

PRCC Hatchery Subcommittee Meeting

Thursday, April 21, 2016

Wenatchee, Washington

Meeting Summary

PRCC HSC Members

Matt Cooper (alt), USFWS
Peter Graf, GPUD (alt) (via phone)
Keely Murdoch, Yakama Nation
Deanne Pavlik-Kunkel, GPUD (alt)
Todd Pearsons, GPUD
Mike Tonseth, WDFW
Kirk Truscott, CCT
Justin Yeager, NOAA

Other Participants

Eric Lauver, GPUD
Elizabeth McManus, Facilitator
Andy Chinn, Facilitator

Decisions

A. HSC members approved the March meeting summary as amended, pending USFWS approval.

Actions

1. USFWS will check on any unaddressed comments for the draft biop rewrite and make sure all parties are contacted and comments addressed.
2. YN will check on earliest availability of Roling and Butchers Ponds for accepting fish for spring acclimation of Nason spring Chinook salmon.
3. USFWS will research Leavenworth NFH stocking records from the 1950's and 1960's to determine if any fish were stocked in Lake Wenatchee.
4. NOAA will provide data on lower Columbia River harvest rates.
5. Ross Strategic will check on which PRCC members are signed up to GPUD's SharePoint site.

I. Updates and Meeting Summary Review

- A. March Meeting Summary** – HSC members approved the March meeting summary as amended, pending USFWS approval.
- B. Habitat Committee** – SRFB project review begins in May.
- C. HCP-HC Update** – Please refer to the 4/20 HCP-HC meeting summary for joint HCP-HC and PRCC-HSC discussions (Appendix A).

II. Permit Updates

- A. NOAA** – Draft Methow spring Chinook permits were sent to the parties and Methow steelhead consultation is beginning. NOAA is waiting to see if an EA or EIS is needed for NEPA requirements. NOAA and CCT are also working on a Tribal Resource Management Plan (TRMP) that provides take authorization for activities. NOAA is considering adding

Chief Joseph hatchery operations into the TRMP rather than the HGMP; CCT is considering internally whether this is a good option.

B. USFWS – The Wenatchee biological opinion is on track for completion by late April / early May. Karl Halupka is working on both the biop rewrite and the ITS.

C. Next Steps

- USFWS will check on any unaddressed comments for the draft biop rewrite and make sure all parties are contacted and comments addressed.

III. Broodstock Collection

A. 2016 Protocols Process Reflections:

- HSC members affirmed that having a more comprehensive document should be beneficial, particularly for hatchery operators.
- Future broodstock collection protocols could include Okanogan spring Chinook.
- Future broodstock collection protocols will have text referencing the YN Coho broodstock collection protocols.

IV. Priest Rapids Hatchery M&E Implementation Plan

A. Final Implementation Plan – The 2016-2017 PRH M&E implementation plan is final and is uploaded to the HSC SharePoint site.

V. Nason Acclimation Facility

A. Intake Issues Update – GPUD is focusing on the critical path of ensuring the intake is operational by the fall, including emergency permitting for in-stream work during the summer work window. The in-stream work will include sediment movement and intake renovation. GPUD is also looking at a more robust intake system and sediment maintenance plan for the longer term.

- USFWS suggested looking at shallow infiltration galleries, which have been used at Winthrop NFH and are under consideration for Entiat.

B. Contingency Planning – In the event that the intake at NCAF is not operational by the fall or, if after repairs and alterations the intake becomes compromised wholly or in part, HSC members identified several alternatives:

- A group of approximately 40,000 – 50,000 wild x wild fish (estimated – this number will be calculated with greater precision) can be kept on station at NCAF using available well water.

For the remainder of the fish (70,000 wild x wild and 100,000 safety net) alternatives that were considered were:

- Transfer safety net group from NCAF to Chiwawa (provided CPUD approval). If limited surface water still exists, after transfer of the safety net fish to Chiwawa, the remaining wild x wild are distributed equally throughout all of the vessels.

- Transfer wild x wild group back to Eastbank until spring (HSC members identified that this is higher risk for smolts due to well temperatures at Eastbank and therefore is not a viable option).
- Transfer wild x wild group to YN ponds (Rolwing or Butcher) for spring acclimation.
- Release wild x wild group as sub-yearlings (emergency release is allowed under permit – there is a natural sub-yearling parr movement out of Nason Creek).

