# FISH PASSAGE CENTER

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**MEMORANDUM**

**To:** **John Stein, PhD**
**Salmon Science Coordinator**
**Northwest Fisheries Science Center**

**From:** **Michele DeHart**

**Date:** **January 30, 2004**

**Re:** **Comments on NOAA Fisheries technical Memorandum– Effects of the Federal Columbia River Power System on Salmon Populations**

We have reviewed the draft technical memorandum dated December 21, 2003 entitled "Effects of the Federal Columbia River Power System on Salmon Populations". We are submitting these comments on January 30, 2004 to meet the February 1, 2004 comment deadline date established in the December 22, 2003 NOAA correspondence to the state and tribal co-managers from Usha Varanasi. The Fish Passage Center, as technical staff for the state and tribal co-managers was requested to review this manuscript and provide comments. We hope these comments will be useful in finalizing the document.

We understand that this memorandum is intended to provide an update of information on the effects of the FCRPS collected since the original White Papers were developed as the foundation for the 2000 Biological Opinion (BIOP). This memorandum is intended to provide the basis for the new Biological Opinion being developed under the remand process. The draft document was made available for review late in 2003 and did not include corroboration with any agency and tribal fishery technical staff members. In general, we do not believe that the technical memorandum provides an adequate and complete basis for the development of a new Biological Opinion. Specifically we found the document to be:

- Poorly organized and does not flow with regard to data, analyses and subsequent hypotheses presented. More time and corroboration with the co-management agencies might have lead to a better quality draft product.
- Unbalanced as to the amount and quality of data (and the uncertainty associated with that data) that is used to develop hypotheses, and the amount and quality of data used to dismiss prevailing hypotheses.

- Rife with rambling hypotheses proffered throughout the results and discussions section. Most lack true scientific substantiation and rely primarily on conjecture and opinions.
- The most glaring deficiency of the document is that it lacks a summary and conclusions section. Without these sections it is impossible to consider the potential application of the information contained in the document.

Since the early 1990's mitigation actions in the form of flow and spill for fish passage have been provided for migrating juvenile salmonids. This coupled with good ocean conditions; habitat improvements and hydropower facility modifications should have produced some improvement in the survival of salmonids to adulthood. The authors should recognize up front that they are primarily evaluating data collected under improved conditions due to the implementation of several mitigative actions.

Page 5 – Evaluations of stocks subsequent to PATH. The authors introduce a paragraph regarding a matrix model developed in 1999 and state that the results showed there was little improvement that could be made in the migration corridor. The matrix model set a value of 0.7 for D and used a range of D values. The authors do not state why they included this information, which seems random in this document without updating the analysis. The authors should address how the D values reported on page 47 (geometric mean of 0.478 for wild spring summer chinook transported from Lower Granite Dam) are significantly lower than 0.7 and how this might alter the conclusions originally made by Kareiva et al. 2000.

Page 14 – The authors' state that they made use of all PIT tagged fish available in the database without addressing the various caveats and details involved in the studies for which fish were tagged. While we realize it is a time consuming and labor-intensive task to define experimental procedures associated with individual tag groups, we do think it would have been appropriate to do that work, or to eliminate unknown treatments from the analysis. By their own admission that some of the survival estimates "may not reflect or represent the true survival of the untagged population to which inference is intended." Consequently, it is difficult to assess the validity of the hypotheses presented by NOAA.

Page 20 – The authors' present information from Zabel et al. (In Review) that they claim suggests that the lower return rates for multiple bypassed fish may be explained by size selectivity of bypass systems. A more thorough presentation and discussion of all the information related to multiple bypassed fish would be more appropriate in this technical document. In addition, the authors' state that this phenomenon did not bias juvenile survival estimates. The suggestion that size selectivity does not bias juvenile survival estimates, but does affect adult return rates suggests significant concern is warranted regarding the use of juvenile survival estimates in assessing hydrosystem performance standards. Utilizing manuscripts that are not available and have not been publicly reviewed is problematic in management decision-making.

