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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCPs Hatchery Committees	**Date:**	March 17, 2016
From:	Tracy Hillman, HCP Hatchery Committees Chairman		
Cc:	Sarah Montgomery, Anchor QEA, LLC		
Re:	Final Minutes of the February 17, 2016, HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees meeting was held at Chelan PUD headquarters in Wenatchee, Washington, on Wednesday, February 17, 2016, from 9:30 a.m. to 3:00 p.m. Attendees are listed in Attachment A to these meeting minutes.

ACTION ITEM SUMMARY

- McLain Johnson (Washington Department of Fish and Wildlife [WDFW]) will develop a timeline for conducting genetic sampling for HCP program species (Item I-A). *(Note: this item is ongoing.)*
- Mike Tonseth and Andrew Murdoch (WDFW) will keep the Hatchery Committees updated on the WDFW moratorium on hexacopter use (Item I-A). *(Note: this item is ongoing.)*
- Keely Murdoch will discuss internally the status of facility improvements at the Chewuch Acclimation Facility (AF; Item I-A). *(Note: this item is ongoing.)*
- Bill Gale and Todd Pearsons will circulate information received from Ann Gannam (U.S. Fish and Wildlife Service [USFWS]) regarding the results of a phosphorus study she presented at the American Fisheries Society 2015 conference (Item I-A). *(Note: this item is ongoing.)*
- Hatchery Evaluation Technical Team members will update the Draft Hatchery Monitoring and Evaluation (M&E) Plan Appendices 2 to 6 and send revised versions to Sarah Montgomery by Thursday, February 4, 2016, which she will forward to the Hatchery Committees for review (Item II-G). *(Note: this item is ongoing. Montgomery forwarded Appendices 5 and 6 to the Hatchery Committees on February 5, 2016, Appendix 4 on February 9, 2016, and Appendix 2 on March 2,*

2016.)

- Sarah Montgomery will distribute Andrew Dittman's presentation, "Effects of Hatchery Rearing and Release Practices on Olfactory Imprinting and Homing," to the Hatchery Committees and Priest Rapids Coordinating Committee Hatchery Sub-Committee (PRCC HSC; Item II-A). (*Note: Montgomery distributed the presentation to the Hatchery Committees and PRCC HSC on February 18, 2016.)*
- Charlene Hurst (National Marine Fisheries Service [NMFS]) will send the revised gene flow sliding scale spreadsheet to the Hatchery Committees (Item II-B). *(Note: Hurst sent the revised spreadsheet to Sarah Montgomery on February 19, 2016, which she distributed to the Hatchery Committees that same day.)*
- Charlene Hurst will send an email to the Hatchery Committees describing the gene flow standards that NMFS proposes for Methow spring Chinook salmon, which will be a decision item during the Hatchery Committees conference call in early March 2016 (date to be determined; Item II-B). *(Note: Hurst sent a document describing the gene flow standards to Sarah Montgomery on February 19, 2016, which she distributed to the Hatchery Committees for review that same day.)*
- Keely Murdoch will develop her draft, "Techniques to Improve Homing Fidelity for Chewuch and Twisp River Releases of Spring Chinook Salmon," into a study plan and coordinate with Chelan, Douglas, and Grant PUDs regarding feasibility (Item II-C).
- The Hatchery Committees will discuss Keely Murdoch's study plan at the March 16, 2016, Hatchery Committees meeting (Item II-C).
- Sarah Montgomery and Tracy Hillman will revise the Grant PUD Target Hatchery Replacement Rate (HRR) Proposal to reflect discussions and agreements during the Hatchery Committees February 17, 2016, meeting and distribute it to the Hatchery Committees (Item II-C). *(Note: Montgomery and Hillman revised the Target HRR Agreement on February 19, 2016, and Montgomery distributed it to the Hatchery Committees that same day.)*
- Sarah Montgomery will compile all Hatchery Committees discussions regarding the 5-Year Hatchery M&E Review process into one document, organized by objective, and send it to Catherine Willard (Item II-C). *(Note: Montgomery completed this item, and sent the draft summary to Willard on March 10, 2016.)*
- Catherine Willard will draft a summary of the 5-Year Hatchery M&E Review process

(Item II-C).

