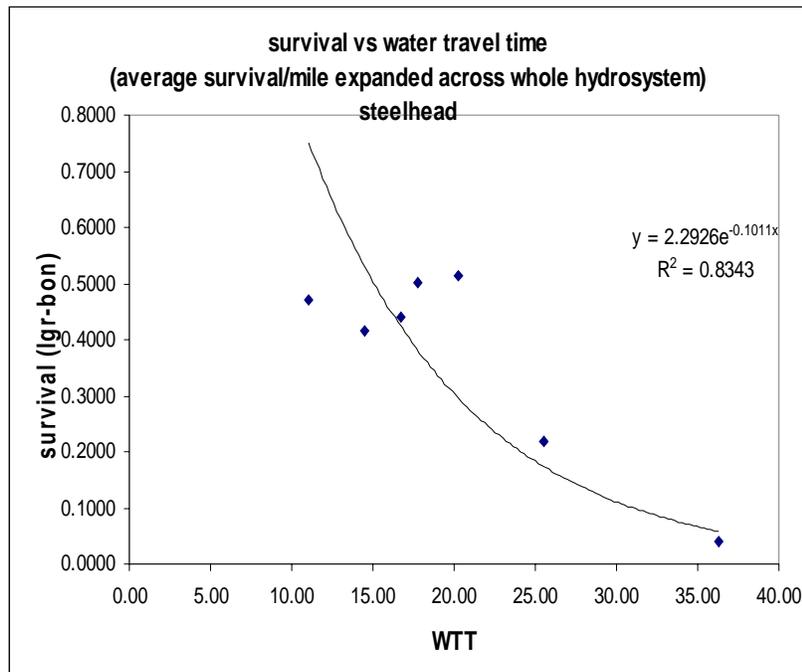
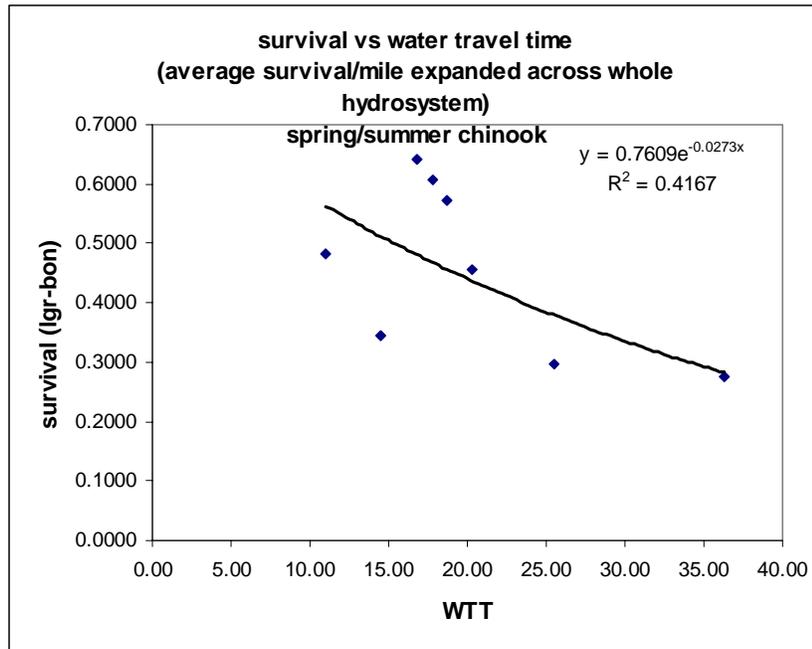
Benefits of limited spill, which occurred in 2001, are evaluated. The survival estimates included in Table 40 of the draft report, show an increase in survival with spill, although NMFS concludes as a result of their statistical tests that demonstrating in-season effects of spill is "problematic." NMFS appropriately qualifies this conclusion by stating that a lack of relationship may have been due to less than an ideal experimental design and low spill provided in 2001 compared to past years and that spill provides additional

(travel time) benefits that are not realized until later in the life cycle. NMFS needs to further qualify its findings with a discussion of the limitations of their analysis including effects of small sample sizes caused by segregating releases into four release groups (Snake River spring/summer chinook, Yakima spring chinook, Upper Columbia spring chinook, and Upper Columbia summer chinook) and into three blocks (pre-spill, spill, post-spill). The lack of a statistical difference in survival between the release groups and blocks was driven primarily by low sample sizes in the post-spill groups. To improve sample sizes and precision of statistical tests, the FPC aggregated all releases into two blocks (pre-spill and spill) and found that yearling chinook survivals from McNary Dam tailrace to John Day tailrace was significantly higher (89.7 vs 78.8%) for fish that migrated after May 21 coincident with initiation of spill at John Day. This demonstrates that even limited spill as occurred in 2001 can provide significant improvements in juvenile survival.