C. Next Steps

- YN will check on earliest availability of Rolwing and Butchers Ponds for accepting fish for spring acclimation.

VI. WA-BC AFS Meeting

A. White River Presentation – GPUD provided a summary of the presentation “*Factors Associated with Fifty-eight Years of Abundance of Endangered White River Spring Chinook Salmon Spawners in the White River*”. GPUD will continue to analyze the data and will report back to the HSC periodically.

VII. HSC Document Sharing

A. HSC SharePoint Site – HSC members were reminded to submit their paperwork to access the HSC SharePoint site. All HSC-related documents will now be distributed via links to the SharePoint site. In addition, further discussion occurred for addressing how to access and use SharePoint.

VIII. Wrap Up and Next Steps

A. Next Meeting: Thursday, May 19, 2016

B. Potential May Meeting Agenda Items

- 2016 NCAF spring Chinook emergency action plan

Meeting Materials

The following documents were provided to HSC members in advance of this meeting:

- April meeting agenda
- Final 2016 Broodstock Collection Protocols

II. Joint HCP-HC/PRCC HSC

A. NMFS Consultation Update (Craig Busack)

Craig Busack said he heard that Karl Halupka (USFWS) plans to have a final version of the Wenatchee River Steelhead Biological Opinion (BiOp) completed in May. Keely Murdoch asked if this would be a final draft for review or a final version. Alene Underwood said she had also asked Amilee Wilson about the state of the draft. Busack said he believes this will be a final version, and that Amilee Wilson (NMFS) thought that Chelan PUD's comments had been adequately addressed in the latest version of the BiOp. Todd Pearsons said he thought that Halupka was going to meet individually with parties to discuss the draft and the Incidental Take Statement (ITS). Tonseth said that WDFW has worked with USFWS on the draft BiOp, and that National Marine Fisheries Service (NMFS) has also worked with USFWS on the draft. Busack said NMFS is hoping the USFWS Wenatchee River Steelhead BiOp is completed soon because the NMFS Wenatchee River Steelhead BiOp is also near completion. Busack said Wilson received the NMFS Wenatchee River Steelhead BiOp from General Counsel, and General Counsel asked for a take surrogate for ecological interactions. He said Wilson has been working on developing a take surrogate, and the BiOp is very near completion. Tracy Hillman asked what a take surrogate is. Busack said take surrogates are used when there are effects of interest that cannot be measured directly. He said, for example, PNI and pHOS standards are take surrogates that are used instead of measuring the fitness of individual fish over time and correlating that with hatchery impacts.

Busack said, for the Methow spring Chinook consultation, NMFS has developed draft permits. He said one confusing thing about the current draft is that YN should not have been included as an authorized agent under the Methow Hatchery permit, because they will receive their own permit. He said if an entity hires YN, they would be covered in the same way as other contractors. Busack said NMFS historically has issued one 1196 permit covering the different PUD programs, and NMFS would prefer to continue issuing permits in that manner. He said review processes are very complicated and making a separate permit for Chelan PUD would cause delay. Underwood said she is surprised to hear that NMFS drafted one permit covering the different PUD programs, because Chelan PUD's desire to have its own permit is consistent with how they applied for coverage (with WDFW as a co-permittee), and has been known and requested for the duration of the consultation process.

Busack said that would cause a delay in issuing the permit. He said NMFS is also undergoing a new National Environmental Policy Act (NEPA) process for the Methow program permits. Truscott asked to whom Busack distributed the draft 1196 permits. Busack said he initially sent them to the permit parties, but he would send the next draft to the Hatchery Committees.

Busack welcomed Emi Kondo (NMFS) to the meeting via phone, and said Kondo is a NMFS attorney working on the NEPA process for the Methow permits. Kondo said NMFS is waiting for approval from General Counsel and leadership, but tentatively planning to complete an Environmental Assessment or Environmental Impact Statement. Kondo said NMFS is tentatively planning to complete the NEPA process in July 2016. Pearsons asked whether the permit would be issued before or after the NEPA analysis is completed. Kondo replied that the permit will likely be issued when the analysis is complete. Busack said NMFS cannot issue permits until USFWS has finished their permitting process for the same programs in the Methow basin. Pearsons asked if USFWS still plans to write a memorandum documenting Halupka's gap analysis, which states that the existing coverage for bull trout is adequate. Busack replied yes, based on his last conversation with Halupka.