- Catherine Willard will send Chelan PUD's Draft 2016 Steelhead Release Plan and Preliminary Results from the 2015 Wenatchee Steelhead Release to Sarah Montgomery, which she will distribute to the Hatchery Committees (Item III-D). *(Note: Willard sent the documents to Montgomery on February 18, 2016, which she distributed to the Hatchery Committees for review that same day.)*
- Todd Pearsons will inquire internally about posting annual reports and 5-year reports on the Grant PUD website (Item IV-A).
- Sarah Montgomery will send a Doodle poll to the Hatchery Committees in order to convene a conference call to discuss two decision items: 1) gene flow standards for Methow spring Chinook salmon; and 2) Chelan PUD's Draft Steelhead Release Plan (Item IV-B). *(Note: Montgomery sent a Doodle poll on February 18, 2016, and a meeting invitation for a March 3, 2016 conference call on February 24, 2016.)*

DECISION SUMMARY

- The Rock Island and Rocky Reach Hatchery Committees representatives present approved the hatchery portion of Chelan PUD's 2016 Action Plan as follows: Chelan PUD, USFWS, WDFW, NMFS, Yakama Nation (YN), and Colville Confederated Tribes (CCT) approved on February 17, 2016 (Item III-A). *(Note: this item is also a decision item at the HCP Coordinating Committees meeting on February 24, 2016.)*
- The Rock Island and Rocky Reach Hatchery Committees representatives approved Chelan PUD's Wenatchee Summer Chinook Statement of Agreement (SOA), *Improvement Feasibility at Eastbank Hatchery for Wenatchee summer Chinook,* as follows: Chelan PUD, USFWS, WDFW, NMFS, YN, and CCT approved on February 17, 2016 (Item III-B).

AGREEMENTS

- The Hatchery Committees and PRCC HSC representatives present agreed to use the methods for calculating and assessing HRR targets described in Grant PUD's Target HRR Proposal, as revised during the Hatchery Committees February 17, 2016,

meeting (Item II-C). *(Note: Sarah Montgomery distributed the revised HRR Target Agreement to the Hatchery Committees on February 19, 2016.)*

REVIEW ITEMS

- Sarah Montgomery sent an email to the Hatchery Committees on February 19, 2016, notifying them that the NMFS-proposed gene flow standards for Methow spring Chinook salmon are available for review (Item II-B).
- Sarah Montgomery sent an email to the Hatchery Committees on February 11, 2016, notifying them that the Draft Broodstock Collection Protocols are available for review (Item II-F).
- Sarah Montgomery sent an email to the Hatchery Committees on February 5, 2016, notifying them that Draft Hatchery M&E Plan Appendices 5 and 6 are available for review. Montgomery also sent Appendix 4 on February 9, 2016 and Appendix 2 on March 2, 2016 (Item II-G).

FINALIZED DOCUMENTS

- Sarah Montgomery sent an email to the Hatchery Committees on February 18, 2016, notifying them that the Final Wenatchee Summer Chinook SOA, *Improvement Feasibility at Eastbank Hatchery for Wenatchee summer Chinook,* is available for download from the Hatchery Committees Extranet site.
- Sarah Montgomery sent an email to the Hatchery Committees on March 3, 2016 notifying them that the Chelan PUD Final 2016 Steelhead Release Plan is available for download from the Hatchery Committees Extranet site.

I. Welcome

A. Review Agenda, Review Last Meeting Action Items, and Approve the January 20, 2016, Meeting Minutes (Tracy Hillman)

Tracy Hillman welcomed the Hatchery Committees and asked for any additions or changes to the agenda. One revision was requested:

- Craig Busack asked to move the Methow spring Chinook salmon gene flow planning discussion to Item II-B on the agenda.

