

Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees and Priest Rapids Coordinating Committee Hatchery Subcommittee Document Date: April 19, 2023

From: Tracy Hillman, HCP Hatchery Committees Chairman and PRCC Hatchery Subcommittee Facilitator

cc: Larissa Rohrbach, Anchor QEA, LLC

Re: Minutes of the March 15, 2023, HCP Hatchery Committees and PRCC Hatchery Subcommittee Meetings

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plan Hatchery Committees (HCP-HCs) and Priest Rapids Coordinating Committee's Hatchery Subcommittee (PRCC HSC) meetings were held virtually on Webex, on Wednesday, March 15, 2023, from 10:00 a.m. to 2:30 p.m. Attendees are listed in Attachment A to these meeting minutes.

Action Item Summary

Long-Term

Joint HCP-HCs and PRCC HSC

- Keely Murdoch and Mike Tonseth will obtain estimates of pre-spawn mortality from Andrew Murdoch to update the retrospective analysis for Wenatchee spring Chinook Salmon (Item I-A). (Note: This item is ongoing; expected completion date to be determined.)
- Members of the HCP-HCs and PRCC HSC will provide feedback to the Washington Department of Fish and Wildlife (WDFW)-revised version of questions on recalculation for Policy Committees (Item I-A). (Note: This item is ongoing.)
- Chelan PUD, Grant PUD, and WDFW will develop recommendations for reducing stress and mortality from disease for individual rearing groups at Eastbank Hatchery. (Item I-A) (Note: This item is ongoing.)

Near-Term (to be completed by next meeting)

Joint HCP-HCs and PRCC HSC

- All members of the HCP-HCs and PRCC HSC will review the 10-Year Comprehensive Review chapters focused on Objectives 1 and 2 and consider potential recommendations for changes to monitoring and evaluation actions (Item IV-B).
- Mike Tonseth will inform the RI/RR HCP-HCs and PRCC HSC of WDFW's recommended options for the transfer or early release of brood year 2021 Wenatchee summer Chinook Salmon (Item IV-D).

- Catherine Willard will discuss the early release of Wenatchee Chinook Salmon in relation to triggers for initiating spill at Rock Island Dam with the RI/RR HCP Coordinating Committee representatives (Item IV-D, C).

Decision Summary

- The Wells HCP-HC approved Douglas PUD's approach for steelhead egg thiamine testing at Wells Hatchery in 2023 through 2025.
- The HCP-HCs and PRCC HSC approved the 2023 Upper Columbia 2023 Brood Year Salmon and 2024 Brood Year Steelhead Broodstock Collection Protocols.

Agreements

- None.

Review Items

- The 10-Year Comprehensive Monitoring and Evaluation (M&E) Report chapters, compiled by species, were distributed on March 2, 2023, for discussion in the next meeting with a focus on Objectives 1 and 2.

Finalized Documents

- The *2023 Upper Columbia 2023 Brood Year Salmon and 2024 Brood Year Steelhead Broodstock Collection Protocols* were approved by the Wells HCP Coordinating Committee on March 28, 2023, with the draft protocols to be accepted as final and submitted to the National Marine Fisheries Service by April 15, 2023.

I. Welcome

A. Agenda, Approval of Past Minutes, Action Item Review

Tracy Hillman welcomed the HCP-HCs and PRCC HSC, reviewed the agenda, and asked for any additions or changes to the agenda. The agenda was approved without additional changes.

Meeting minutes from the February 15, 2023, meeting were reviewed and approved.

Action items from the HCP-HCs and PRCC HSC meeting on February 15, 2023, were reviewed.

(Note: Italicized text below corresponds to action items from the previous meeting.)

Long-Term

Joint HCP-HCs and PRCC HSC

- *Keely Murdoch and Mike Tonseth will obtain estimates of pre-spawn mortality from WDFW to update the retrospective analysis for Wenatchee spring Chinook Salmon (Item I-A). (Note: This item is ongoing; a presentation will be given in early 2023.)*
Murdoch said this item is ongoing.
- *Members of the HCP-HCs and PRCC HSC will provide feedback to the WDFW-revised version of questions on recalculation for Policy Committees prior to the next meeting (Item I-A). (Note: This item is ongoing.)*
Hillman said this item is ongoing.

Near-Term (to be completed by next meeting)

Joint HCP-HCs and PRCC HSC

- *Mike Tonseth will work with Matt Cooper to distribute an analysis showing feasibility of the Methow spring Chinook Salmon Outplanting Plan based on historical run-size data and proportionate natural influence (PNI) targets (Item I-A). (Note: This item is ongoing.)*
Tonseth said he coordinated with Cooper to reframe the approach to this issue, which will be to incorporate actions into the next consultation for permits for the Methow Spring Chinook program. An email by Mike Tonseth to Larissa Rohrbach summarized the status as follows:

...we simply can't find a reasonable workaround to the existing plan that won't violate the current permits or trigger a re-consultation. Additionally, I have also been able to touch base with Brett and discuss the potential for a waiver to the current pHOS/PNI limits outlined in the permits and it just isn't workable without a re-consultation of some sort, on the effects of adult out-planting which then leads us right back to the approved 2017 plan which was developed to be implemented within those permit sideboards. The current Methow spring Chinook permits are set to expire in 2027 – 4 short years from now. From my perspective, we should perhaps be looking at the long game with regards to an out-planting plan (which would include both eyed egg and adult components). Designing an implementation plan should be the easy part but based on my conversations with Matt (and Bill), and Brett, the lengthier conversation will be about how PNI/pHOS limits may be able to flex under an out-planting regime and how that language would look and how NOAA would interpret the different efforts (whether its eyed egg or adult oriented) and the subsequent effects. We (the hatchery committees) also have to consider what effect these approaches may have on the results of the M&E (thinking NNRs as one of the big components) and how results could

either be interpreted and/or measured (from an eyed egg out-planting perspective, since outside of parental based tagging – which is labor intensive and expensive, there is little we can do to differentiate NO adults from adults produced from eyed egg out-plants when they return). In summary, I think it would be prudent to take a step back and identify some bigger ticket issues around out-planting strategies such that when new HGMPs are written which would include an out-planting plan, it can be consulted on relatively easy and without much delay since the critical PNI/pHOS conversations with NOAA would be had in advance (it took over 18 months just to discuss pHOS/partial pHOS/ and PNI and the multi-pop PNI model the last go around so we should be making sure we have allowed ourselves sufficient time to work through issues.

