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MEMORANDUM

TO: Jay Hesse, Nez Perce Tribe

FROM: Michele DeHart, FPC

DATE: November 1, 2017

RE: Transport Bypass Ratios for truck transported subyearling Chinook at Lower Monumental Dam

Based on your request we reviewed available T:B (Transport to Bypass adult return) ratios at Lower Monumental Dam (LMN) during time periods when truck transport was occurring at the project and when PIT-tag data were available to provide a measure of return rates.

- Based on our review we see no evidence to suggest that truck transport would be beneficial after August 15 of each year we compared (T:B ratios for trucking would likely be below 1).

- NOAA's evaluation of seasonal SARs of bypassed PIT-tagged fall Chinook at LMN range from 2% to 4% after August 15 in the migration years 2006 to 2012.

- Our evaluation of PIT-tagged fish detected at LMN showed similar SARs (2.5%) for late season bypassed fish when we combined the years 2006 to 2014.

- No truck transported juveniles were found to return as adults from LMN between 2006 to 2012, although data is very limited as only 9 PIT-tagged fall Chinook were trucked in those years.

The proposal to terminate transportation curtail sampling when fewer than 50 subyearling Chinook are detected in 3 consecutive days at LMN, as discussed at FPAC, would, in some years, occur after the time when truck transport would be initiated at the project. In order to address your request to evaluate the potential T:B ratios at this time of year we reviewed seasonal Transport: Bypass SAR ratios (T:B) from NOAA (Smith et al 2017) as well other available literature on subyearling fall Chinook transportation to determine the relative benefit to truck transport at Lower Monumental Dam. Due to small sample sizes,
Smith et al (2017) provides mainly information comparing barge transported subyearling Chinook to bypassed smolts. While NOAA has evaluated late season trucking at Lower Granite Dam, no truck transport evaluation occurred at Lower Monumental Dam in that study.

Smith et al (2017) compared SARs of transported and bypassed juvenile fall Chinook collected at LMN during the years 2006 to 2012. They developed predictive models of SARs for transport and bypassed fish and also calculated SARs for two week cohorts of fish to validate the predictive models (Figure 1 below). Their evaluation relied almost exclusively on PIT-tagged fish that were transported in barges. Truck transport at LMN has begun on or shortly after August 16 in the years summarized in their analysis. Figure 1 shows the summary plot from Smith et al (2017) summarizing their comparison of transport and bypass SARs of “surrogate” fish. Transport groups (represented by green squares) were only available until August 1 in most years, and would have been transported via barge, not truck.

