

Memorandum

To: Wells, Rocky Reach, and Rock Island HCPs Hatchery Committees and Priest Rapids Coordinating Committee Hatchery Subcommittee Date: November 20, 2019

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

cc: Larissa Rohrbach, Anchor QEA, LLC

Re: Final Minutes of the October 16, 2019 HCP Hatchery Committees and PRCC Hatchery Subcommittee Meetings

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees (HCs) and Priest Rapids Coordinating Committee Hatchery Subcommittee (PRCC HSC) meetings were held in Wenatchee, Washington, on Wednesday, October 16, 2019, from 9:00 a.m. to 3:00 p.m. Attendees are listed in Attachment A to these meeting minutes.

Action Item Summary

Joint HCP-HCs and PRCC HSC

- Mike Tonseth will coordinate with Andrew Murdoch (Washington Department of Fish and Wildlife [WDFW]) to present pre-spawn mortality modeling results for spring Chinook salmon at an upcoming HCP-HC meeting (Item I-A). *(Note: this item is ongoing.)*
- Kirk Truscott will discuss with Colville Confederated Tribes (CCT) biologists whether elemental signature analysis could differentiate natural-origin Okanogan spring Chinook salmon from other natural-origin Chinook salmon during broodstock collection at Wells Dam for Methow Fish Hatchery (MFH) programs (Item I-A). *(Note: this item is ongoing.)*
- Brett Farman will discuss with Charlene Hurst and Mike Tonseth the potential use of a multi-population model for estimating proportionate natural influence (PNI) for the Nason and Chiwawa spring Chinook salmon programs (Item I-A). *(Note: this item is ongoing.)*
- Greg Mackey will work with Mike Tonseth to test a modeling approach and prepare a white paper on the method for determining a range for the number of females to be collected for a given broodstock in the upcoming year (Item II-C).
- Brett Farman will confer with Charlene Hurst and confirm whether transfer of surplus spring Chinook salmon eyed-eggs from MFH to the Colville Confederated Tribes' 10j program is consistent with the intent of the 10j permit (Item II-D).
- Bill Gale will confirm whether Winthrop National Fish Hatchery (WNFH) can receive surplus spring Chinook salmon eyed-eggs from MFH (Item II-D).

- Mike Tonseth will prepare, and Larissa Rohrbach will distribute, the Appendices to the Broodstock Collection Protocols (BCPs) for editing by the relevant parties that were identified in the October 16, 2019 meeting (Item II-E).

Decision Summary

- There were no decisions made in today's meeting.

Agreements

- The HCP HCs and PRCC HSC agreed to allow scientists to report the carcass survey data at the historic reach scale for comparison to past results, and also to report the data at a scale that is appropriate for each reach and population to discern distribution trends.

Review Items

- Larissa Rohrbach sent an email to the Wells HCP-HC on September 16, 2019, notifying them that Douglas PUD's draft 2018 Monitoring and Evaluation (M&E) Report for the Wells and Methow program is available for 60-day review with edits due by Friday, November 15, 2019 (Item I-A).
- Larissa Rohrbach sent an email to the PRCC HSC on October 22, 2019, notifying them that Grant PUD's draft 2018-2019 Priest Rapids Hatchery M&E Annual Report is available for 30-day review with edits due by Friday, November 20, 2019 (Item I-A).

Finalized Documents

- There were no documents finalized in today's meeting.

I. Welcome

A. Review Agenda, Review Last Meeting Action Items, and Approve the September 18, 2019 Meeting Minutes (Tracy Hillman)

Tracy Hillman welcomed the HCP-HCs and PRCC HSC to the meeting.

Hillman asked for any additions or changes to the revised agenda (distributed via email by Larissa Rohrbach on October 14, 2019).

Attendees requested to add several items for discussion to the agenda.

- Hillman asked to discuss the scale of carcass survey analysis in the Comprehensive Report (due in 2020). This would follow the discussion of updates to the genetics section of the M&E Plan.
- Hillman added that the Committees would offer performance evaluations for himself and Rohrbach in today's meeting (under administrative business).
- Todd Pearsons added conference announcements to the administrative business.
- Mike Tonseth added consideration for changing start time of the meetings to the administrative business.
- Greg Mackey added a discussion on the disposition of surplus Methow Hatchery spring Chinook salmon eyed eggs. Hillman said this would be discussed as part of the surplus juvenile production discussion (Item II-D).

The HCP-HCs and PRCC HSC members approved the revised agenda.

The HCP-HCs and PRCC HSC representatives reviewed the revised September 18, 2019 meeting minutes. Additional minor revisions were made in the meeting. The HCP-HCs and PRCC HSC members approved the meeting minutes as revised.

Administrative business was discussed.

Tonseth asked if the start time could be shifted to 10:00 a.m. to accommodate logistical challenges related to school schedules. Bill Gale suggested accommodating the schedule in the winter but reverting back to a 9:00 a.m. start time in the summer. Gale asked if the school schedule has always been the same and is unlikely to change in the future. Tonseth and Keely Murdoch said it is unlikely to change. All parties agreed to changing the meeting start time to 10:00 a.m. during school months (September through May). During other months, the meeting will start at 9:00 a.m.

Pearsons said the Upper Columbia Science Conference will occur on January 22 and 23, 2020, in Wenatchee, Washington, and abstracts are currently being reviewed. Pearsons said the Western Division American Fisheries Society meeting will be held in Vancouver, BC, on April 12 through 16, 2020, with abstract submission open through November 8, 2019.

Hillman noted that it is time for the HCP-HCs to provide an evaluation of his and Rohrbach's performance. Greg Mackey asked how the Committees members would like to convey feedback to Hillman and Rohrbach. Mackey said generally the feedback was positive. The following feedback was provided to Hillman over email:

Mackey said the HCP-HCs conducted an evaluation of the Chair, Tracy Hillman. Mackey said the PUD representatives polled all the members by email offering opportunity to reply directly or request a conference call or meeting to discuss the Chair's performance. All members replied via email that

they were pleased with the Chair's performance and wanted Douglas PUD and Chelan PUD to retain Hillman's services for another three-year term. Hillman agreed to serve as the Chair for the Wells, Rocky Reach, and Rock Island Hatchery Committees for another three years.

Mackey also provided a positive review of the meeting support services provided by Rohrbach in 2019. Pearsons noted that applying the same approach to maintaining the meeting records for the PRCC HSC has been successful for ensuring meeting discussions were accurately summarized.