- *Mike Tonseth will prepare a clean copy of the 2023 Broodstock Collection Protocols to be distributed for authors to make final revisions (Item IV-A).*

This item will be discussed in today's meeting.

- *Mike Tonseth and Chelan PUD will add placeholder language to the 2023 Broodstock Collection Protocols to indicate that Chelan PUD, Grant PUD, and WDFW will develop recommendations in the coming year for individual rearing groups at Eastbank Hatchery directed at reducing stress and mortality from disease (Item IV-A).*

This item will be discussed in today's meeting.

RI/RR HCP Hatchery Committee

- *Catherine Willard will revise the RI/RR HCP Action Plan to reflect a more accurate schedule for developing the executive summary of the 10-Year Comprehensive Report (Item I-A).*

Willard said this item is complete. The RI/RR HCP Action Plan was approved by the HCP Coordinating Committee.

Wells HCP Hatchery Committee

- *Tom Kahler and Betsy Bamberger will prepare a plan for the collection of egg samples from steelhead at Wells Fish Hatchery to monitor baseline thiamine levels (Item II-A).*

This item will be discussed in today's meeting.

II. Wells HCP-HC

A. DECISION: Steelhead Egg Thiamine Level Testing

In last month's meeting, the Wells HCP-HC asked for a written description of the proposed work to evaluate baseline levels of thiamine in steelhead eggs prior to giving approval of the sampling approach. On February 22, 2023, a written memorandum describing the egg thiamine level testing

approach was distributed by Douglas PUD (Attachment B). The memorandum describes the proposal for the work to be done; 5 grams of eggs (roughly 50 eggs) will be collected from at least 30 females or up to 54 females, which represents all of the Columbia Safety-Net (CSN) brood, if the expenditure for that sampling can be approved.

Keely Murdoch asked whether the thiamine levels could be different in the CSN fish spawned at Wells Hatchery compared to the fish spawned for Methow conservation programs at Winthrop National Fish Hatchery. Murdoch added that collecting from the CSN makes sense to avoid take from conservation programs. Kahler said, its unknown if levels would be different; Winthrop National Fish Hatchery has decided to supplement all their brood with thiamine injections. Once the fish are supplemented, baseline thiamine levels cannot be obtained. The CSN fish would not be supplemented. Differences are not expected based on genetics because the stocks are relatively homogeneous. Differences in thiamine levels would be manifest if the fish are distributed differently in the ocean, which we have no way to determine, but also no reason to expect. It will be assumed that the CSN are representative for the baseline Methow thiamine levels.

Bill Gale confirmed that the U.S. Fish and Wildlife Service (USFWS) plan is to sample all hatcheries region-wide, and their fish health recommendation was to supplement because thiamine levels were found to be low in pilot sampling efforts done in 2022. That decision was made based on the assumption that baseline sampling would be done in the CSN fish. Gale said he will pass this plan to the USFWS fish health program so these data can be folded into their region-wide sampling program.

Kahler confirmed the committees will receive an annual presentation or 3-year report on results.

All parties of the Wells HCP-HC approved the CSN steelhead egg thiamine level testing plan.

III. PRCC HSC

A. Priest Rapids Hatchery Release Timing

Rod O'Connor gave a presentation entitled "Update on Release Timing Evaluation at Priest Rapids Hatchery" (Attachment C). The objective of the release timing evaluation is to understand whether releasing fall Chinook Salmon from Priest Rapids Hatchery (PRH) earlier than historical release dates results in better survival to adulthood. Grant PUD indicated they plan to continue with the early release schedule in 2024.

Keely Murdoch asked about a conflict between release dates and the tagging work being done by Jeff Fryer (Columbia River Inter-Tribal Fish Commission). O'Connor said that Fryer's tagging work is done on a narrow schedule; he has to sort PRH fish out of his sample to obtain enough numbers of his targeted wild fish. Pearsons said Fryer would probably not be supportive of this plan. Murdoch asked whether it's possible to assemble data on full brood year survival and look for increases in

adult returns across brood years. O'Connor said eventually that is what they plan to do, but at this time there are only data for 2 full brood years. Mike Tonseth said part of what complicates Fryer's work are the large number of unclipped subyearlings with no coded wire tags (CWTs) that come out of Priest Rapids Hatchery, which make it difficult to target natural-origin fall Chinook Salmon. O'Connor said Grant PUD makes an effort to coordinate with Fryer. The hatchery fish are large and are sorted out from the natural fish. Hillman noted that some small hatchery fish could be inadvertently included by Fryer.

Pearsons said the first two PRH releases will be in the river when Fryer starts marking. Pond C is released during the marking period and Ponds B and A are released after the marking period. Pearsons said Fryer is focused on juvenile survival and outmigration; Grant PUD thinks it's more important to focus on survival to adulthood.

Kirk Truscott asked whether age-2 adults are included as jacks in the analysis. O'Connor said yes; they are not the ideal target for broodstock, but the data are available, so they are included. Truscott asked for a reminder on the initial reason for experimenting with release timing—whether it was because of changes made at the Wells Hatchery with survival benefits. O'Connor said in part, yes. The evaluation is also being done in anticipation of future flow patterns with climate change, with spring runoff that is likely to occur earlier in the season (which has not been the case during the study so far). Pearsons said the recommendation to adjust release timing originally came from Mike Lewis (WDFW), the complex manager at PRH. Tonseth said staggering release date was also done, in part, to release all fish at a similar size; this approach allows the offspring of fish that are spawned later to grow longer. Tonseth said Paul Hoffarth (WDW) had observed a positive correlation with survival when fish were released a bit earlier versus later.

O'Connor noted that Grant PUD is presenting the details on this program, but they are also included in the Broodstock Collection Protocols. Pearsons said Grant PUD is requesting approval to continue with the PRH release timing as part of approval of the 2023 Broodstock Collection Protocols.