Busack said the Chelan Hatchery and Genetic Management Plan (HGMP) is currently under review and open to public comment. He said, for Methow summer steelhead, a NEPA process is already underway; however, it cannot be completed until the proposed action with respect to gene flow is clarified. A management framework was developed in 2013, but Busack feels it is inconsistent with the approach being taken for spring Chinook salmon, so it likely needs to be modified. Once this is done, the NEPA process covering Methow steelhead can be continued. Truscott stated that a different HGMP provides coverage for the Okanogan steelhead program.

Busack said NMFS would like to include the existing programs at Chief Joseph Fish Hatchery in the Tribal Resource Management Plan (TRMP) program, because the existing coverage for Chief Joseph Fish Hatchery (FH) expires soon. Truscott said the CCT are still in discussions about the inclusion of Chief Joseph FH into the TRMP, and CCT would not want to delay the issuance of a BiOp for the TRMP by including the Chief Joseph FH programs. He said the changes to the HGMP would be that fewer fish are released than in the original HGMP.

Regarding the Mitchell Act lawsuit, Busack said NMFS is being sued for funding hatchery programs without having Endangered Species Act (ESA) coverage for the funding itself. He said NMFS is developing a BiOp to cover the funding of the Mitchell Act programs. He said, to his knowledge, the only connection to Upper Columbia programs is that hatcheries in the lower Columbia River support the mid-Columbia coho salmon programs, but all coho salmon programs have explicit ESA coverage. He said NMFS hopes to have the BiOp completed by August 2016 so that they can disperse funds to the programs.

Busack said the Puget Sound early-run winter steelhead consultation has been signed, and fish have been released. He added that NMFS has hired four new staff to work on consultations such as the ones he described during this update.

B. HETT Update (Sarah Montgomery)

Sarah Montgomery said she distributed Draft Hatchery M&E Plan Appendices 2, 4, 5, and 6 to the Hatchery Committees on March 18, 2016, for review. She said Keely Murdoch is working on Appendix 3. Keely Murdoch said she would gather more information about the Okanogan program, with a target completion date of May 18, 2016. The Hatchery Committees will review Appendices 2 through 6 during the June 15, 2016, meeting.

C. Draft Chewuch Homing Study Proposal (Keely Murdoch)

Keely Murdoch said the imprinting and homing workgroup met on March 23, 2016. She said they primarily discussed a study plan for embryonic imprinting and briefly discussed methods for implementing a sequential imprinting study. She said the attendees were herself, Greg Mackey, Tom Kahler, Catherine Willard, Mike Tonseth, Jason Wahls (WDFW), Trista Welsh-Becker (WDFW, now at USFWS), and Charlie Snow (WDFW). She said Mackey and Kahler also discussed the draft study plan with Andrew Dittman (National Oceanic and Atmospheric Administration) via phone prior to the workgroup meeting. Keely Murdoch shared a document titled, "Draft Chewuch Homing Study Proposal" (Attachment B), which Sarah Montgomery distributed to the Hatchery Committees on April 11, 2016. She said the workgroup agreed that the treatment would be confined to the Chewuch River, and the Twisp River would remain untreated and serve as a control, meaning that the entire study would be a before-after control-impact (BACI) study. She said the treatment would consist of applying Chewuch River water from the eye-up throughout feeding stages. She said the fish will be incubated in isobuckets with a recirculating system, so that one truckload of water is estimated to last 1 week. In addition, she said there would be a chiller to control water temperatures. Keely Murdoch said, based on information from WelshBecker, ultraviolet (UV) sterilization will likely be used to disinfect the water. UV treatment is known to change water chemistry, but research by Dittman suggests the imprinting signal may be retained. Mackey said many of these methods are based on a study being performed at the Issaquah Salmon Hatchery, which the Hatchery Committees plan to visit in order to observe its system and facility.

Murdoch said the document is still in its draft stages, and specifically needs work in the analytical section on how homing and straying data will be analyzed. Tracy Hillman suggested the study plan reference Appendix C of the 5-year Hatchery M&E Report, which describes methods for analyzing BACI study design.