Action items from the HCP-HCs and PRCC HSC meeting on September 18, 2019, were reviewed, and follow-up discussions were addressed (*note: italicized text below corresponds to agenda items from the meetings on September 18, 2019*):

Joint HCP-HCs and PRCC HSC

- *Mike Tonseth will coordinate with Andrew Murdoch (Washington Department of Fish and Wildlife [WDFW]) to present pre-spawn mortality modeling results for spring Chinook salmon at an upcoming HCP-HC meeting (Item I-A).*

Tonseth said this item is ongoing; there may be pre-spawn mortality values for females but not yet for males.

- *Kirk Truscott will discuss with Colville Confederated Tribes (CCT) biologists whether elemental signature analysis could differentiate natural-origin Okanogan spring Chinook salmon from other natural-origin Chinook salmon during broodstock collection at Wells Dam for Methow Fish Hatchery programs (Item I-A).*

Truscott said this item is ongoing.

- *Brett Farman will discuss with Charlene Hurst (NMFS) and Tonseth the potential use of a multi-population model for estimating proportionate natural influence (PNI) for the Nason and Chiwawa spring Chinook salmon programs (Item I-A).*

Farman said he contacted Hurst and Tonseth to initiate a discussion, but the item is still ongoing.

- *Greg Mackey will distribute a white paper reviewing broodstock composition and mating strategies for conservation programs, focusing on spring Chinook salmon at the Methow Hatchery (Item I-A).*

This item was distributed by Larissa Rohrbach on October 14, 2019, with a request that any comments or edits be provided to Mackey, and is attached to these minutes as Attachment B. This item is complete.

- *Larissa Rohrbach will add HCP Policy Committee guidance on policy-level issues to the HCP-HC Meeting Protocols (version dated May 15, 2019; Item I-A).*

Tracy Hillman said the final meeting minutes were distributed on September 26, 2019.

[Rohrbach updated the HCP-HC and PRCC HSC Meeting Protocols following the meeting and distributed an updated version on October 22, 2019. This item is complete.]

- *Mike Tonseth will distribute a suggested drafting plan for the Broodstock Collection Protocols (BCPs) assigning specific members to address topics for discussion; Tracy Hillman will determine whether there is a need for an additional conference call in early October to discuss research needs to address given topics (Item II-B).*

Tonseth said this will be discussed in today's meeting. This item is complete.

- *Catherine Willard will coordinate with other HCP-HC and PRCC HSC members to draft separate sets of genetic monitoring hypotheses that are specific for the individual hatchery programs to monitor for changes in population genetics over time (Item II-C).*

Tracy Hillman said this item will be discussed in today's meeting. This item is complete.

PRCC Hatchery Subcommittee

- *PRCC HSC representatives will submit a list of minimum data or information needs for making a decision on the White River spring Chinook salmon hatchery program to Tracy Hillman (Item I-A).*

Hillman said this item is ongoing because the PRCC is working on the direction for the HSC. This action will be removed from the list until further direction is provided by the PRCC.

- *Brett Farman will ask Craig Busack (National Marine Fisheries Service [NMFS]) to participate in PRCC HSC process for identifying data needs and making a decision on the White River spring Chinook salmon hatchery program (Item I-A).*

Farman said Busack is willing to participate to some extent but would like to address focused questions if possible. Farman said Busack's retirement date is in February. Hillman suggested discussing potential questions for Busack in the HSC meeting.

II. Joint HCP-HCs and PRCC HSC

A. Genetics Updates to the Monitoring and Evaluation Plan for PUD Hatchery Programs

Tracy Hillman projected the edited version of the genetics section (Objective 7) of the PUDs' Monitoring and Evaluation Plan (M&E Plan) in the meeting. Catherine Willard said she did not receive feedback on the most recent revisions [distributed by Rohrbach on October 4, 2019] and shared her edits to the document.

Willard summarized the discussion the Committees had in the previous meeting, that there is an interest in analyzing genetic changes of hatchery-origin returns. The original question focused on the analyses of natural-origin returns exclusively. Willard stated that she captured the analyses of

hatchery-origin returns by modifying the Objective 7. Willard said the agreement during the last meeting was that different types of programs would ask different questions about genetic changes over time. She shared edits to the M&E Plan narrative about adding segregated programs to the analyses to convey that segregated programs desire to monitor the risk of using multiple generations of hatchery-origin fish in their broodstock. Willard added a monitoring question about segregated programs (Questions 7.1.1 and 7.1.2) with relevant hypotheses that apply to the modified monitoring question. Willard said she removed the equivalence testing hypotheses and added language that states that biologically relevant effects for measured differences in genetic metrics have not been determined to date, and when they are, the equivalence testing hypotheses equations could be added back to the document. Hillman said he had added language to the narrative on the purpose of equivalency testing and application to many of the hypotheses (also in response to Independent Scientific Advisory Board [ISAB] feedback). Hillman asked if the Committees wanted to approve sections of the document as they are completed or approve the entire document once all ISAB feedback is incorporated. Keely Murdoch asked if there could be a need to make more changes after review of the other objectives. Hillman said changes can always be made because it is a living document. Hillman said a benefit of approving this section separately is that it would allow the programs to move forward on planning genetic analyses.

Greg Mackey said he is not ready to approve the section because he still needs to take time to map out the hatchery samples that would be analyzed and whether that type of analysis would inform the Douglas PUD programs. Mackey summarized the conclusion from the last meeting that in conservation programs the parents of the hatchery fish are wild so the "hatchery fish" are the offspring of wild parents such that any changes observed would be stochastic (essentially sampling error) and not necessarily informative of what the neutral markers should tell us (shifts in the genetic status of the population). Mackey agreed that with incorporation of contemporary natural-origin fish into the conservation programs, comparisons of the contemporary natural-origin fish to the natural-origin baseline makes sense to monitor for genetic changes away from the baseline.

Willard summarized the struggle to understand whether hatchery fish should be analyzed but also noted the conclusion from last month's meeting was to go forward with analyzing hatchery-origin samples. Todd Pearsons said a contingency of voting to approve this section of the M&E Plan may be to allow the Committees to re-evaluate whether to analyze the hatchery samples once the value of that information is better understood.

Mackey said he would be willing to approve the M&E Plan in sections. Pearsons said it would be best to standardize versions with a single publication date so that they are easily referenced in other documents. Mackey said in 2021 there will be another rewrite of the M&E Plan and asked what sections may need changes. Hillman said major changes are not needed, just revisions to respond to

ISAB feedback. The genetics section was different from others because there were major changes to the hypotheses proposed. Mackey asked about the Before-After-Control-Impact (BACI) analysis. Hillman said description of the BACI analysis is in an appendix to the M&E Plan and that descriptions within the M&E Plan should be sufficient. Willard noted that revisions to the genetics sections address a discrepancy in what the M&E Plan said would be done to analyze the effect of hatchery programs on natural populations and the intent of the plan.