IV. Joint HCP-HCs

A. DECISION: 2023 Broodstock Collection Protocols

Mike Tonseth said there were a few minor edits made by USFWS since the revised draft 2023 Broodstock Collection Protocols were distributed for approval on March 6, 2023.

Appendix H of the Broodstock Collection Protocols was reviewed in the meeting to confirm the dates for release from PRH are consistent with the information presented by Grant PUD today. Pearsons said the fish culturists make final release date decisions, which may vary by a day or two.

All HCP-HC and PRCC HSC parties approved the *Upper Columbia River 2023BY Salmon and 2024BY Steelhead Hatchery Program Management Plan and Associated Protocols for Broodstock Collection, Rearing/Release, and Management of Adult Returns*.

B. 10-Year Comprehensive Report Synthesis Presentation

Rod O'Connor presented a PUD Comprehensive Report Summary (Attachment D). Co-authors included Todd Pearsons, Catherine Willard, Tim Taylor, Rolland O'Connor, and Tom Kahler. O'Connor noted that the reports are large with a lot of detail and that his presentation is a high-level synthesis of report highlights and takeaways summarizing what has been learned from the 10-year reporting effort. The report chapters are organized by species, with 10 objectives addressed for each species. Sockeye Salmon reporting is being handled separately and will not be discussed today. Outcomes were summarized in matrices showing whether objectives are being met, results are mixed, or objectives are not being met. Spring Chinook Salmon and steelhead populations are smaller than the other species; for a number of objectives, it is difficult to determine whether objectives had been met using the data available. For Objectives 1 and 2 (abundance and productivity), it was determined that monitoring that was implemented under the *Hatchery Monitoring and Evaluation Implementation Plan* (M&E Plan), was not consistent with determining whether objectives were met. When objectives are reviewed by program type; fewer objectives are being met for the integrated conservation programs, which are also the smallest programs, therefore more difficult to monitor.

Mike Tonseth said, regarding conservation program size, one of the concluding statements is that conservation programs are too large. Some of these programs include both a conservation component and a safety-net component; is this intended to state that the hatchery program in total is too large, or the conservation component is too large? Pearsons said that to achieve the abundance and proportion of hatchery-origin spawners (pHOS) targets, the hatchery programs are too large, probably at either the scale of the whole program or just the conservation component; however, this statement refers to the combination of program components. Tonseth said he wants to use consistent terminology when discussing recent program implementation, so it's actually the integrated hatchery programs, not just the conservation component, that the conclusion applies to.

Tonseth said another conclusion stated that a change in program implementation every 10 years has made it difficult to evaluate the effects of changes. Tonseth said he believes that statement was probably true prior to the last recalculation, but since then, the changes to programs have been smaller in terms of total smolt production goals. In the next comprehensive report, there will be 20 years of data that will represent a relatively static program (i.e., 20 years with no major changes in hatchery programs). Pearsons agreed and noted that there are some metrics that can be evaluated within a 10-year period, such as phenotypic comparisons between hatchery-origin and natural-origin fish.

Keely Murdoch asked about the problems with the abundance and productivity metrics. For instance, in the HCPs, in Section B of the Introduction, it describes the intent of the HCP to increase abundance and productivity through a combination of hatchery, habitat, and survival standards. Yet when we look at these data, it is within the bubble of hatchery programs only. Additionally, a conclusion of a paper by Pearsons from 2002¹ is that a hatchery program by itself cannot address productivity unless we can improve the habitat carrying capacity. Is there evidence that we've improved habitat capacity through the concurrent habitat actions? Looking at Objectives 1 and 2 on abundance and productivity metrics in isolation is a flaw of the M&E Plan. Pearsons responded that there are limiting factors and limiting life stages. The assumption when the HCPs and Priest Rapids Settlement Agreement were developed was that the adults were the limiting life stage—that there were not enough adults coming back to seed the environments. That is probably correct in some years, such as when adult returns are low due to ocean conditions. In some years when there are many natural-origin returns, more hatchery-origin returns may not produce more natural-origin fish. Murdoch agreed, but said there is a need to show that the many habitat actions that have been implemented have increased the carrying capacity. For instance, a limiting life stage may be during the overwintering period in the tributaries. When revising the M&E Plan, perhaps the interaction between hatchery supplementation and habitat can be better described. Pearsons said that the limiting life stage is likely to vary across years. In some years, a limiting life stage might be the adult returns; in some years of good escapement, the limiting life stage may be at the summer parr stage.

Hillman said the cumulative effects of all actions are integrated in the adult abundance and productivity analysis. What cannot be easily evaluated separately is the hatchery effect. The tests that try to estimate the hatchery effects rely on comparisons with reference streams before and during hatchery supplementation (using a Before-After-Control-Impact [BACI] design). When comparing supplementation programs with reference streams over time, the abundance within supplementation streams has declined. Murdoch said one complicating factor is that the reference streams are not in the Upper Columbia Basin, and another is the Mid- and Upper-Columbia River hydrosystem, which is managed very differently than the federal projects downstream. Hillman agreed that within the Upper Columbia Basin, the trends are similar across streams; whatever is happening in the supplemented streams is happening across all of the Upper Columbia Basin. Murdoch agreed but said that effect is also not well described and we can't expect the hatchery program to adjust for that effect. Hillman said there may be a way to use state-space models to tease out the effects of habitat improvements now that we have a longer time series. Kahler agreed that this was a source of frustration during analysis of the data; without an in-basin reference stream, it was not possible to differentiate basin effects from hatchery effects.

¹ Pearsons, T. N. 2002. Chronology of ecological interactions associated with the life-span of salmon supplementation programs. *Fisheries* 27(12):10-15.

Murdoch asked what the next steps are. The HCP-HCs and PRCC HSC must produce a summary report that includes the Committees' recommendations for adaptively managing through the M&E Plan. This report is massive, and it takes a long time to absorb all the information. We need to start talking about how we will write the report as the Committees. Pearsons said he has some ideas for consideration. The summary report would be finalized as a consensus document by the Committees, and members may consider using the information presented today as the foundation of the report. Recommendations may be presented in different ways; we may present only consensus recommendations to apply to revisions to the M&E Plan or changes to the hatchery programs, or present a set of consensus recommendations and a set of minority opinions, which could ensure a party's position is maintained in the record.