Page 22. NOAA states that while SAR data is only available for Snake River spring/summer chinook they use dam counts to assess changes to other populations. Snake River spring/summer chinook have produced SARs in the 2-6% range for smolts back to Lower Granite Dam. While

this is certainly encouraging information, it is impossible to predict if this trend will continue in the 2-6% range needed for recovery, particularly if changes are made to present mitigation measures. Additionally, the use of dam counts as a ratio (Figure 6) is somewhat misleading. While numbers have increased, it is not possible to determine if these ratio changes translate to achieving recovery goals.

Page 23 – The statement is made that travel time only varied by a few days, with the exception of 2001. NOAA should include a discussion of the flow objectives for spring and summer flows, and how in most of the years recorded here the flow objectives were met, or were close. Under the implementation of flow objectives, the variability in travel time would be minimized as displayed in the table.

Page 27 – NOAA argues that similar juvenile survival estimates between hatchery and wild stocks suggests that hatchery fish can be used as a surrogate for wild fish relative to the collection of juvenile survival information. NOAA fisheries needs to explain how this is consistent with the statements made later in the document that smaller fish do not survive to return as adults at the same rate as larger fish. Most wild fish are smaller than their hatchery counterparts. This again raises the question of the meaning of juvenile survival estimates in overall recovery of salmonid populations.

Page 28 – NOAA should consider explaining the relation between bird predation and flow. From the data presented it appears that the magnitude of bird predation is directly related to the flow that occurred in that year.

Page 30 - Paragraph 4 – NOAA states that juvenile fish that migrate in September and October account for 14 and 36% of the total adult return from PIT tagged fish. This statement is extremely misleading. We do not know that these fish migrated in September and October. We do know that they passed Lower Granite Dam, but without PIT tag detection through the winter months we cannot know if the fish over-wintered in the lower Snake or Columbia River and migrated as yearling fish, or continued through the system. Also, if undetected fish made up 36% of the adult return is this the same situation, undetected because juvenile sampling facilities are not operational. In addition, it is unclear if this is an annual trend, or if it is due to migration conditions observed in specific years.

Page 36 – NOAA makes the argument that the relation between fish travel time and flow is not as clear as past years' and may actually be a relation between smoltification and travel time based on data collected in 2002 and 2003. They show little or no relation between flow (which varied little) and travel time during the early part of the migration. The importance of smoltification as a variable in determining migration speed has previously been recognized (Berggren and Filardo, 1993). However, these data do not demonstrate that smoltification has more influence than flow, but rather that, in the absence of flow changes smoltification becomes the dominant variable. The primary point missed by NOAA is that the actual travel time may have been reduced from that observed, if flows had been provided during this period.

The authors cite the paper by Smith et al. (2002) to conclude that there was a strong relation between river flow volume and the reach travel time of yearling chinook and steelhead smolts in

the Lower Granite Dam to McNary Dam reach, but no such relation between river flow volume and smolt survival. The authors should also add text to cite the analyses presented on pages 74-95 of the 2002 Fish Passage Center Annual Report that showed a statistically significant relation between smolt survival in this reach and a flow-related variable in a multiple regression. The flow-related variable is water transit time (also termed water particle travel time). Water transit time is computed by dividing the daily reservoir volume by daily average discharge, and then taking an average of these daily ratios over a 7-day window around the median dates of passage of a PIT tagged group of smolts through each of the reservoirs of interest. Lastly, the water transit times in each reservoir is summed over the four reservoirs between Lower Granite and McNary dams. This flow-related variable has a closer link to what the migrating smolts are experiencing in each reservoir than the typical average flow volume indexed at one dam in the reach. During the 7-day window of passage at each dam in the reach, the additional variables of spill proportion and river temperature were obtained and averaged across Little Goose, Lower Monumental, Ice Harbor, and McNary dams. The FPC analyses showed a statistically significant joint effect of water transit time, spill proportion, and river temperature on yearling chinook reach survival, and for steelhead a statistically significant joint effect of water transit time and spill proportion of the smolt reach survival. The results of the FPC analyses should also be added to counter-balance the statement made based on the Smith et al. paper.