Hillman posed a general question. He said salmon adapt to local environmental conditions. In some cases, this may mean that genes coding for non-adaptive phenotypes are lost because of natural selection (i.e., homing and local adaptation reduce genetic variation). He asked if those genes are actually lost, or are they retained but not expressed (the genes or histones or both are methylated). Murdoch asked if Hillman was referring to hatchery-rearing effects or in selective pressures in the wild. Hillman said the question applies to both hatchery and natural rearing. Murdoch said one of the confusing factors is that in a hatchery there shouldn't be genes lost because individuals [or their genes] are not being lost to competition as they would be in the wild. Bill Gale said the testing for allele frequency evaluates changes to the DNA template; however, in other cases, such as age at maturity, gene expression is affected by rearing in the hatchery.

Hillman referred to a case where Chinook salmon ova from the Sacramento River were transplanted to New Zealand (series of publications by T.P. Quinn, M.J. Unwin, and M.T. Kinnison). These fish survived and evolved into several populations, each with unique heritable traits (e.g., different fecundities, age at maturity, length at age, migration timing). Apparently, these fish retain high genetic diversity (or experienced significant positive genetic mutations) and simply express those genes that result in phenotypes that improved survival within the different river systems. Given the founder effect and the rapid rate at which these fish evolved, this seems to be a case of differential gene expression rather than a loss (or increase) in genes or alleles. Hillman said the hypotheses in the M&E Plan focus on gene frequency. Clearly, a loss of genes or alleles is not good, but maybe the genes are not lost. Perhaps they are retained in the nucleus and simply not being expressed. Gale said presentations like that given by Mackenzie Gavrey (NOAA Fisheries Northwest Fisheries Science Center; presented to the HCP-HCs on May 17, 2017) on epigenetic changes that can transfer across generations indicate that allele frequencies should not be the only monitoring target.

Mackey said it's important to keep in mind that the genetic monitoring is focused on neutral markers, alleles that are lost by chance (i.e., genetic drift) not by selection, that are used as a proxy for the selection process that causes a loss of diversity that may occur due to hatchery processes. Mackey said selection occurs for genes that confer fitness. He also noted that selection only selects "against" genes, not "for" genes, so genes that are not selected against should remain in the population. Only genes that are selected against would be driven to low levels or lost. Mackey said

in summary, genes are unlikely to be lost except in very small populations. Mackey said it would also be interesting to investigate further the co-adapted gene complexes brought into a population when population mixing occurs. Mackey said selection is not perfection, it just has to be good enough.

Hillman said the intent of his question was to help identify effect sizes for equivalence testing. Mackey said the science is progressing rapidly for identifying selective markers in fish.

Spatial Scales for Carcass Survey Analysis

Hillman said another question related to the M&E Plan is what the appropriate spatial scale is for analyzing hatchery and natural-origin female carcass distributions. Currently, carcasses are recorded using GPS in the field and then the spatial distribution of natural-origin and hatchery-origin carcasses are analyzed statistically at the 100-meter (m) scale following criteria in the M&E Plan. Hillman said it is difficult to depict a long reach of river (e.g., 40 kilometers [km]) graphically if carcass distribution is analyzed at the 100-m scale. Hillman said in the last comprehensive report, spring Chinook salmon carcasses were analyzed at the 500-m scale. Hillman also said that the smaller the scale, the more likely it is to observe a statistical difference between groups.

Murdoch said she thought in the previous M&E Plan the data were analyzed by river kilometer. Willard read from the M&E Plan that states spatial analyses should be done at the historic reach scale and at the 100-m scale. Mackey said they have done both scales and that the boundaries of the historic reach designations can be arbitrary, or not biologically relevant (e.g., based on convenient river entry points). Willard said Douglas PUD reported the average of the river kilometer at which hatchery and natural-origin female carcasses were observed, while Chelan PUD reported the frequency distribution of carcasses. Willard and Mackey said it makes more sense to report the frequency. Hillman said management decisions could be different when looking at the data at the 100-m, 500-m, or 1-km scale. Pearsons said it depends on the program. For instance, spatial distribution of fall Chinook salmon would be very different than spring Chinook salmon. The original metrics were developed for spring Chinook salmon and in some cases the metrics have not been a good fit for the other species. Pearsons said it also depends on the reach, and the way that carcasses drift. Using the 100-m level of analysis gives a false sense of confidence in carcass locations. Mackey said the other problem with precision is that the field staff may carry the carcasses before marking their location by GPS. Willard, Gale, and Murdoch said their biologists mark the location by GPS before moving the carcass to collect other biological data (e.g., size, scales). Pearsons said data collection using GPS allows the data to be analyzed in many different ways. Peter Graf agreed and said the data should be binned according to what is appropriate for the population, stream, or reach. Mike Tonseth agreed that there should not be a "one size fits all" approach for all sites and stocks. For instance, a smaller tributary like Nason Creek versus the Hanford Reach of the Columbia River should have different scales of inference. Hillman said that he does not see much value in analyzing

carcass data at small spatial scales (e.g., 100 m). Gale asked if the distributions were actually being tested statistically. Hillman said yes. The p-values are generally smaller when analyzing the data at the smaller scales [indicating higher probability of statistically significant difference].

Tonseth said it is necessary to use different spatial scales for analyzing spring Chinook salmon and steelhead compared to fall Chinook salmon just because of the size of the sites, populations, and carcass drift in certain reaches. Hillman said he was hopeful that there could be a general approach that would be applied for all stocks or populations. Pearsons suggested retaining the data collection approach that allows for flexibility, starting analysis at a broad spatial scale, and if differences are not observed, then moving to a smaller spatial scale.

Murdoch read from the original analytical framework (prior to updates in 2013), which states the analysis should be done at 0.01 km (10 m). Murdoch read that the original framework states that statistical analysis should be done by origin and sex, but analysis by sex would not actually be done if males are not analyzed. Murdoch said the original test was intended to be a comparison of averages of river kilometer and the data were broken out by reach for visualization. Hillman said an ANOVA (Analysis of Variance comparison test) could be used but this approach ignores useful distribution data. With ANOVA, year and origin are independent variables. Willard asked whether the original analytical framework was updated in 2013. Mackey and Tom Kahler said yes. Murdoch asked what updates have been made over time to the M&E Plan. Willard said the more recent updates included graphic and Chi-squared analysis. Mackey said one reason comparing means was not working was because the distributions were not normally distributed. Mackey said in some cases statistics are not even needed to see the differences.