Keely Murdoch said the timeline for the implementation of the embryonic imprinting study has been pushed back 1 year (starting in brood year [BY] 2017) to allow time to make and test the incubation system, as well as time for planning any infrastructure modifications.

Mackey said it would be important to run trials with hatchery-by-hatchery fish before using wild broodstock, so that wild-by-wild fish from endangered broodstock are not placed into a new system that has not been fully tested. He said they foresee using a UV treatment system, a chiller, and a filtering system for larger pathogens like the one at Issaquah Salmon Hatchery. Tonseth said

another option for conducting facility testing would be to use an unlisted stock as a surrogate, such as eggs from Winthrop National Fish Hatchery. Keely Murdoch said time could be saved if the system were tested with hatchery-by-hatchery steelhead in the spring of 2017, in which case the system would be running smoothly in time to implement the study for BY 2017 spring Chinook salmon. She said that would provide 1 year to make any necessary infrastructure changes. Tonseth said the timing of making infrastructure changes is likely the biggest limitation to starting the study in 2017.

Todd Pearsons said that time should be allowed to work out bugs in the system, because this is pioneering work, and it will likely be challenging. He said one of the lessons learned from the size-target study was that it took a few years for fish culture staff to get the system and methodology running smoothly. He said there are ecological issues and uncertainties that will be worthwhile to work out before the study begins using wild-by-wild eggs. For example, the effects of the UV system on water chemistry are unknown, and it is possible that something in the UV treatment process would cause a fish to detect a difference in treated water compared to control water, thus affecting the imprinting signal. Also, it is unknown whether water should be UV treated throughout the entire study, or just when pathogen risks are highest (like from the beginning of the study to the eyed-egg stage). Busack said there is vulnerability from an ESA perspective in using wild-by-wild eggs, and that hatchery-by-hatchery spring Chinook salmon should at least be used to test the system first. Pearsons replied that using hatchery-by-hatchery spring Chinook salmon at a production scale could create issues in meeting PNI objectives. Keely Murdoch emphasized that the work described in this study plan is not entirely pioneering. Rather, incubation methods are already being implemented at Issaquah Salmon Hatchery, which the Hatchery Committees have already learned from and plan to visit in order learn more. Keely Murdoch said as long as there are no glitches during the incubation process, the worst-case scenario in using Methow Composite wild-by-wild fish is that they mostly return to the Methow River, which is already occurring. She said she does not see a need to test the incubation system at full production scale with Chinook salmon, and testing with steelhead in the spring should be sufficient.

Mackey said he calculated that the average rate at which fish released into the Chewuch did not home back to the Chewuch is 32 percent. He said the target from the M&E plan is 5 percent, so the study would ideally result in a change in the stray rate of 27 percent. He said the magnitude of this change is very large, with the desired change nearly the size of the mean itself. He conducted a quick two-tailed power analysis to estimate the number of years it would take to detect a certain effect size and found that it would take at least 4 years to detect a change in the mean stray rate of 27%. He said these results should be reviewed and discussed further, but using at least five brood cohorts might be a good starting point. Busack said a 5 percent stray rate might not be a realistic target value for the Methow basin, and management targets should be defined before the study is undertaken. He said the Hatchery Committees should discuss what degree of improvement is meaningful from a management perspective.

Keely Murdoch said the imprinting and homing workgroup will visit the Issaquah Salmon Hatchery, which rears Kokanee, but if they visit in the spring, there may not be eggs on station. Mackey said it is important to see how the facility is plumbed regardless of whether or not they have eggs on station. Willard said she will send a Doodle poll to the Hatchery Committees in order to determine a date for visiting the Issaquah Salmon Hatchery.

D. Carrying Capacity Estimates (Tracy Hillman)

Tracy Hillman shared a presentation titled, “Carrying Capacity: Chiwawa Spring Chinook” (Attachment C). (Note: Sarah Montgomery distributed the presentation to the Hatchery Committees following the meeting on April 21, 2016.) Hillman said the purpose of this presentation is to share carrying capacity estimates for Chiwawa River spring Chinook salmon, and get feedback from the Hatchery Committees about how he should estimate carrying capacity for other programs to include in Appendix 1 of the Draft Hatchery M&E Plan. A summary of the presentation and questions and comments are included in the following sections.