Tonseth suggested starting with recommendations that focus on what is not working, or what is lacking sufficient information, and allowing for improvements in efficiencies on monitoring that is working. Tonseth agreed the report should be a consensus report, but recommendations need not only show the consensus. It would be valuable to record both the areas of consensus and the areas where discussions were had and consensus was not met, but discussions could continue in the future, with other staff who may join the Committees in the future.

Hillman agreed, but noted it took a lot of effort to make adjustments in just one monitoring metric (hatchery replacement rate) during a major revision of the M&E Plan (in 2015), and no other changes were made. Hillman supported focusing on the objectives highlighted in red in O'Connor's presentation to make actual changes to the program outside of recalculation. Hillman suggested using Mark Sorel's (WDFW) life-cycle model to test potential effects of program changes. Tonseth noted that the effect of the dramatic reduction in juvenile hatchery production, coupled with adult management, will not be evident until the next 10-year comprehensive report milestone. Tonseth said there is a need to think about the metrics highlighted in yellow to determine which ones are the highest priority; perhaps monitoring phenotype similarity is not as high a priority as determining run and spawn timing or distribution.

Willard said today's presentation showed both how well the M&E Plan is working to evaluate the hatchery programs and what the results of the 10-year Comprehensive Report were. Murdoch said, as she reviews the chapters, she is making note of recommendations on the report itself and the M&E Plan. If we are not satisfied with the plan, or the results of the monitoring, changes to both the monitoring approaches and the plan implementation should be included in the recommendations. Willard and O'Connor agreed.

Truscott noted that in the summary matrix, there are eight question marks across all stocks and asked what has limited our ability to highlight those cells with green, yellow, or red. He asked whether it is the type of data being collected, the variability of the data, or something else.

Understanding why the metrics or data are insufficient may provide insight into how we would change the M&E Plan.

Truscott also said the last two key findings appear to contradict each other, the first stating that changes to programs as often as every 10 years limit the ability to detect effects, followed by a conclusion that additional sampling would not change the results. Pearsons said that, for instance, the phenotypic similarity objectives can be addressed within the 10-year span of data collection; however, abundance and productivity metrics cannot be addressed within 10 years. Statistical power asymptotes, so additional years of data do not provide more power. Truscott said, specifically focused on abundance and productivity, hatchery production was reduced substantially in the 2011 recalculation effort, and adult management was implemented to maintain PHOS recently, which is not reflected in these datasets for the most part. If those activities resulted in a large enough positive or negative effect, would we continue to say we cannot make a difference with additional years of monitoring and management? Hillman said the power to detect an effect depends on sample size, variability in the data, and the size of the treatment effect. With the BACI approach, the comparison is between supplemented and un-supplemented streams, before and during supplementation. When we do a power analysis, based on the data we have, the results tell us that for some programs, we cannot get more power by adding more years of data. Power can be improved by reducing the variability; however, in the Upper Columbia Basin, we already collect data that are more accurate and precise than data collected in reference areas. It is unlikely we can do much to improve the quality of data collected in reference areas. Power can also be improved by increasing the treatment effect, which leads to the question, what amount of reduction in supplementation is necessary to produce a change in abundance or productivity that could be detected? In many cases, adding more years of data under the status quo is not going to increase the statistical power; however, there were only two complete cohorts after the 2013 adjustments in hatchery production to incorporate into these data. If the effect size is large enough with those changes in hatchery and adult management, additional years of data may reveal effects.

Pearsons asked whether the recent management changes have been large enough to observe the effects. Hillman noted that effectively, there was little change in program size for Chiwawa spring Chinook Salmon because in the past, the program was never able to meet production targets. Truscott said that was not the only change—that was coupled with adult management at Tumwater Dam, so monitoring cannot answer directly whether a reduction in program size had an effect. The relationship between PHOS or PNI and its effect on productivity is likely not linear and remember that PNI is a theoretical gene-flow model. Truscott said it is difficult to agree that because there has been variability in how we operate the programs, we cannot detect an effect, and it doesn't matter how many more years we monitor, it will make no difference in how we manage the programs. Hillman said there are other modeling approaches, like state-space models, that may help answer some of these questions. Perhaps we need to consider additional analytical approaches when we

evaluate the M&E Plan. As a reminder, all the spreadsheets used to conduct the analysis are available. Truscott said, to confirm, there is not a linear relationship between a much smaller reduction in hatchery production and improvement in ability to detect changes, and Hillman agreed. Hillman said the next statistical report will be produced in 3 years and will contain at least 5 additional years of data since making major changes to the supplementation programs.

Truscott asked whether the reference populations return with the same run-timing as the Upper Columbia Basin populations. Hillman answered no, the reference populations return a bit later than the upper Columbia spring Chinook Salmon. Truscott noted that because the Upper Columbia Basin populations are the earliest returns, they can be hit harder by predation. Truscott asked what abundance metrics were used. Pearsons answered there were many. Hillman said the metrics were total spawning escapement, natural-origin and hatchery-origin spawning escapement, natural- and hatchery-origin recruits, and adult-adult productivity. Harvested fish are included in recruitment estimates as well as fish that spawn outside target areas (strays) and fish collected for broodstock. Truscott asked how pre-spawn mortality is accounted for in the Upper Columbia Basin populations. Hillman said it would not affect spawning escapement estimates but would affect estimates of recruitment. Currently, neither pre-spawn loss nor enroute losses are included in recruitment estimates.

Hillman said it's worth noting that the among-population stray rates are different for the Endangered Species Act-listed stocks than the summer Chinook Salmon and fall Chinook Salmon. There appear to be fewer issues with among-population straying for stocks with populations of larger geographic areas. For example, the summer Chinook Salmon population encompasses the majority of the Upper Columbia Basin; if the population was broken down by subbasin, the among-population stray rate targets might be highlighted in yellow. Pearsons said Upper Columbia summer Chinook Salmon data were analyzed at the scale of the Upper Columbia Basin, subbasin, and tributary scales. Pearsons said, for 2014 through 2018, the summer and fall Chinook Salmon recipient population stray rate was less than 10% for straying into subbasins and the Hanford Reach.