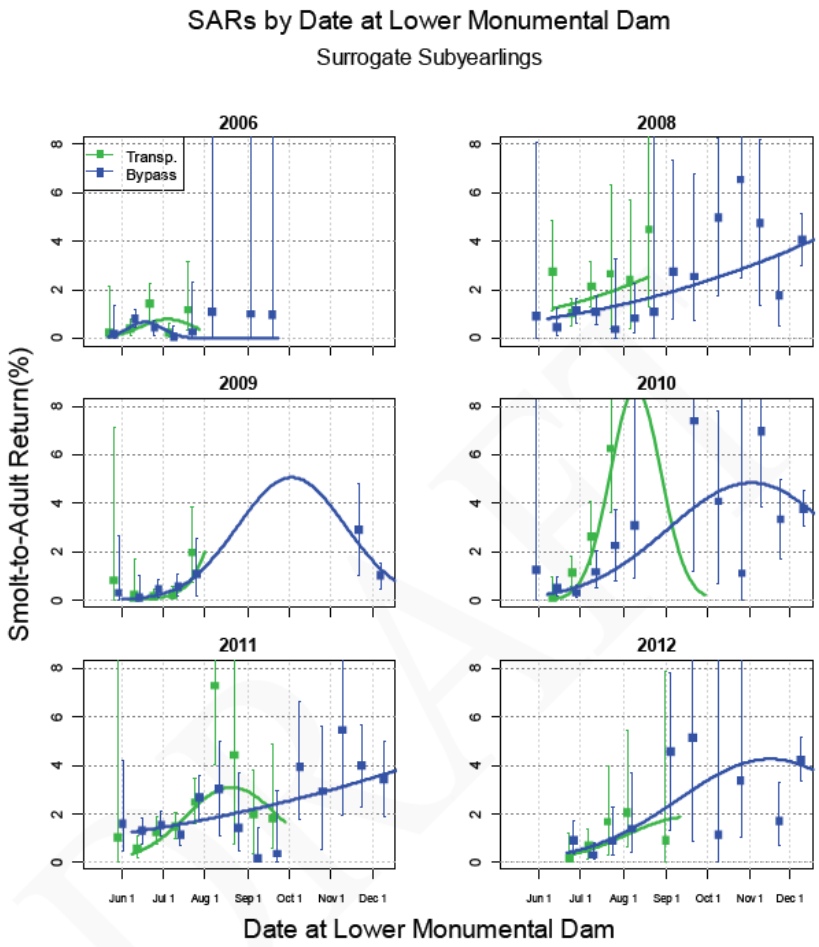

Figure 8. Biweekly and model-averaged daily estimates of smolt-to-adult return rates **(SARs)** for PIT-tagged **surrogate** subyearling fall Chinook salmon transported from or bypassed at **Lower Monumental Dam**, 2006 and 2008-2012. Surrogate subyearlings released into the Snake and Clearwater rivers were combined.

Figure 1. Excerpted from Smith et al 2017.

In the years when truck transport data appear to be available (2011 and 2012 after mid-August), the transport cohorts were predicted to have lower SARs than the bypassed fish. Their plots generally show SARs of bypassed fish rising into the 2% to 4% range for those groups of PIT-tagged subyearling Chinook bypassed after mid-August of each year. Their analysis shows that bypass SARs for fall Chinook become relatively high later in the summer and into the fall, and the trend for barge transported and/or late season trucked fish is for decreasing SARs. Thus T:B ratios would likely be below 1 after mid-August in most of the years included in the analysis.

Our own PIT-tag analysis, of the migration years 2006 to 2014, suggests very few PIT-tags were available during periods of truck transport at LMN to provide information on SARs, let alone T:B ratios. However, the few tags that we analyzed suggested no benefit to truck transport at

LMN. The limited data suggests that in-river SARs are relatively high (over 2%) during this time of year. While only 9 transported PIT-tags were available during truck transport for the years 2006 to 2014, none returned as adults, while, of the 231 PIT-tagged subyearling fall Chinook bypassed during the same time period, 6 adults returned. With small sample sizes, the analysis is limited so caution is advised in extrapolating from results.

The CSS Report (McCann et al 2016) found transport was not beneficial to most fall Chinook PIT-tag groups analyzed in years migration years 2006 to 2012. Unlike Smith et al (2017), the CSS compared transport to non-detected in-river migrant (TIR). In the CSS analysis smolts were mainly barge transported fish, and were transported or migrated past Lower Monumental Dam before August 1 of each year. Eighteen of 48 study cohorts evaluated in the CSS analysis showed significant benefit to adult returns from migrating in-river as juveniles while five cohorts showed a significant transport benefit. Overall, 25 TIRs were not significantly different than one. In all, 31 of 48 adult return cohorts showed a benefit to in-river migration (TIRs < 0) while 17 showed a transport benefit. These results mainly apply to barge transported fish, and include fish transported at all three transport dams in the Snake River. However, given the relatively higher SARs from barge transport relative to truck transport (Mundy 1994), the CSS analysis indicates that trucking fall Chinook from LMN is likely not beneficial.

References

Mundy, P.R. D. Neely, C.R. Steward, T.P. Quinn, B.A. Barton, R.N. Williams, D. Goodman, R.R. Whitney, M.W. Erho, and L.W. Botsford. 1994. Transportation of juvenile salmonids from hydroelectric projects in the Columbia River Basin; an independent peer review. Final Report. U.S. Fish and Wildlife Service, Portland, Oregon.

Smith, S.G., T. M. Marsh, and W. P. Connor. 2017. Responses of Snake River Fall Chinook Salmon to Dam Passage Strategies and Experiences (Draft). Research Report National Marine Fisheries Service Seattle, Washington.