Background (Slides 1-5) The definition of carrying capacity varies depending on which model or method one uses. “Habitat capacity” is the number of individuals or biomass the resources of a given area can support through the most unfavorable period of the year, also called the maximum environmental load. “Population capacity,” on the other hand, is the maximum equilibrium population size estimated using population models such as the logistic equation or some stock-recruitment models, which defines an upper limit to population growth as density increases. Both types are considered carrying capacity. Fish experience bottlenecks during their life cycle, which limit population size. For example, fish may experience streamflow and temperature problems during summer rearing. Fish that pass through a summer bottleneck may not fill winter habitat due to the mortality in the summer. In this case, the winter period is recruitment limited.

Population Regulation (Slides 6-7) Carrying capacity can most easily be estimated when population growth is density-dependent. Population growth is affected by mechanisms whose effectiveness increases as population size increases. For example, if the number of parr per spawner decreases with increased number of total spawners, a density-dependent factor is likely occurring and regulating the population.

Methods for Estimating Carrying Capacity (Slides 8-10) Hillman’s methods for estimating carrying capacity focused on stock-recruitment models. Hillman used three types of stock-recruitment models: Ricker, Beverton-Holt, and Smooth Hockey Stick. The Ricker model curve peaks and then decreases, which is appropriate for when organisms exhibit scramble competition for a resource, and thus, all suffer if the resource is limiting. For example, ocean-type Chinook salmon data often fit a Ricker curve because spawning habitat becomes limiting, and the overall population decreases. The Beverton-Holt and Smooth Hockey Stick curves both increase then flatten out. With the Beverton-Holt curve, one cannot estimate the number of spawners needed to fully saturate the habitat due to the asymptotic nature of the curve, whereas using the Smooth Hockey

Stick model, which does reach a maximum, one can estimate the maximum number of spawners. Hillman said the Beverton-Holt and Smooth Hockey Stick model fit the Chiwawa River spring Chinook salmon data equally well, because they represent a situation where fish compete for a limiting resource (contest competition), which is often appropriate for tributary rearing of salmonids.

Results (Slides 11-16) Hillman said for the population carrying capacity of Chiwawa Spring Chinook salmon parr, he found the models best fitting the data were the Beverton-Holt and Smooth Hockey Stick models. For habitat carrying capacity, which was estimated using quantile regression and estimating 90 percent reference intervals, he said there is variability among the models. For comparison, he also included results from a quantile regression forest model (QRFM) used by Integrated Status and Effectiveness Monitoring Program (ISEMP), which calculated the quantity and quality of habitat in the Chiwawa basin. The estimates of habitat carrying capacity are higher than population carrying capacity.

Hillman said confidence intervals in the models tighten over time because more data give a better estimate for the alpha and beta parameters in the models. He said the estimates of carrying capacity do not vary much after approximately 20 years of data are used in the models.

Hillman said, for the population carrying capacity of Chiwawa Spring Chinook salmon smolts, the three models all fit the data approximately equally well. That is, theoretic information criteria (AICc) was unable to identify a best-fitting model. Similar to the data for parr, habitat carrying capacity estimates are higher than population carrying capacity estimates.

Hillman said carrying capacity estimates for smolts vary more than parr likely due to variable winter conditions. He said more years of data are required to stabilize the parameters in the models when there are more life stages included in the analyses. He said the Ricker model fit the data best over time (highest r-squared value), so it is possible that scramble competition is occurring for winter habitat.

Hillman said it was difficult to fit the models to the Chiwawa spring Chinook salmon adult data because ocean conditions primarily affect adult recruitment. He noted that adding parameters to the models that describe ocean conditions could increase the precision of the estimates. He suggested that management decisions be made based on parr and smolt carrying capacity estimates because the results are more related to in-watershed conditions.

Summary (Slides 17-18) In summary, Hillman said carrying capacity estimates for Chiwawa spring Chinook smolts are on average about half the size of the estimates for parr. He suggested the movement of parr into the Wenatchee River during the winter partially affects the estimates. Hillman said the Ricker model is probably not the best model to use for estimating carrying capacity for parr. Both the Beverton-Holt and Smooth Hockey Stick explained most of the information in the parr data.