Hillman suggested moving forward by deciding whether a prescriptive approach should be written into the M&E Plan, or whether the analysts should be allowed to determine the scale for each stock and location. Graf suggested starting at 500 m and adjusting to minimize noise in the data and ensure the data are not overly clumped. Pearsons said he supports stating that analyses should be carried out at "an appropriate scale," for instance, analyzing data at 500 m does not show anything for Hanford Reach Fall Chinook salmon and would not be appropriate for that stock. Pearsons said analyzing the data by the historic reaches allows for evaluation at the largest scale, and then it should be up to the analyst to decide what smaller scale is appropriate.

Mackey said presenting the data by historic reaches presents the context. Gale said the historic reaches should not be the only default analysis method because the boundaries may not be biologically relevant. Murdoch said the time scale associated with the historic reaches is much longer and has a larger dataset and therefore should be preserved. Graf suggested leaving it to each analyst to explain why a certain scale is chosen and report at the scale that is most appropriate for a given location and population.

Gale said choosing how to bin histograms is always a problem and there are not great statistical tools to make decisions on where to separate the bins. Hillman said there are some statistical packages that do this, but he does not recommend the approach.

Agreement: The HCP HCs and PRCC HSC agreed to evaluate female carcass distribution data at the historic reach scale for comparison to past results, and also allow analysts to report distributions at a scale that is appropriate for each location and stock.

Kirk Truscott said this discussion pertains to longitudinal trends [along the river channel] but there could also be an interest in analyzing the data across the channel. Hillman agreed and said that probably pertains more to redd distribution and less to female carcass distribution. Survey crews are not assigning redds to a specific origin of fish.

B. Improvement Feasibility at Eastbank Hatchery for Wenatchee Summer Chinook Salmon SOA

Catherine Willard said that in 2016 the Rocky Reach/Rock Island HCP HCs approved a statement of agreement (SOA) to include chilled, partial water reuse at Eastbank Hatchery to help with rearing fish and to meet Wenatchee River Total Maximum Daily Load (TMDL) requirements for phosphorous discharge limits, specifically from hatchery production at Dryden Acclimation Pond adjacent to the Wenatchee River. Ian Adams presented information from the SOA and process that has led to a different approach for meeting the TMDL requirements for the Dryden Acclimation Pond.

Ian Adams gave the presentation entitled, "*Chelan County PUD Dryden TMDL Compliance*" (Attachment C).

Slide 2: The 2016 SOA indicated that phosphorous discharge limits from Dryden Pond would be met by rearing Wenatchee summer Chinook salmon to a smaller size. The SOA states, "This would be accomplished by constructing a new chilled partial water reuse system at Eastbank Hatchery utilizing circular ponds as a successfully demonstrated rearing practice prior to transfer to the Dryden Acclimation Pond for final spring acclimation."

Slides 3, 4: In 2012, after receiving an addendum to the TMDL from the Washington State Department of Ecology (Ecology), Chelan PUD took five preliminary actions to attempt to address phosphorous discharge from Dryden Pond. The final SOA moved forward with investigating feasibility of chilled partial reuse system at Eastbank Hatchery in order to grow smaller fish that would release fewer pollutants.

Slide 6: Secondary actions included modifying feeding practices, rearing Wenatchee summer Chinook salmon to a smaller size with existing infrastructure, and further negotiations with Ecology,

in particular, regarding the background phosphorous levels in the Wenatchee River that exceeded thresholds for the TMDL [not including discharge from Dryden Pond].

Slide 7: Feeding methods were adjusted to hand-feeding rather than broadcast feeding with a mechanized blower system to avoid over-feeding. The fish were switched to a low-phosphorous feed (lowest levels commercially available). Adams said the low-phosphorus feed is difficult to acquire. Bill Gale said they have moved away from using this feed at Leavenworth National Fish Hatchery (LNFH) because of difficulty of acquiring the feed. Adams said they worked closely with staff at Eastbank Hatchery to reduce the size of fish during early incubation prior to transfer to Dryden Pond (previous target was 10 fish per pound, now 18 fish per pound; the hatchery typically achieves 16 fish per pound). Phosphorous discharge over years from 2012 to 2019 was shown. Feeding, early growth, and stocking methods were adjusted each year. Phosphorous levels have remained below TMDL thresholds over four consecutive years.

Slides 8,9: Adams said new Ecology staff have helped Chelan PUD to clarify the terms of their TMDL and to edit the terms of the TMDL so they are more easily interpreted. Ecology also allows for the dismissal of background phosphorous content from Dryden discharge samples.

Slides 10, 11: Some additional benefits were observed by reducing flow through the Dryden Pond per guidance from WDFW fish health on industry standards for flow indices. Water quality auto samplers were installed at Dryden Pond intake and outflow. Data are sent to Ecology once monthly during "Critical Season" months (March and April) as defined by Ecology.

Kirk Truscott asked whether the existing circular reuse at Eastbank was instrumental in adjusting fish size prior to transfer. Adams said that was not the biggest effect. The bigger effect was better management of fish reared in raceways. Only about 20% of the fish are in the circular ponds.

Gale asked whether the conversation with Ecology was difficult regarding removal of background phosphorous levels from the baseline. Adams said the conversation was difficult in the past but was more productive in recent years. Gale said LNFH will have to consult with the U.S. Environmental Protection Agency for a similar Clean Water Act Section 404 permit. Gale said there is a similar problem in Icicle Creek for LNFH, but the data that are the bases for the TMDL are out of date and he is interested in determining whether Ecology will be renewing the TMDL using more recent data.

Peter Graf said one of the other problems with the criteria that were provided for Dryden Pond is that the phosphorous load is spiky and there was no temporal element to the criteria provided in 2012.

Truscott asked how reducing flows through Dryden Pond helped to meet the TMDL; one would think the contrary would be true due to more dilution by higher flows. Adams said the change in

phosphorous load allocation with flow is not linear. Phosphorous load criteria values are higher per CFS at lower flows than they are with increased flow values (shown in Slide 7). Adams said the criteria are limits for total discharge per day, so lower flows reduced total daily discharge and the phosphorous with it.

Adams said in the one year that flow had been dropped in half, the fish health issues that had occurred for several years were not exhibited. Mike Tonseth said when the flows were higher, it caused fish to move to the side of the pond and resulted in higher densities around the edge of the pond. Tracy Hillman said there are terms for this: "ecological density" versus "crude density." Truscott suggested that perhaps fewer mortalities and decaying fish may have reduced phosphorous discharge too.

Gale asked if Ecology provided options for how water quality is sampled. Adams said the options were to manually take two grab samples once per week during a normal work day and composite them, or to take hourly samples over 24-hours for one day each week and composite them. Gale said that is similar to sampling at LNFH.

Hillman thanked Adams for his presentation.

Hillman concluded the discussion by stating that because Chelan PUD is meeting their TMDL, the 2016 SOA on Improvement Feasibility at Eastbank Hatchery for Wenatchee Summer Chinook salmon is not needed.

