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MEMORANDUM

To: Curtis Knudsen, Oncorh Consulting

Michele DeHart

From: Michele DeHart

Date: November 30, 2014

Re: Response to comments on the Draft CSS 2014 Annual Report

Attached, please find the Comparative Survival Study Oversight Committee responses to your comments on the draft 2014 Comparative Survival Study Annual Report. Thank you for reviewing our report and providing comments. Your comments help to keep us on track and aid in clarifying the details of our report. Please note that in the following pages, your original comments are presented in italic font followed by the responses in standard font.

Comments from Curtis Knudsen, Oncorh Consulting

Dear Ms. De Hart;

Thank you for the opportunity to comment on the Draft CSS Report for 2014. I was encouraged when I first heard that, in response to the ISRP's comments, there would be another comprehensive study of the long-term effects of PIT and CW tags on spring Chinook salmon in the Columbia Basin. My comments on the 2014 Draft CSS Report are below.

General comments:

I am disappointed in the lack of detail reported in the study design, the analytical methods, and the adult data collected. There is some broad discussion of adult monitoring in the Methods, but no detail regarding statistical analyses, no reporting of juvenile or adult data (juvenile recaptures, adult tag recaptures by age for SARs estimates, sample sizes for adults monitored for tag loss during holding at Carson NFH, no reporting of tag loss at entry to the hatchery, and no reporting of final sample sizes for tagged and untagged fish at spawning over sampling/spawning dates). One would believe, based in the Results and Discussion sections, that there were no tags lost in adults either during holding or over the time since juvenile release. However, there is no support for that assumption (no data reported) and the authors have stated in the Methods that they will collect adult data and make estimates of adult tag loss rates to be used to correct SARs. Thus, they recognize that it is necessary to estimate adult tag loss rates prior to estimating corrected SARs. Therefore, given their own study design it seems premature to calculate SARs without clarifying that no attempt to estimate or correct for tag loss or differential survival has been made.

CSS Response: It is important to recognize that Chapter 6 should be considered a progress report on a study that is several years away from completion. However, we have provided additional details on the study design, analytical methods, and adult data collected. Preliminary results (i.e., based on only one year of age-4 returns) showed no tag loss for the dual-tagged fish, and this is reported.

Finally, given that BY2009 PIT-only and PIT+CWT fish had equal in-hatchery survival (Fig. 6.2) and equal juvenile post-release survival to Bonneville Dam (Fig. 6.3 [mis-labeled in the text as 6.2]), it is difficult to explain why the PIT+CWT group would have adult SARs that were only 1/3 that of either the PIT tag only, CWT only or no-tag groups (Fig. 6.4). Individually each tag type had no effect at all, yet when both tags were placed into a fish their survival was reduced by 67%. This is an extraordinary result and deserves a more thorough description of how it was calculated and a full and detailed discussion of why this might have occurred, both of which are lacking in the report. If these results are true, one would never consider putting a CWT and PIT tag together into the same fish, as 67% of the tagged fish would be expected to die. Also, the Discussion should include a paragraph highlighting that essentially all the additional mortality experienced by the dual-tagged group occurs only after they pass Bonneville Dam. This is a very important result deserving more thought and discussion by the authors.

CSS Response: We have provided the juvenile tagging and adult return data for each of the study groups in Table 6.4. We have provided some speculative discussion of possible reasons for the low return of the dual-tagged group from brood year 2009. However, these results are highly preliminary and should be interpreted with caution at this point in the study.

Detailed comments:

1) *The concern that ripe females may expel PIT tag through their vent is mentioned in the Methods, but no data is reported and no details given on how the data would be analyzed, were it actually collected. Was this data collected, and if so, where are the results? If it was not collected, why? If fish are not checked at the time they enter the hatchery holding pond, particularly the dual-tagged fish, how will the authors know which individual fish entered with a CWT+PIT, a CWT only (lost their PIT), or with a PIT only (lost their CWT during holding)? These data are needed to estimate tag loss at entry to the holding pond. Also, this data is critical in order to accurately assess tag shedding during holding. Do the authors have a method to assess what the PIT tag recapture efficiency is of the PIT detector at the entrance of the adult holding pond? If so, what was the PIT tag recapture efficiency of the adult holding pond detector?*

CSS Response: We have provided additional details on how the adult data will be collected and analyzed. Because we are interested in analyzing the effect of adult age on tag retention, and age-5 adults from the first release year returned in 2014, these results will be presented in future reports.