The report also states that the observed increase in survival in 2001 may have been due to temporal effects that have been observed in previous years. However, unlike past years, spill was the only environmental variable that had increased when the temporal increase in survival was observed. In 2001, flows, and turbidity, between McNary and John Day dams were consistently low throughout the migration season and travel times were long. In addition, although sample sizes were too low for statistical tests, unlike past years, fish survival estimates were more precise and decreased dramatically for groups released on or after June 7 that occurred coincidental with termination of spill. These observations and further discussion needs to be included in the report to avoid misinterpretation of results and conclusions related to the benefits of spill on fish survival.

Flow/Survival Relationships

The report concludes that due to low flow and spill conditions in the Snake and Columbia Rivers in 2001, system (Lower Granite to Bonneville) survivals of chinook and steelhead were extremely low. Chinook system survival in 2001 was 27.6% and 4.2% for steelhead, which was considerably lower than any recent years. Similar findings were reported for survivals calculated on an average per-project basis. To determine the effect of flow on survival, NMFS conducted regressions between per-project survivals dating back to the 1970's and flow. NMFS relies on regressions of per-project survivals and flow to explore the relationship between flow and survival. NMFS does not detect a relationship with this analysis because of the variables they selected to represent fish survival. Per-project survival when extrapolated from short reach estimates, does not accurately reflect fish survival through the whole hydrosystem, overestimating survival and obscuring a flow survival relationship. It is difficult to detect statistically a flow-survival relationship using historic per-project survivals because the yearly survivals were based on different tagging methodologies (early years were based on freeze brands and recent data based on PIT tags) and different number of projects used in average per-project survival estimates (range of 2-7 projects). Using historic per-project survivals tends to reduce the variability in survivals between years (ex: excluding steelhead survival in 2001, survivals for chinook and steelhead ranged from 0.85 to 0.95 during 1993-2001) and reduce the ability to detect a flow-survival relationship. . If survival per mile is regressed against average water particle travel time and average proportion spilled over the length of the migration season a significant relationship is observed for both spring/summer chinook and steelhead. Survival estimates for yearling chinook were from CSS (Bouwes et al 2001) in 1994-2000 and NMFS (Zabel et al. 2001) in 2001; steelhead survival estimates were from NMFS whitepapers for 1994-1999 and NMFS (Zabel et al. 2001) in 2001. Stepwise regression results for spring/summer chinook indicated survival per mile was moderately dependent ($r^2=0.54$; $p<0.04$) on a combination of water travel time and spill (interaction term).. Stepwise regression results for steelhead indicated survival per mile was strongly dependent ($R^2=0.98$; $p<0.005$) on water travel time, spill and the interaction of spill and water travel time. These analyses bring an additional facet to the consideration of flow augmentation as a passage strategy. The following plots show that flow is an important component for steelhead and spring/summer chinook survival through the hydrosystem.



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Longer reach survivals as used in the FPC analysis is a preferred approach to evaluating the effects of flow on survival because it allows use of a wider range of survivals that makes it easier to detect flow vs survival relationships. For example, although longer reach survival data using PIT tags is limited to recent data sets, FPC was able to demonstrate a more marked effect of low flows in 2001 on survival than reported by NMFS for both chinook and steelhead when Lower Granite to McNary (1995-2001 data) and Lower Granite to John Day (1999-2001) reach survivals were used (Figures 2-4).

The FPC analysis corroborates findings of analyses used to establish NMFS' Snake River spring flow objective that flows less than 85 kcfs results in high mortality of Snake River spring/summer chinook. Spring flows in 2001 were substantially below (<50 kcfs seasonal average) the flow objective of the 2000 Biological Opinion. Flow-survival relationships in the Biological Opinion showed that survivals of Snake River spring/summer chinook were consistently low when Snake River flows were below 85 kcfs. The NMFS report should acknowledge that the data presented by FPC support the 2000 Biological Opinion minimum spring flow objective of 85 kcfs for the Snake River and that low flows as occurred in 2001 can significantly reduce survival of both yearling chinook and steelhead.

To conclude, we hope that these comments will be considered and reflected in the drafting of the final report. The report provides important information for Columbia River fish passage management decisions. Improving the analyses, and strengthening the discussion, and providing appropriate conclusions with caveats to better explain the strengths and weaknesses of the data and analyses will better inform fishery managers and the region how to best design and implement fish passage measures to maximize survival of spring migrating fish.

Sincerely



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