C. Establishing ranges around broodstock collection targets

Greg Mackey said in 2013 he gave a presentation showing a modeling approach for determining the number of broodstock adults that would be required to meet juvenile production targets for the upcoming year. Mackey said modeling was originally done in Excel using PopTools but became hard to manage in Excel, so he rewrote the model code in R. Mackey said he then ran a number of scenarios through the model.

Mackey gave a presentation entitled, "*Managing Risk and Expectations in Broodstock Collection*" (Attachment D).

Slides 2, 3: Mackey showed the basic broodstock calculation: multiply the number of adult females desirable by a number of factors (e.g., pre-spawn survival, fecundity) to determine number of smolts produced. One can test iterations with different numbers of females to achieve the number of smolts desired. However, each of those factors in the equation has a mean and associated variance that were calculated from annual data sets.

Slide 5: When using a random draw from the distribution of each factor, it is unlikely a given value will be the mean of the distribution. If variances are large, choosing an individual value farther away from the mean is more likely.

Slide 6: Mackey calculated the percentage for how often a parameter would fall +/- 10% outside the mean for each factor.

Slides 7,8: Histograms depict the distributions of the various factors. One approach is to choose the number of females that might work, or alternatively one can ask the model to identify a number of females. One would choose the number of model iterations that would be run to determine an ideal number of females.

Slide 9: Running model iterations allows one to test allowable critical values for the number of females necessary and estimate the probability of achieving the target number of smolts while staying below 110% of the target.

Slide 10: Effect of population size. At very low program sizes the number of females needed to create an overage can be very small (e.g., if only 13 females are required, one additional could create an overage).

Slide 11: Data inputs. A database could be maintained for factors like survival and fecundity, then R can calculate statistics from the data.

Slide 12: Data distributions for factors considered for yearling summer Chinook salmon.

Slides 13–16: Results. Figure shows number of females (x) by probability of meeting a target (y), along with probability of exceeding 100% permitted production. The ideal result would maximize probability of meeting the program target and minimize probability of creating a surplus. The curve shows optimum number of females for meeting program size without exceeding permitted program size (producing a surplus number of juveniles). One use would be to apply the model and look back at whether the calculations of factors, such as fecundity, were accurate. This information could also be given to managers to identify targets for meeting program size or used to identify a range of numbers to give managers some flexibility in number of fish collected.

Gale asked if Bacterial Kidney Disease (BKD) culling was included in the data. Mackey said it is part of the model but was not used for this simulation. Mackey said you could include the percentage collected assuming culling would occur.

Slides 17–19: Key Concepts. PUD programs do not want to routinely fall below targets and fail to meet mitigation obligations; however, going over targets poses problems like collecting too many wild adults for broodstock or needing to find a home for surplus juvenile fish.

Mackey concluded by saying he would like to start using this model in the 2020 BCPs to identify target numbers.

Willard asked whether the optimal numbers identified by the model matched the current targets in the BCPs. Mackey said some of the data for various factors he used from monitoring reports was slightly different than what was in the BCPs. Tonseth said in recent years a geometric mean has been reported rather than arithmetic mean to de-emphasize the extreme high and low values. Tonseth said sometimes different pre-spawn mortality values are reported for males and females of hatchery-origin and natural-origin fish. Mackey said this year is a good example of a case for spring and summer Chinook salmon when fish were quite a bit bigger with higher fecundities than what was assumed in the BCP. Tonseth said in some programs (e.g., steelhead), fecundity has been highly variable and problematic to predict. For instance, within one age class, fish would come back at the same length but different body condition; perhaps there is a different metric that could be collected like fish girth behind the pectoral fin to associate with fecundity that would be a more predictive metric of fecundity than length (measured as post-orbital to hypural length). Tonseth said when fecundity is that much higher, it does not take many females to create an overage of thousands of eggs. WDFW does not want overages, which are especially problematic for listed fish.

Todd Pearsons asked whether the 10% overage limit is an annual target or rolling target and whether it is captured in agreements. Tonseth said that is an annual target and is written into the permit language. The 90% minimum to meet the mitigation credit has been the PUD's obligation. Pearsons said a 5-year rolling average is used to report PNI. Is the 90% target a rolling average or an individual year? Gale said it is an individual year but is not specifically worded in other agreements like *US v. Oregon*. The conversation has always assumed that 10% below targets is always a trigger for regulatory actions. Gale said the other way this is evaluated is a total adult production (TAP) goal; no range is offered, but TAP reported on an annual basis would likely be aggregated over 5 years because of variability due to ocean conditions. Pearsons said the target number of juvenile releases is really a sensitive metric and it is hard to hit the target, so a rolling average over 5 years, for instance, may be a more appropriate way to evaluate whether targets have been met.

Truscott said there are also cases where targets are not met because of production issues that affect only 1 year. If the method Mackey proposes is used and something happened during production, then the method might be in question. Truscott acknowledged the range provided for meeting program levels offers some flexibility.

Tonseth said the approach he uses is a back-calculation from target number of smolts to the number of adult females needed for the broodstock. Mackey said conceptually it is the same math, just running the calculations in reverse compared to the method presented today. Tonseth suggested

going through the conventional approach and the approach developed by Mackey, and then comparing the outputs.

Hillman said the challenge is to provide a single target to the fish culturists. Tonseth said in-season monitoring of the return will be evaluated to determine if the target should change. Steelhead are the most variable. Gale said the strength of Mackey's method is allowing managers to see what variable is driving the selection of number of females, and the factors input into the model could be targeted based on what is known about a given run, like BKD load; a value slightly higher than the mean could be selected for that factor. Pearsons asked Tonseth if the latitude should be given to the fish culturists ahead of the season or should changes be made in-season by the Committees. Tonseth said M&E specialists are sampling the fish for length and fecundity in season and can recommend adjustments in season. Tonseth said if the change was large, he would advise bringing the decision for discussion in the Committees. Mackey confirmed that the original goal was to provide a range of acceptable targets in the BCP; Tonseth said the State would hesitate to give the fish culturists that flexibility because they will choose the maximum every time. Mackey confirmed that a very small spring Chinook salmon program should not be over-collected, but for larger summer Chinook salmon programs, they could notify the Committees that extra fish are being retained. Tonseth said he would rather see fish culturists subsample some individuals to confirm assumptions about the factors that greatly affect production before collecting more fish in excess of target numbers.

Hillman asked what the next steps for this topic should be. Mackey said he would like to work with Tonseth to test the method further and prepare a white paper for use across the programs. Mackey said he would like to try it for the Douglas PUD programs. Tonseth said he would like to couple the method with a proposal for one of the programs in the 2020 BCPs.