Page 37 – line 3. The relation among survival, flow, temperature and turbidity for Upper Columbia subyearling chinook should be recognized as a trend, although not "statistically" significant.

Page 39 Table 13 and page 47 Table 21 – There is a discrepancy between these two tables in the number of PIT tagged wild chinook adults in the non-detected (non-transported) category. Both tables state that this category of fish represent the migratory history for the non-tagged fish, but the number of wild chinook adults in each year differ between the two tables. Table 21 has the higher numbers of PIT tagged wild chinook in the non transported category than shown in Table 13 for the non-detected category. The data in Table 21 appears to reflect returning adults from those PIT tagged wild chinook smolts not detected at a Snake River transportation site, and are closer in magnitude to what was used in the Comparative Survival Study (CSS numbers are less than 15% smaller than the NMFS numbers in Table 21, but 10-35% higher than the NMFS numbers in Table 13). It is unclear whether the non-detected category in Table 21 required the PIT tagged wild smolts to also get by McNary Dam undetected in each year, but if so, that would cause a lower number of PIT tagged wild chinook smolts and subsequently adults in this category. However, there was no springtime transportation at McNary Dam in 1995 through 2000, so those years should not include the requirement of passing McNary Dam undetected as a condition of being included in the non-detected category. I am not sure if this was the case, but the numbers in Table 13 are substantially lower than in Table 21, indicating there was some major change in criteria for deciding how many fish are in the non-detected (non-transported) categories between these two tables.

Page 45 – Estimates of D. NOAA should include a discussion of how well the D values collected and presented here compare to the D values assumed in the analyses conducted for the 2000 BIOP. They should also include a discussion of how well they compared to the D values generated from the CSS studies.

Page 51 – From the data presented it appears that transported fish survive better later in the migration season (D of transport exceeds D of non-transported groups). However, from figure 17 it is apparent that most fish have already passed the project by this time in the migration season. Perhaps a discussion is warranted as to whether transportation can ever be an effective recovery tool for spring/summer chinook. These data coupled with the information presented on page 37 (annually 70 to 99% of wild chinook and 60 to 90% of hatchery chinook are transported) suggests that the "spread –the risk" policy is biased towards a more questionable management strategy.
Page 53 – NOAA refers to evidence that PIT tagged fish may return at lower rates than the untagged population and suggest their use in comparative studies, but not in assessing absolute adult returns. However, previous studies conducted by IDFG (Keifer et al. 2002 and updated Keifer 2004, personal communication) did not show a lower SAR for PIT tagged wild spring chinook compared to the untagged population (Figure 1).

Page 55 – It is true that transported fish likely enter the ocean prior to the time that there non-transported counterparts. However, this alone cannot be used to explain the seasonal delayed mortality observed for transported fish without a much more detailed analysis. Ocean conditions are highly variable and it is not inconceivable that at times transported fish may experience better ocean conditions that their non-transported counterparts.

The data do not support delaying hatchery releases at this time without a much more thorough review of the data and addressing all the potential complications that might occur from extended holding and potential delay.

Page 57 paragraph 3 –As we discussed previously, the data presented do not suggest little relation between travel time and flow, but rather that, in the absence of flow changes smoltification becomes the more dominant variable. The primary point missed by NOAA is that the actual travel time may have been reduced from that observed, if flows had been provided during this period.