Hillman said estimating carrying capacity for Chiwawa spring Chinook salmon parr, smolts, and adults took a long time, and not all programs have comparable datasets. He said adult data need to be included in the 5-year report, but for estimating carrying capacity within basins, he requested guidance from the Hatchery Committees on how to move forward.

Hillman asked if there are other dataset for parr. Mackey said there are 2 years of parr data for Twisp River spring Chinook salmon. Hillman said he could estimate carrying capacity for spring Chinook salmon and summer Chinook salmon for some programs, but steelhead will be difficult. Mackey said the only other data for the Methow is from screw traps to estimate basin-wide spring Chinook salmon carrying capacity. Tonseth said there is likely not enough available data to estimate carrying capacity for steelhead. Mackey asked if it would be reasonable to replicate the Chiwawa River snorkel methods in other streams to verify that other streams exhibit similar fish densities and then use the Chiwawa River estimate of carrying capacity based on the amount of habitat found during surveys to extrapolate carrying capacity for other streams. Hillman said that would be possible and has performed the calculations for other systems in the past. Mackey said it would only be reasonable if the Chiwawa River has similar densities to other streams.

Hillman said he would estimate carrying capacity for spring Chinook and summer Chinook salmon using all three models and will work with Mackey to acquire the appropriate data for the Methow River.

Hillman asked the Hatchery Committees how they plan to use these results and Appendix 1. He said the data change yearly, so it could be a methodology section. Busack said ocean variability is important to consider in the stock-recruitment analyses; for example, coho salmon returns have been low recently despite the availability of habitat. Hillman said he presented a paper on summer Chinook salmon stock-recruitment modeling to the Coordinating Committees that addressed the effects of ocean conditions on productivity.

Hillman will send the paper to Busack. He said the Adaptive Management Implementation Plan (AMIP) life cycle modeling group might also be a good resource for this discussion.

Mackey said Appendix 1 is included in the Draft Hatchery M&E Plan so there is a convenient and acknowledged source of carrying capacity information that can be used for reporting and identifying management strategies. He said, for example, it can be used to determine if too many or too few spawners are returning. Mike Tonseth said one management goal is to optimize the number of spawners, which can be accomplished through adult management. He said adult management already biases the number of spawners by prioritizing gene flow management over filling the habitat to carrying capacity. Hillman said harvest levels and adult management can be incorporated into the analyses. Truscott said the estimates may destabilize due to the changes in the last 2 years with adult management. Tonseth said water conditions in 2015 may also widen

the variance on carrying capacity estimates. Hillman added that major rain-on-snow events act as density-independent effects.

Hillman said he and Andrew Murdoch will continue to draft Appendix 1 using this feedback, with a focus on methodology with some populations as examples. He said the methods will likely change over time.

Todd Pearsons said carrying capacity estimates can also be used to assess how fish should be divided into conservation and safety-net programs. He suggested compiling a table with carrying capacity estimates that the Hatchery Committees can review to inform hatchery programs. Hillman said he is producing tables for spring Chinook salmon in the Chelan PUD and Grant PUD annual reports, so one can track estimates of carrying capacity over time. He said this cannot be done for every stock, and smolt estimates would need to be adjusted for fish that migrate out of a watershed and survive downstream. Hillman said he was surprised at the relatively low carrying capacity estimates for the Chiwawa River basin, because there appears to be a lot of high-quality habitat. He said he thinks the system is nutrient-limited, and high flows also affect the number of fish in the system.

Kirk Truscott asked if hatchery-origin and natural-origin fish spawned in the same locations and proportions, would population capacity be higher. Hillman said he thinks it is possible. The upper river is fully seeded during high spawner escapements; however, changes in abundance and distribution occur in tributary streams with changing spawner abundance. He said density of fish does not vary much within multiple channels with logjams over time, because these habitat types are preferred habitat for juvenile spring Chinook. Densities in less preferred habitat and in tributaries changes considerably with spawning escapement. Regarding the geographic distribution and correlated habitat used by hatchery fish, Keely Murdoch asked if the density-dependence signal could be caused by years in which hatchery fish are more numerous on spawning grounds. Hillman said that is possible. He indicated that there are studies that have shown strong density dependence within tributaries when ocean conditions are poor, because hatchery adults return to the same location instead of colonizing vacant habitat.