Hillman thanked Mackey for his presentation.

D. Surplus Juvenile Production

Tracy Hillman provided background on the topic, which Douglas PUD originally distributed an email on September 20, 2019, regarding out-planting surplus juvenile steelhead to a non-anadromous lake. The surplus juveniles were offspring of hatchery-by-hatchery crosses from the Methow Safety Net (MSN) and Columbia Safety Net (CSN) programs.

Keely Murdoch reiterated concerns she had originally expressed via email that although the Yakama Nation (YN) approved the anticipated methods for distribution of surplus juveniles listed in the BCP, there was no chance to discuss this particular decision in the Committees, and a decision was made rather quickly. Murdoch said the release of surplus juvenile salmon and steelhead to non-anadromous waters should be a very last resort. Murdoch said she would have liked to find a

different program to accept these fish and an adequate discussion for the potential for release of the fish to the Columbia River. Murdoch said there is an irony that the Committees are comfortable releasing an extra 500,000 to 1 million subyearling summer Chinook salmon to the Columbia River for orca but no discussion was had for releasing 50,000 juvenile steelhead. Murdoch said she was unclear why this was such a rush. There is an advantage to holding fish longer to ensure that nothing unexpected happens during rearing that reduces numbers such that program targets for release numbers are not met. Murdoch said she feels those conversations could have been had in the Committees. Hillman acknowledged that that topic was not brought to the Committees for discussion in the last meeting.

Brett Farman clarified that for NMFS the willingness and the desire to release additional juveniles are not interchangeable positions. NMFS would prefer not to reconsult on the permits that were very recently finalized if they do not need to. Farman said, for the surplus steelhead, this was a discussion of a listed stock, whereas for increasing summer Chinook salmon numbers, we are talking about a non-listed stock. Farman said he does not support releasing fish in areas where they were not intended to be either; however, he is constrained by the Biological Opinion on the hatchery programs that identifies different effects of releasing fish in anadromous waters. Murdoch agrees that she also is not necessarily interested in re-opening consultation. However, for example, when unintended mortalities occasionally happen that exceed the "take" provided in the Biological Opinion, typically a letter is written to NMFS that safeguards will be put in place and other reasons such a loss will not happen in the future and the programs move on. Murdoch asked whether the release of surplus juveniles to anadromous waters could be handled in a similar manner.

Farman said he sees this differently, that the first case describes incidents that are not predictable, and in the second case the "unforeseen overage" is not really unforeseen; 110% of program size is intended to be the upper limit to an overage, but over time it can end up becoming the target. Murdoch said she disagrees that in this case 110% of program size was used as the target. There are many factors with ranges around the normal results that make it difficult to predict exactly the number that will be produced. Murdoch said this surplus resulted from things that happened that were outside managers' control.

Mike Tonseth said this surplus resulted from protocols used for the 2018 broodstock. Tonseth reminded members that the Committees approved a BCP in 2018, which affects the 2019 broodstock, that identified a steelhead overage to be collected in the fall as backup, in addition to the target number of adults to be collected to support safety-net programs. Tonseth said it was identified for all members that fall collections of steelhead would always result in a surplus. Murdoch said if that is the case, additional broodstock should not be collected in the spring to limit surplus. Tonseth said the CCT want to prioritize the spring collection for Okanogan River releases because the

MSN and WNFH adult returns cannot be sorted out at Wells Dam, and those destined for the Okanogan River can only be collected/identified in the spring. Tonseth said the 2020 broodyear (described in 2019 BCPs) should be the last broodyear with an acknowledged surplus prior to spawning. Tonseth said those mechanisms are in place, developed by WDFW, for dealing with that overage, which is why the Hatchery Production Management Plan (Appendix G of the BCPs) was written with a very specific pathway for addressing the overages. Tonseth said the reason for backup collections in the fall was because of the uncertainty of the spring collections with the understanding that there would be surplus juveniles.

Bill Gale said it is important to note the surplus juveniles were the product of hatchery-origin adults; there are no fewer natural-origin fish on the spawning ground as a result of out-planting to non-anadromous waters. Gale said progeny from excess adult fish that would be collected at Wells Hatchery (surplused at Wells Hatchery) would not have been encouraged to move into the Methow or Okanogan rivers anyway.

Murdoch said it is not a responsible way to deal with overages every year and is glad the changes are being made in the BCP.

Kirk Truscott noted that incremental reductions have been made in the overage each year. Gale said, given low numbers being observed passing over Bonneville Dam so far this year, this could be the year that we wish we would have collected an overage. Tonseth said counts at Priest Rapids Dam (PRD) indicate they will meet their targets.

Tonseth said in the future, if these are discussions that should happen in Committees, Appendix G should be revised, which was intended to allow the process to carry forward without requiring Committee discussion or approval each time. Murdoch said she does support a change to that aspect of the protocol.

Gale asked if there are non-anadromous waters on tribal lands. Tonseth and Truscott confirmed that they did follow through with that but did not find a suitable option before releasing these surplus steelhead.

Tonseth asked Farman whether NMFS could still permit the release of surplus fish that are the result of unexpected overages from in-hatchery effects that are not under the control of the managers, i.e., is it still in the spirit of the permit to release those fish? Murdoch agreed that it is an annual target, but to be under the target in some years and over in some years represents the normal functioning of operations.

Farman said the release of surplus juveniles is problematic because it affects the estimation of "take" in terms of endangered species risk. Farman said programs could come up with a maximum release

number with boundaries around that; however, a shift in that number would require re-consulting with NMFS on the number of adults taken for brood. Farman said he was initially a proponent of considering the target release number as an average, for instance over 5 years, to allow for the over- or under-production that occurs due to operations each year. However, the problem with this approach is if there are 3 to 4 years in the 110% range, the operator would be required to produce below mitigation targets to adjust the average downward; that is the origin for developing 110% as an annual limit.

Tonseth supports continuing the improvements on front-end predictions so there are fewer problems on the back-end of production.

Hillman suggested in the future we need to ensure Committee members are aware of surpluses and allow a discussion to be had in Committee meetings.

Tonseth noted that the BCP states the surplus needs to be dealt with at the earliest possible life stage to avoid impacts to densities and other production issues. The discussion needs to be timely and cannot languish for months.

Gale said that regarding Methow steelhead, it should be recognized that use of the term "collection goal" is misleading. The goal refers to the number of natural-origin females spawned; however, the program will over-collect hatchery-origin fish to meet broodstock needs, which is different from some of the other programs. Tonseth agreed that females should be the primary target in the BCPs.