Katy Shelby said the Committees should ensure that the data collected can actually inform the metrics that management decisions will be made from. For instance, CWTs in the bodies are used for the Nason conservation program and are useful to those conducting hatchery and M&E activities in the Wenatchee Basin; however, they are not reflected in metrics like stray rates or harvest rates because people are not looking for them outside of the basin.

Hillman suggested that the Committee members review these conclusions and study the reports to think about how to bring this topic onto next month's agenda.

Willard suggested focusing on Objective 1 (abundance and productivity), starting with spring Chinook Salmon, as a test of how to work through developing recommendations. Hillman agreed that this is the most important metric to address and noted that the juvenile productivity metric will

be difficult to address, because there is nothing to compare with the juvenile productivity estimates. Tonseth said Objective 2 might be easier to address for identifying deficiencies. Tonseth clarified that recommendations from this 10-year Comprehensive Review will inform an update to the 5-year M&E Plan. Hillman agreed and said that a timeline should be made to discuss those results within the year. Willard said discussions could happen concurrent with updates to both the Implementation Plan and M&E Plan. Pearsons agreed with focusing on Objectives 1 and 2; each group could work on developing their set of recommendations, then come back together to identify overlap and differences that should be discussed. O'Connor and Pearsons recommended reading through the executive summary sections for each species for the high-level conclusions and identifying sets of recommendations from a high level review to identify commonalities. Hillman also recommended reading the discussion sections where limitations and challenges to meeting objectives were also reviewed.

C. Chiwawa spring Chinook Salmon Emergency Release

Mike Tonseth said an email was sent yesterday regarding an emergency release of spring Chinook Salmon at Chiwawa Acclimation Facility. Daily mortality was climbing rapidly. Pre-release sampling showed 16% have clinical signs of bacterial kidney disease (BKD). The best approach will be to release all fish to reduce transmission to the fish that are not showing clinical signs.

Tonseth said BKD has been a problem across the state this year. Kirk Truscott said there has been little evidence of BKD in Okanogan programs; however, early releases occurred for other reasons. Tom Kahler confirmed there has been BKD in one of the raceways at Methow Hatchery with spring Chinook Salmon being reared for the Twisp program. Tonseth said in the fall, the Nason spring Chinook Salmon had more BKD, but it has remained at a low level, perhaps due to differences in rearing conditions. The Nason spring Chinook Salmon are reared in circular tanks located indoors, whereas the Chiwawa spring Chinook Salmon are reared in an outside raceway that are exposed to potentially stressful activity going on around them.

Keely Murdoch noted that these fish are being released approximately 1 month early; however, spill and passage through the juvenile bypass system will not be provided until thresholds for the number of fish are met at Rock Island Dam. There may be some indication of their outmigration rate from the smolt traps. Tonseth agreed and recognized that they are being released into suboptimal conditions when the spill program is not operating yet in the mainstem. Murdoch asked whether early spill could be considered. Willard said relative survival measures for fish that pass through the turbines are around 90%, although she agreed the bypass is intended to ensure higher survival. Willard agreed to discuss these comments with Lance Keller, Chelan PUD's HCP Coordinating Committee representative. Hillman commented that issues associated with dam operations are within the purview of the Coordinating Committees and should be discussed there.

D. Brood Year 2021 Wenatchee Summer Chinook Salmon Acclimation and Release Planning

Catherine Willard said there are also high levels of BKD in the yearling Wenatchee summer Chinook Salmon currently rearing at Eastbank Hatchery. Willard reported that Megan Finley (WDFW aquatic veterinarian) recommends releasing the fish directly into the Wenatchee River. Another option is to acclimate them for a shortened period of time at Dryden Pond. At Dryden Pond, the densities are higher than in the river but lower than in the raceways at Eastbank Hatchery. If transferred to Dryden Pond, the fish would be more exposed to pathogens than if released to the river directly, but they would at least acclimate to the natal stream longer before outmigrating. Mike Tonseth said Wenatchee summer Chinook Salmon have to be transported either way, whether they have to be moved to Dryden Pond or directly planted into the Wenatchee River.

Tonseth said there have been a couple of treatments for the disease at Eastbank Hatchery, but the fish have not responded well. Additional treatment options would be to reduce densities in raceways and increase flows to flush bacteria through. Fish could be directly released in the river as far upstream as possible, e.g., just below Tumwater Dam. Even if a release from Dryden Pond to the river is done, the amount of acclimation time at Dryden Pond would be relatively small, but risk of disease would go up. There is also a disease history for bacterial gill disease and cold-water disease at Dryden Pond. The question to consider is which of the following is going to result in more mortality: a direct plant with less acclimation time or an acclimation period at Dryden Pond?

Keely Murdoch said she has the same concern as with the release of Chiwawa spring Chinook Salmon if fish are directly planted without providing juvenile spill at Rock Island Dam.

Murdoch asked whether a solution could be to directly release half of the group to the river and plant the other half at Dryden Pond, which could acclimate at lower densities. Tonseth said that was considered; however, there would be no way to evaluate the effect of those two conditions. Murdoch said perhaps it's not necessary to evaluate differences between the conditions.

Truscott recommended that if fish are taken to Dryden Pond, a couple of truckloads could be planted into Dryden Pond, then observed for a week to determine how they handle the stress of the transport.

Tonseth said he is not advocating for a direct release to the river now, but waiting for later in the season closer to the typical release date (April 15) when there may be more flow in the river, partly to observe and account for the mortality. Willard said there are different mortality rates among the three raceways at Eastbank Hatchery: 2.5%, 10 to 25%, and 20% mortality. Passive integrated transponder (PIT)-tag representation across all three raceways is not even; the PIT-tagged population in Pond 13 is now experiencing the least mortality. Wherever those fish are released, the PIT-tagged population will not represent the mortality rates for the whole group. Willard said most of the M&E

metrics are answered with CWTs and not the PIT tags. Willard said she is concerned about stray rates from fish that are not acclimated at Dryden and directly released in the Wenatchee River straying into the Entiat River. Murdoch asked how PIT tags are used in M&E objectives. Willard said PIT tags are used to calculate smolt-to-smolt survival, and detections in the tributary later in the season are used as a surrogate for residualization. Murdoch reminded everyone that PIT tags were also used for calculating smolt-to-adult returns during the recalculation, and data from this year's release should be flagged in the annual reports for future recalculation efforts.