Page 57 paragraph 4 – NMFS has suggested a higher probability of smaller smolts (both yearling chinook and steelhead) being diverted by the screens into the bypass channels at the collector dams. This results in the population of fish being transported to be smaller in length than the population passing the dams through spill and turbines. NMFS also notes that "smaller juvenile salmon return at lower rates" which would "suggest that fish detected in juvenile bypass systems return at lower rates than non-detected fish." From these findings, they state "transportation evaluations of PIT-tagged fish marked above a dam, then collected and barged compared to non-detected fish serving as controls may produce biased results." If the fish PIT tagged and released upstream of the hydro system are passing through the hydro system in the same manner at the non-tagged fish they are representing, then the T/I ratio would not be biased. Instead it would simply have a fish size effect confounded in the estimate. Fish collected at Lower Granite Dam, PIT tagged, and then routed to transportation and in-river routes would produce T/I ratios that would not have the fish size effect confounded in the estimate; however, this estimate would not be representative of the non-tagged population. Therefore, using the term "biased" results is not correct in this context.

Page 62 paragraph 4 – Besides the effects of avian predation during the low flow year of 2001, NMFS should note that many steelhead smolts that were not transported apparently residualized in the reaches below Lower Granite Dam and did not completed their in-river migration until 2002. There are a total of 18 PIT tagged adult returns in 2002 and 2003 of wild steelhead PIT tagged at locations above Lower Granite Dam for the 2001 migration year (tagged July 2000 through May 2001). Seven of the 18 PIT tagged adults were detected as a smolt at Lower Granite Dam in 2001 and then was either transported there or at Little Goose or Lower Monumental dams. One of these PIT tagged wild steelhead was transported at Little Goose Dam a year after being detected at Lower Granite Dam. Another four PIT tagged adults detected at Lower Granite Dam in 2001 were detected again as in-river migrants at another downstream dam a year later. Another four PIT tagged adults from in-river migrants were only detected at the dams as smolts in 2002. This leaves three more PIT tagged adults, and these fish had no detections at dams as smolts. However, given the lack of spill in 2001 and high collection efficiency of the screens, these undetected PIT tagged smolt either migrated undetected in 2002 or were transported undetected from Lower Granite Dam (most likely during May when large numbers of tagged and untagged smolts were passing through the collection facility). Based on the returning PIT tagged adult wild steelhead data, it appears that most non-transported PIT tagged wild steelhead smolts that survived the poor in-river conditions of 2001 did so by completing their migrated the following year. This may help explain the extremely low in-river survival estimates of less than 5% from Lower Granite Dam to Bonneville Dam in 2001. In the survival model, fish that overwinter in the hydro system are not distinguished from the mortalities in the hydro system.

Page 64 – Snake River Sockeye salmon – NOAA should include a more thorough discussion of the captive broodstock program and the results to-date, as well as a discussion of the few number of returning adults observed for this species during a time period that other species are showing improved returns.

Page 65 – As previously stated, the lack of a summary and conclusions section is a glaring omission, rendering the memorandum to have limited if any use.

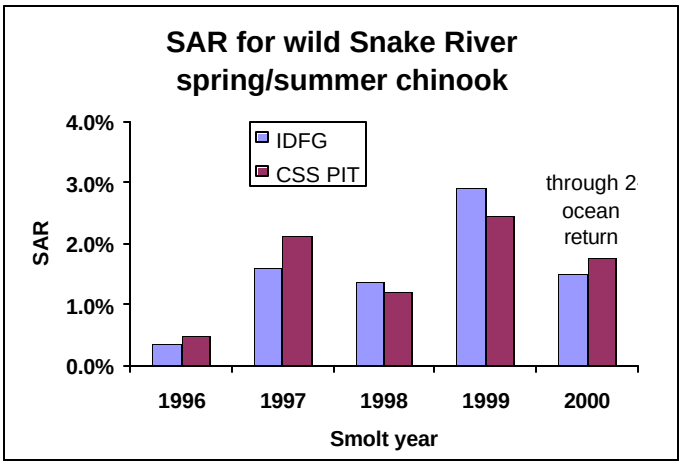

Figure 1. Estimated SARs for wild Snake River spring/summer chinook, for the untagged fish (IDFG) and for PIT tagged smolts from the CSS. (Keifer, personal communication).