Spring Chinook Surplus

Greg Mackey said the MFH has approximately 8,000 extra spring Chinook salmon eyed-eggs. Mackey said fecundity was high among the 2019 broodstock and reducing the program by 8,000 eyed-eggs will bring the program size to 110% of the target number of juveniles. Mackey said these are the progeny of hatchery-origin female eggs crossed with wild males and that the same wild males were crossed with other fish in production, so those genes would not be lost. Mackey said he inquired if WNFH would accept the surplus eggs but Chris Pasley (U.S. Fish and Wildlife Service [USFWS]) said they are already at target production numbers.

Mackey asked Truscott if they could be used for CCT's 10(j) program at Chief Joseph Hatchery (CJH) as described in step 3 of the Surplus Upper Columbia Juvenile Spring Chinook Management, Methow Sub-basin section of Appendix G of the BCPs. Truscott said he is uncertain whether their permit allows MFH fish to be used for the 10(j) program. The permit stipulates that WNFH fish will be used for the 10(j) program. Murdoch suggested moving 8,000 eyed-eggs from WNFH to the 10(j) program and moving the MFH surplus to WNFH.

Truscott said CJH could accommodate 8,000 extra eyed-eggs but they would have to be at the same developmental stage (measured in temperature units) as the eggs that are currently incubating at CJH. Mackey said one female's eggs will hatch this week and the other two batches will hatch next week. Tonseth said, from WDFW's perspective, destroying eggs is preferable. Once the eggs hatch, they cannot be destroyed and have to be released.

Gale asked how many have already been transferred to the 10(j) program. Truscott said the target of approximately 240,000 has been met, so the proposal to transfer more is problematic. Tonseth said that WNFW can destroy a requisite number of eyed-eggs to accept more from the other program. Gale said WNFW has taken on more coho salmon and is probably at maximum production for steelhead and may not have the capacity to take more eyed-eggs. Gale said he needs to talk to Pasley about whether there is capacity and whether their eggs have hatched yet.

Truscott asked Farman whether receiving eyed-eggs directly from MFH is acceptable, knowing that this is a shift in the terms of the permit. Truscott said currently there are spring Chinook salmon on station at CJH and asked if there are any restrictions to CJH taking 8,000 more than they are permitted to rear. Truscott said CJH will take the eggs if allowable by NMFS.

Farman said he would like to talk to Charlene Hurst about whether the issue of CJH receiving eyed-eggs for the 10(j) program directly from MFH is consistent with the intent of the permit. Mackey said this needs to occur within the next day, prior to fish hatching. Farman asked if there was a written proposal for these steps. Tonseth suggested referring to step number 3 of the Surplus Upper Columbia Juvenile Spring Chinook Management, Methow Sub-basin section Appendix G of the BCPs.

Farman asked what the margins of error are for the egg count. Murdoch said there are a lot of things that can happen between hatch and release. Tonseth said the number of eggs collected has been adjusted for those factors.

Gale said he will call Pasley to confirm whether WNFH can take the excess eyed-eggs. Gale said to do so would affect the PNI results of the 3-population model.

E. Broodstock Collection Protocols Assignments

Tracy Hillman projected the table of assignments for development of content for the 2020 BCPs (Attachment E) and reviewed the tasks and timing of necessary discussions.

Bill Gale asked what the timeline is for reviewing contributions and agreeing to what will be written in the BCPs. Hillman said assignments should be completed during the November meeting. Authors will then commence drafting sections of the BCPs. Members will review draft sections during December, January, and February.

Greg Mackey agreed to prepare alternative spawning recommendations for the November meeting, including testing new methods in certain programs. Gale suggested testing the use of the alternative broodstock methods in the Methow spring Chinook salmon program first. Mike Tonseth said there may not be enough spread in ages because spring Chinook salmon tend to return largely at the same age. Tonseth suggested the Carlton program (Methow/Okanogan summer Chinook salmon raised at Carlton Acclimation Pond) for testing the methods with a multiple age-class mix. Mackey said Douglas PUD is interested in trying the method with the Wells summer Chinook salmon, also.

Kirk Truscott asked how the broodstock would be collected. Mackey said broodstock are collected in the usual way, i.e., take healthy fish and attempt to match larger males with smaller females. Mackey said the selection for larger males is not made during collection. Gale said because there is no way to test the success of the method, he suggests trying it with any stock to test the feasibility of implementation, but not necessarily to test for biological effects. Tonseth said the way the implementation would work is that the largest males would be selected when they are ripe and smaller males may be selected just because they are ripe on the given day. Mackey agreed that feasibility of the implementation should be tested.

Mackey agreed that it is probably not possible to test the biological effects and it should be implemented on faith that it is the best method for the resource. Tonseth noted that the literature suggests this could be a best management practice. Gale reminded members that the Hankin method was modeled but has not yet been implemented.¹ Todd Pearsons asked if the test is to look for an increase in age at maturity. Gale said the decision is to use best management practices.

Hillman said the most recent edition of Tom Quinn's 2018 salmon ecology book² focuses on four primary reasons for change in age at maturity and references the original work by Ricker, which discusses the balance between selecting for earlier maturation versus forcing fish to spend another year in the ocean and subjecting them to another year of harvest. Gale said he supports using the knowledge of what fish do in nature to improve hatchery spawning practices and that perhaps the outcomes will not be to produce all older fish but broaden the age distribution, which may also benefit the stock.

Hillman summarized the BCP discussion tasks and asked if there were other topics that should be discussed next month to avoid conflicts later.

¹ Hankin, D. G., J. Fitzgibbons, and Y. Chen, 2009. "Unnatural Random Mating Policies Select for Younger Age at Maturity in Hatchery Chinook Salmon (*Oncorhynchus Tshawytscha*) Populations." *Canadian Journal of Fisheries and Aquatic Sciences* 66(9):1505–1521.

² Quinn, T. P., 2018. *The Behavior and Ecology of Pacific Salmon and Trout, Second Edition*. University of Washington Press, Seattle, WA and American Fisheries Society, Bethesda, Maryland.

Tonseth said parts of the BCP could be reviewed early. Tonseth suggested that appendices be distributed for various authors to work on prior to review of the complete plan in February. Suggested co-authors and notes on production status for each appendix are summarized in Table 1.