Tonseth said that in the past, emergency releases have not been formally tracked. There has not been a formal way to try to estimate what proportion of the population might be affected by disease. WDFW and the PUDs have had detailed discussions about how those metrics will be included in annual reports to better inform brood years with low survival. We have the most control of these fish in the hatchery environment and, from the state's perspective, we want to start including this type of information in a standardized way in annual reports.

O'Connor said another issue is to consider upper acceptable limits for disease loss that cause us to start considering an emergency release versus a threshold for continuing with the rearing plan, understanding that there will be a certain level of loss. Tonseth said he does not think it would be realistic to develop a one-size fits all approach to developing mortality triggers. Hillman noted that Megan Finley brought up the concept of higher mortality thresholds for various programs when she presented to the Committees in February. Tonseth noted that disease management plans, to be incorporated into the Broodstock Collection Protocols in the future, are intended to capture how disease will be managed in adult broodstock, not necessarily the juveniles. O'Connor said straying and tolerance for mortality in the hatchery are two things that are common and should be managed differently for the different programs.

Truscott said it's difficult to compare a small number of years of inoculation treatments with a lot of variability around whether disease occurs or not. Chief Joseph Hatchery has taken the approach of least risk and injects all females taken for broodstock with erythromycin and Draxxin. Tonseth said the injection does introduce stress; Finley has been reviewing the adult mortality data to consider this factor. Gale said the recommendation to not inoculate fish is to prevent development of antibiotic-resistant strains of bacteria, and USFWS would support looking at all the factors contributing to disease before prophylactically inoculating fish. Tonseth said this Wenatchee summer Chinook Salmon program has occurred since 1989 with some form of inoculation, except in recent years. The only change has been rearing fish at lower densities with the reduction of hatchery supplementation programs. Truscott said environmental stressors have increased, including Columbia River water temperatures. Stress is additive, and he supports doing everything we can to reduce stress in the hatchery.

Bill Gale said he trusts Truscott and Willard to make the best decision. If the diseased fish separate themselves within the raceway, perhaps the diseased fish can be crowded separately, and the unaffected fish treated differently and removed for transport. Tonseth agreed to take this suggestion back to staff for discussion but said that crowding would stress the fish further. Truscott suggested transporting the healthiest fish to Dryden Pond, then directly releasing diseased fish. Tonseth noted diseased fish would also expose wild fish to disease. Fish with clinical signs of disease will die. Tonseth said transporting all fish with reduced density loading may require four to five truckloads over 1 week, depending on the amount of tempering that needs to be done. Tonseth asked whether there is more support for allowing for more acclimation time at Dryden Pond, noting that if mortalities increase, the fish would be released to the river under an emergency basis.

The Committees agreed that if fish are segregating themselves in the raceway, healthy fish should be transported to Dryden Pond for acclimation, and unhealthy fish should be directly released to the river. If the diseased fish are not segregating themselves in the raceway, a small group of healthy fish should be transported to Dryden Pond to observe their survival over a week or more before transporting all fish to Dryden Pond.

Gale said if it's the fish health recommendation to cull the diseased fish, he would support that. Tonseth said if that is Finley's recommendation, he will contact the Committees for their agreement.

Following the meeting, Tonseth responded to the Committees with a range of options for consideration. The option that was supportable by the RR/RI HCP-HCs and the PRCC HSC was to split the production, directly plant fish from the two most disease-compromised raceways, and transfer fish from the least-compromised raceway (the PIT-tagged group) to Dryden Pond for acclimation. The transfer of the acclimated group was scheduled to begin Monday, March 27, 2023, and continue over 2 to 3 days with reduced loads to minimize stress.

WDFW noted that the decision to hold some fish at Dryden Pond is contradictory to the recommendation of their fish health staff (which was to direct plant all the fish into the river). WDFW recognizes the interests and concerns expressed by other Committee members (and raised the concern internally as well) about trying to maximize acclimation and imprinting time to maximize homing fidelity, and under more benign conditions, WDFW would place a high priority on trying to achieve those objectives. However, under the current conditions, WDFW believes that a higher priority should have been placed on preservation of life with objectives such as homing fidelity and lower stray rates being secondary to the preservation of life. It is and has been WDFW's position that preservation of life (i.e., taking actions that put fewer fish at risk) in situations such as this should be a priority, and they hope greater consideration will be given in the future if or when a situation such as this occurs.

V. Administration

A. Next Meetings

The next regular HCP-HCs and PRCC HSC meetings will be held on Wednesday, April 19; Wednesday, May 17; and Wednesday, June 21, 2023. The HCP-HC and PRCC HSC agreed they would meet in person from March through November. Virtual access will also be available for those who cannot attend the meeting. The meetings will start at 10 a.m.

VI. Attachments

Attachment A: List of Attendees

Attachment B: Egg Thiamine Testing Memorandum

Attachment C: Update on Release Timing Evaluation at Priest Rapids Hatchery

Attachment D: PUD Comprehensive Report Summary Presentation

**Attachment A
List of Attendees**

Name	Organization
Larissa Rohrbach	Anchor QEA, LLC
Tracy Hillman	BioAnalysts, Inc.
Scott Hopkins* ^o	Chelan PUD
Catherine Willard* ^o	Chelan PUD
Kirk Truscott* [‡] ^o	Confederated Tribes of the Colville Reservation
Betsy Bamberger ^o	Douglas PUD
Tom Kahler*	Douglas PUD
Rod O'Connor* [‡]	Grant PUD
Deanne Pavlik-Kunkel ^o	Grant PUD
Todd Pearsons [‡]	Grant PUD
Tim Taylor	Grant PUD
Brett Farman* [‡] ^o	National Marine Fisheries Service
Ben Goodman ^o	Washington Department of Fish and Wildlife
Alf Haukenes	Washington Department of Fish and Wildlife
Katy Shelby	Washington Department of Fish and Wildlife
Mike Tonseth* [‡] ^o	Washington Department of Fish and Wildlife
Keely Murdoch* [‡]	Yakama Nation
Cory Kamphaus* [‡]	Yakama Nation
Bill Gale* [‡] ^o	U.S. Fish and Wildlife Service
Charles Frady ^o	U.S. Fish and Wildlife Service