2) *Did the personnel at Carson NFH record the data they collected as fish were checked during inoculation, spawning, etc. (see page 188, line 3-4)? And if so, why did they depend on the data queried from RMIS, rather than their own data records? This seems like a very inefficient data collection protocol as there can be a 1 year or more delay in when REMIS posts CWT data submitted. It isn't clear to me how data from unmarked fish will be accessed from RMIS (page 188, lines 18-19, "Coded-wire tag and unmarked fish data were queried from RMIS by filtering for specific CWTs and Carson NFH returns'). What unmarked fish data will be obtained this way?*

CSS Response: Personnel at Carson NFH collect and maintain the data on adult sampling and submit CWT recoveries at the hatchery to RMIS. Hatchery sampling records are used to determine the number of untagged adult returns by age.

3) *How will adult SARs based on CWT tag and PIT tag recaptures in fisheries and at lower river monitoring sites be compared and how will non-tagged fish be included in those comparisons? No monitoring of CWT release group unmarked fish occurs in those fisheries. Tag recapture efficiencies of CWT and PIT tags are quite different and no data on Carson untagged fish prior to entering the hatchery will be available. Will unequal fishery selection rates on marked and unmarked fish in mark-selective fisheries be accounted for? Do unmarked non-Carson fish stray into the Carson hatchery adult holding pond, and if so, how will they be dealt with?*

CSS Response: We are using only PIT and CWT recoveries that occur at Carson NFH. All fish produced at Carson NFH are adipose fin-clipped. There is very little indication of non-Carson

fish straying into the hatchery. During 1990–2013, there have been 18 CWT recoveries of non-Carson spring Chinook from seven hatcheries (Round Butte, Dworshak, Lookingglass, Nez Perce, Willard, Little White Salmon, and Warm Springs). During that same time period those hatcheries released over 50 million CWT smolts, therefore the potential number of strays entering Carson NFH is miniscule.

4) The authors state that they will estimate the, “...number of untagged adults returning to the hatchery, corrected for tag loss”. However, no adult tag loss estimates are made, thus no corrections for tag loss can be made. The authors should explain why these data are not included in the report, why no corrections were made, and why they decided to calculate adult SARs in spite of this. In addition, no details are presented on how SARs were calculated nor reporting of sample sizes used in those calculations, nor how confidence intervals were estimated.

CSS Response: We have provided the number of adult returns by age for all of the study groups including the dual tagged group (six adults). All six retained both their PIT tag and CWT. We will wait until there are more returns to estimate tag loss and apply corrections for tag loss. We have stated that the SARs are uncorrected for tag loss.

5) It is stated that, “Tag loss rates are estimated by quantifying the number of adults from the dual-tagged group without a CWT (i.e., with a PIT-tag-only) and the number of adults from the dual-tagged group without a PIT tag (i.e., with a CWT-only).” However, there are no details of how the calculations would be done, no citations of literature, or actual sample sizes for each of these specific groups given. These recaptures are individual specific, that is, a dual-tagged fish is either PIT+CWT, PIT-only, or CWT-only at the time of entering the adult holding pond and each fish’s state must be determined. This is the information which is most critical to assessing the state of the animals prior to entering the hatchery as they passed the lower river PIT tag monitoring sites. As the authors mention, PIT tag shedding by fish as they mature during holding, particularly females (PIT tag loss rates > 40% have been reported), can be significant and without knowing what the state of fish were in as they entered the trap no estimate of change (tag shedding) over time can be made.

CSS Response: We have stated that we will use the methods of Seber (1982: 94-96) to estimate tag loss for the dual-tagged individuals. We have presented the number of dual tag group recoveries (6) and all six retained both tags at hatchery entry. Future reports will present data and analysis on PIT tag shedding after hatchery entry.

6) Any reporting of adult SARs seems premature until these problems and omissions are corrected. As the report now stands, there is no way to confirm these results or track how they were generated.

CSS Response: We have provided the data used to calculate the SARs, allowing for confirmation and tracking of the results.

Again, thank you for the opportunity to comment and I encourage the authors to follow through and report on their study with the detail and thoroughness they have indicated is needed and the topic certainly deserves.

*Sincerely,
Curtis Knudsen
Oncorh Consulting*