Table 1
2020 Broodstock Collection Protocols Assignments

Appendix	Title	Assigned Parties	Notes
A	2019 BY Biological Assumptions for UCR Spring, Summer, and Fall Chinook and 2020 BY Summer Steelhead Hatchery Programs	WDFW and PUDs	
B	Current Brood Year Juvenile Production Targets, Marking Methods, Release Locations	All	
C	Return Year Adult Management Plans	WDFW lead	Contingent on run forecast available in Jan/Feb 2020
D	Site Specific Trapping Operation Plans	PUDs and M&E staff YN to review	Identify plans and ensure they are still accurate
E	Columbia River TAC Forecast	WDFW	Forecast available in late Dec 2019/early Jan 2020
F	Annual Chelan, Douglas, and Grant County PUD M&E Implementation Plans	PUDs	Provide links
G	DRAFT Hatchery Production Management Plan	All	
H	DRAFT Preferred Alternative for 2020 BY and Beyond, Methow Sub-basin Conservation Steelhead Programs	Revisit after completion of 2019/2020 steelhead return	Pending discussion by Joint Fisheries Parties; concern about acquiring broodstock in the spring
I	Program Specific Rearing and Release Descriptions	PUDs and M&E staff	Staged release at PRH to be addressed
J	2019 BY Spring and Summer Chinook Disease Management Plans	CPUD M&E staff and WDFW veterinarian (Megan Finley)	

K	2019 YN Coho Broodstock Collection Plans	YN	
General	Species-Specific Run Forecasts	WDFW	

Tonseth will break out the appendices and send those to Larissa Rohrbach for distribution. Tonseth requested that all edits be submitted to him by the December meeting and for members to identify any additional issues that require further discussion during the December meeting. Tonseth said some topics will require waiting until completed returns are observed in October.

F. National Marine Fisheries Service Consultation Update

Brett Farman said there is no new update from last month. Representatives from the PUDs confirmed that the recently finalized permits have been signed or have been submitted within the PUDs for signature.

Tracy Hillman asked what the next steps are. Mike Tonseth said the next permit is the Wenatchee Spring Chinook permit, which is due in 2026. Truscott said it depends on the results of the next 5-year status review (due in 2021). Hillman asked members to identify when discussions should start on developing the Hatchery and Genetic Management Plans. Tonseth said recalculation will occur in 2023. Farman suggested starting discussions in 2023.

III. PRCC HSC

A. Approve the September 18, 2019 Meeting Minutes, Committee Updates, and Meeting Summary Review (Todd Pearsons)

The PRCC HSC representatives approved the September 18, 2019 meeting minutes as revised.

Brett Farman said he will not be able to attend the November meeting and so would send along his updates via email, or inquire whether his alternate, Charlene Hurst, could attend.

B. Recap Wenatchee Spring Chinook Salmon Life-Cycle Model and Next Steps for White River

Tracy Hillman said the presentation by Jeff Jorgensen to the PRCC was similar to a presentation to the Regional Technical Team (RTT), with some updates and specificity for the hatchery programs. PRCC Facilitatory Denny Rohr told Hillman that the PRCC is still working to determine the next steps for the HSC.

Keely Murdoch stated that the PRCC has not yet met this month. Murdoch summarized the overall problem for the PRCC HSC, that, in her opinion, the Lake Wenatchee survival proposal that was

submitted by WDFW was missing a step to collect data that could feed into the life-cycle model (LCM), and what was missing was identification of the questions the LCM would be asked to answer. Murdoch said the PRCC was stuck on whether to issue an RFP for additional data collection because members could not decide what data should be collected. Murdoch said she hopes the path forward is the PRCC can come up with a list of questions they would like the LCM to address. Jorgensen can then confirm what additional data are needed to fill these data gaps, and the PRCC could move forward with a proposal.

Todd Pearsons was thinking that Jorgensen would try to answer the questions that were prepared by the PRCC HSC, but time ran out and the majority of them were not addressed. Murdoch said she thought many of them were addressed in the presentation. Pearsons noted that there will be three talks about the topics in question at the upcoming Upper Columbia Science Conference that may inform this process: a talk by Matt Polacek (WDFW) on predator assemblage in Lake Wenatchee, one by Carlos Polivka (USFWS) on effects of non-lethal predation risk in Lake Wenatchee, and one by David Beachamp (University of Washington) on rearing and foraging behavior using stable isotope analysis in Lake Wenatchee. In addition, Dan Rawding is presenting an Upper Columbia spring Chinook salmon life-cycle survival model using passive integrated transponder (PIT) tags. Jorgensen referred to this other model during his presentation. Pearsons said it looks like there is a fair amount of work that is ongoing or has already been done in Lake Wenatchee.

Mike Tonseth said WDFW's predator assemblage analysis was done as part of the original Lake Wenatchee study proposal and is a replication of Thompson and Tufts' work done in the 1960s to confirm which predators are eating which prey.

Hillman summarized that the HSC will wait for direction from the PRCC per feedback from Rohr.

IV. Administration

A. Next Meetings

Larissa Rohrbach reminded the HCP HCs that Douglas PUD's 2018 M&E Report is currently available for a 60-day review, with comments due to Greg Mackey by November 15, 2019.

Todd Pearsons asked whether the group had decided that annual reports should be limited to a 30-day review to streamline the review periods. PUDs intended to spread the reviews over the year. Kirk Truscott said that he generally does not need the 60-day review but sometimes needs the 60-day period to find time to work on it. Bill Gale said 60 days is useful so other staff can review. Tracy Hillman reviewed protocols and confirmed that it states at least 30 days unless decided otherwise. Gale said his preference is that if 60 days can be given then to do so. Mike Tonseth said implementation plans were already shifted to accommodate contracting. Pearsons said he will be

sending the PRH report soon so there will be some overlap in the review period with the Methow program report.

The next HCP-HCs and PRCC HSC meetings are November 20, 2019, December 18, 2019, and January 15, 2020, at Grant PUD in Wenatchee, Washington.

V. List of Attachments

Attachment A List of Attendees

Attachment B "Review of Hatchery Broodstock and Mating Practices for Conservation Programs"

Attachment C *Chelan County PUD Dryden TMDL Compliance*

Attachment D *Managing Risk and Expectations in Broodstock Collection*

Attachment E 2020 Broodstock Collections Protocols Discussion Topics Schedule

**Attachment A
List of Attendees**

Name	Organization
Tracy Hillman	BioAnalysts, Inc.
Larissa Rohrbach	Anchor QEA, LLC
Ian Adams	Chelan PUD
Catherine Willard*	Chelan PUD
Kirk Truscott*‡	Colville Confederated Tribes
Greg Mackey*	Douglas PUD
Tom Kahler*	Douglas PUD
Peter Graf‡	Grant PUD
Todd Pearsons‡	Grant PUD
Brett Farman*‡°	National Marine Fisheries Service
Bill Gale*‡	U.S. Fish and Wildlife Service
Mike Tonseth*‡	Washington Department of Fish and Wildlife
Alf Haukenes	Washington Department of Fish and Wildlife
Keely Murdoch*‡	Yakama Nation

Notes:

* Denotes HCP-HC member or alternate

‡ Denotes PRCC HSC member or alternate

° Joined by phone