Notes:

* Denotes HCP-HCs member or alternate

‡ Denotes PRCC HSC member or alternate

^o Joined by Webex

Attachment B

Egg Thiamine Testing Memorandum



Memorandum

TO: Wells HCP Hatchery Committee
FROM: Betsy Bamberger, Douglas PUD
SUBJECT: Egg Thiamine Testing
DATE: February 21, 2023

Thiamine deficiency complex (TDC) in salmonids is a vitamin B1 deficiency that results in various neurological problems and overt mortality in both adults and their progeny. It is hypothesized that shifts in the relative abundance and consumption of certain oceanic prey species is causing an increase in TDC in the Pacific Northwest. The incidence and severity of TDC in the Interior Columbia Basin is not currently well understood and regional data is limited. Douglas PUD proposes a monitoring effort not to exceed three years to determine baseline thiamine concentrations in the eggs of summer run Steelhead, a species believed to be particularly susceptible to TDC and locally protected under the Endangered Species Act. Initial sampling efforts will target hatchery-origin fish from the Columbia Safety Net (CSN) program at Wells Hatchery. Successful thiamine supplementation, via hen injection or egg immersion bath, is possible in hatchery-reared populations if concentrations are deemed low or deficient.

Douglas PUD has contracted with the United States Geological Survey (USGS) Columbia Environmental Research Center to test for total thiamine levels in eggs. Douglas PUD will collect and ship roughly 5 grams (or roughly 50) of green eggs from each of at least thirty and up to 60 females annually, starting in calendar year 2023 through 2025. Douglas PUD will reassess the number of necessary eggs per female following the results of the 2023 testing, and prior to spawning of the CSN Steelhead in 2024. Sample collection and shipment will be in accordance with USGS protocols.

USGS Columbia Environmental Research Center will assess free thiamine (TH), thiamine monophosphate (TMP), and thiamine pyrophosphate (TPP) as described by Futia et al. (2017) on samples shipped annually for Douglas PUD. For thiamine extraction, approximately one gram of unfertilized egg tissue will be extracted and be run in duplicate. Thiamine levels will be determined using a high-performance liquid chromatograph (HPLC) system (Agilent Technologies 1100 series). Concentrations from the three thiamine vitamers will be summed to determine total thiamine concentrations in nmol/g. This information will be reported to Douglas PUD no later than 6 months from date of email notification of shipment details. Results will be shared with the Wells HCP Hatchery Committee. Further action at the hatchery level will be informed by the interpretation of the results and the observations of egg and fry survival from 2023 through 2025.

Attachment C

Update on Release Timing Evaluation at Priest Rapids Hatchery

Update on release timing evaluation at Priest Rapids Hatchery

PRCC HSC March 15, 2023



Pond A

Pond B

Pond C

Pond D

Pond E

Priest Rapids
Hatchery
final rearing
ponds

800 ft



Historic vs recent release dates

Year of Release	E	D	C	B	A
2012-2016 Median	6/12	6/15	6/18	6/22	6/25
2017-2022 Median	5/23	5/25	6/9	6/14	6/19

Adult Age 2 CWT Recoveries at PRH

Age 2 (Release Years 2016 - 2020)	Pond E	Pond D	Pond C	Pond B	Pond A
Mean Release Date	22-May	25-May	9-Jun	14-Jun	19-Jun
Total CWT fish Poned	1,199,113	1,205,692	1,202,971	1,202,658	1,204,541
Adult CWT Recoveries at Priest Rapids Hatchery	467	456	311	290	167
Release to Trap Survival All Ages	0.0004	0.0004	0.0003	0.0002	0.0001

Adult Age 3 CWT Recoveries at PRH

Age 3 (Release Years 2016 - 2019)	Pond E	Pond D	Pond C	Pond B	Pond A
Mean Release Date	22-May	25-May	9-Jun	14-Jun	19-Jun
Total CWT fish Poned	959,191	960,026	963,681	963,072	964,659
Adult CWT Recoveries at Priest Rapids Hatchery	2,388	2,211	1,831	1,344	862
Release to Trap Survival All Ages	0.0025	0.0023	0.0019	0.0014	0.0009

Adult Age 4 CWT Recoveries at PRH

Age 4 (Release Years 2016 - 2018)	Pond E	Pond D	Pond C	Pond B	Pond A
Mean Release Date	22-May	25-May	9-Jun	14-Jun	19-Jun
Total CWT fish Poned	717,388	718,602	723,213	722,452	723,865
Adult CWT Recoveries at Priest Rapids Hatchery	1,047	1,052	1,215	945	635
Release to Trap Survival All Ages	0.0015	0.0015	0.0017	0.0013	0.0009

Adult Age 5 CWT Recoveries at PRH

Age 5 (Release Years 2016 - 2017)	Pond E	Pond D	Pond C	Pond B	Pond A
Mean Release Date	22-May	25-May	9-Jun	14-Jun	19-Jun
Total CWT fish Poned	478,592	481,911	483,145	481,504	484,049
Adult CWT Recoveries at Priest Rapids Hatchery	809	791	999	756	537
Release to Trap Survival All Ages	0.0017	0.0016	0.0021	0.0016	0.0011

Summary

- Since 2016, fish ages 2-5 from Ponds E-B have greater release-to-trap survival than Pond A
- We would like to continue with the early release schedule in 2024
- Continue monitoring to update survival estimates

Attachment D
PUD Comprehensive Report Summary
Presentation

PUD Comprehensive Report Summary

Presentation to the HCP-HC and PRCC HSC

March 15, 2023

Todd Pearsons, Catherine Willard, Tim Taylor, Rolland O'Connor, and
Tom Kahler

Reporting approach

Purpose of hatchery M&E plan and reporting

1. Evaluate the performance and effects of the PUD hatchery programs
2. Inform management of hatchery programs with science (adaptive management)
3. Fulfillment of ESA requirements

Report type	Frequency	Content	Function
Data	Annual	Cumulative description of data (raw and derived) and field methods. Basic statics reported.	Informs annual M&E implementation plans
Statistical	5 year	Presentation of statistical analyses and description of statistical methods. Addressed in the Program Review when the two would occur in the same year.	Informs 5 year M&E plan and provides in depth data analysis
Program Review	10 year	Integrates and interprets information from data and statistical reports and also includes integration from other programs and studies. Written in scientific manuscript format. Fulfills HCP “Program Review” requirements. Addresses Statistical Report requirements.	Informs recalculation and adaptive management. Determines if programs are meeting objectives.

5 Comprehensive Reports, 10 M&E objectives

- Spring Chinook
- Summer Chinook
- Fall Chinook
- Steelhead
- Sockeye

Results and synthesis

Roll-up of M&E report - definitions

- Yes=achieved objective
 - No=did not achieve objective
 - Mixed=objective was achieved for some programs or metrics, but not all
 - ?=it is uncertain whether objective was achieved
-
- Red=concern, take action where appropriate
 - Yellow=warning – mixed or uncertain results
 - Green=No concern – continue monitoring or objective has been addressed

Summary

M&E Objective	Spring Chinook	Summer Chinook	Fall Chinook	Steelhead
1 Adult abundance, productivity	?	?	?	?
2 Juvenile productivity, pHOS	?	?	?	?
3 HRR>NRR	Yes	Yes	Yes	Yes
4 PNI, pHOS targets met	No	Yes	Yes	No
5 Run spawn time, distribution	Mixed	Yes	Yes	Mixed*
6 Stray targets met	No	Mixed	Yes	No
7 Genetic targets met	Mixed	Yes	Yes	Mixed
8 Phenotype similarity met	Mixed	Mixed	Mixed	Mixed
9 Release targets met	Yes	Yes	Yes	Yes
10 Harvest contribution	Yes	Yes	Yes	Yes

* M&E plan does not include steelhead distribution

Are M&E plan design and data availability sufficient to address objectives?

M&E Objective	Spring Chinook	Summer Chinook	Fall Chinook	Steelhead
1 Adult abundance, productivity	No	No	No	No
2 Juvenile productivity, pHOS	No	No	No	No
3 HRR>NRR	Yes	Yes	Yes	Yes
4 PNI, pHOS targets met	Yes	Yes	Yes	Yes
5 Run spawn time, distribution	Yes	Yes	Yes	Yes*
6 Stray targets met	Yes	Yes	Yes	Yes
7 Genetic targets met	Yes	Yes	Yes	Yes
8 Phenotype similarity met	Yes	Yes	Yes	Yes
9 Release targets met	Yes	Yes	Yes	Yes
10 Harvest contribution	Yes	Yes	Yes	Yes

* M&E plan does not include steelhead distribution

Objectives consistently met

- HRR>NRR
- Release targets met
- Harvest contributions

- We have high confidence we can replicate these results in the future

Objectives not consistently met

- SPC and STH PNI and pHOS not meeting targets
- SPC and STH not meeting all stray targets (multiple hatcheries)
- H SPC spawn distribution is lower elevation than natural-origin
- Results do not incorporate recent changes to PUD programs including reduction in program sizes
- Different perspectives about H SPC spawning distribution adequacy
- In general, integrated hatchery programs are too large relative to natural-origin fish abundance to achieve pHOS and stray targets for within subbasin stray metrics for spring Chinook.

Consistent uncertainties in results

- Abundance (total, NOR, NOS)
- Productivity (pHOS vs. juveniles, adults, density corrected)
- Limitations – no in basin references, insufficient treatment contrast, high natural variation, low statistical power, ineffective method (RST)
- Without major changes to M&E plan and perhaps programs, it is highly likely these results will be repeated in the future

Common patterns across programs

- H smolts are larger at release than N fish
 - H mature earlier than N (e.g., jacks)
 - H produce fewer eggs than N, but they are similar when standardized for length
 - H generally spawn at lower elevations than N (SPC, SUC)
 - H stray more than N at small spatial scales, but not at large scales, particularly when moved and with weirs
 - Recipient stray targets were exceeded from a single or multiple hatcheries
-
- *** These patterns are also generally seen throughout the West (not specific to the UC)*

Common finding about hatchery type

- Segregated and integrated harvest augmentation programs meet management objectives more than integrated conservation programs
 - Segregated programs (Chelan Falls SUC, Wells Steelhead and SUC, USFWS SPC Leavenworth)
 - Integrated harvest augmentation (Wenatchee SUC, Methow SUC, Okanogan SUC, Hanford Reach FAC)
 - Integrated conservation (Chiwawa and Nason SPC, Methow SPC, Wells/Omak STH)

Are M&E plan objectives being met by different hatchery types?

M&E Objective	Integrated Conservation (SPC, STH)	Integrated Harvest (SUC, FAC)	Segregated Harvest (SUC, STH)
1 Adult abundance, productivity	?	?	n/a
2 Juvenile productivity, pHOS	?	?	n/a
3 HRR>NRR	Yes	Yes	Yes
4 PNI, pHOS targets met	No	Yes	n/a
5 Run spawn time, distribution	Mixed	Mixed	n/a
6 Stray targets met	Mixed	Mixed	Yes
7 Genetic targets met	Mixed	Yes	n/a
8 Phenotype similarity met	Mixed	Mixed	n/a
9 Release targets met	Yes	Yes	Yes
10 Harvest contribution	Yes	Yes	Yes
% of objectives met	30%	50%	100%

Key M&E findings and context

- The mechanics of supplementation is working (HRR>NRR)
- Harvest is being provided by all programs
- 8 of 10 objectives can be assessed with current plan and data
- We can't definitively assess abundance/productivity objectives
- 2 objectives for SPC and STH are not being met (stray, PNI)
- Program type (harvest, conservation) influenced whether objectives were met
- Programs change every 10 years or sooner so difficult to evaluate effects of changes on some objectives, particularly recent ones (e.g., abundance)
- It is unlikely that more annual samples will result in big improvements in statistical power to detect changes or result in different findings

Overview

- We have learned and invested a lot to get great information
- The data we collected is some of the most robust in the world
- Some conclusions have been known for some time, others are broadly true, while others are new
- Hatcheries are not a perfect tool, but they can be very useful to achieve certain management objectives such as providing harvest that can't be provided easily with other approaches