The Hatchery Committees reviewed the revised draft January 20, 2016, meeting minutes. Sarah Montgomery said there are several outstanding comments to be discussed. The Hatchery Committees discussed the outstanding comments and made revisions.

Hatchery Committees members present approved the draft January 20, 2016, meeting minutes, as revised.

Action items from the Hatchery Committees meeting on January 20, 2016, and follow-up discussions, were addressed *(note: italicized text below corresponds to agenda items from the meeting on January 20, 2016)*:

- *Mike Tonseth will add contingencies for overages to the Broodstock Collection Protocols (Item I-A).*
  This item is complete and will be discussed during today's meeting.
- *McLain Johnson (Washington Department of Fish and Wildlife [WDFW]) will develop a timeline for conducting genetic sampling for HCP program species (Item I-A).*
  This item is ongoing.
- *Mike Tonseth and Andrew Murdoch (WDFW) will keep the Hatchery Committees updated on the WDFW moratorium on hexacopter use (Item I-A).*
  This item is ongoing.
- *Sarah Montgomery will distribute meeting materials to the Hatchery Committees and the Priest Rapids Coordinating Committee Hatchery Sub-Committee (PRCC HSC; Item I-A).*
  Montgomery distributed the following six documents on January 21, 2016:
  1) Chelan PUD's TMDL Compliance at Dryden AF presentation; 2) Chelan PUD's Size-at-Release Target Summary presentation; 3) Chelan PUD's Draft 2016 Rocky Reach and Rock Island HCP Action Plan; 4) Tracy Hillman's HRR Targets spreadsheet; 5) Chelan PUD's Draft SOA for Wenatchee summer Chinook salmon; and 6) Douglas PUD's Draft 2016 Wells HCP Action Plan.
- *Hatchery Committees members will send Tom Kahler questions or topics for Andrew Dittman to discuss at the February 17, 2016, Hatchery Committees meeting by February 3, 2016 (Item I-A).*

This item is complete and will be discussed during today's meeting.

- *Rob Jones (National Oceanic and Atmospheric Administration [NOAA]) will send a letter to the HCP Coordinating Committees regarding changes in NOAA representation on the Hatchery Committees (Item II-A).*
  Dale Bambrick (NOAA) sent a letter regarding changes in NOAA representation on the Hatchery Committees to Tracy Hillman on February 11, 2016, which Kristi Geris forwarded to the Hatchery Committees and HCP Coordinating Committees that same day.
- *Tracy Hillman will calculate 40th percentile hatchery replacement rate (HRR) targets that include harvest (Item II-B).*
  Hillman provided the updated spreadsheet to Sarah Montgomery on January 22, 2016, which she distributed to the Hatchery Committees that same day.
- *Grant PUD will discuss internally approving the use of the 40th percentile approach that includes harvest for calculating HRR targets (Item II-B).*
  Todd Pearsons sent a document titled, "HRR Target Proposal," regarding this topic to Sarah Montgomery on February 9, 2016, which she distributed to the Hatchery Committees that same day.
- *Keely Murdoch will develop her outline, "Techniques to Improve Homing Fidelity for Chewuch and Twisp River Releases of Spring Chinook Salmon," into a draft (Item II-D).*
  Murdoch sent the draft to Sarah Montgomery on January 26, 2016, which she distributed to the Hatchery Committees and Hatchery Evaluation Technical Team (HETT) that same day.
- *The Hatchery Committees will discuss Keely Murdoch's draft, "Techniques to Improve Homing Fidelity for Chewuch and Twisp River Releases of Spring Chinook Salmon," with Andrew Dittman (NOAA) at the February 17, 2016, Hatchery Committees meeting (Item II-D).*
  This item will be discussed today.
- *HETT members will update the Draft Hatchery Monitoring and Evaluation (M&E) Plan Appendices 2 to 6 and send revised versions to Sarah Montgomery by Thursday, February 4, 2016, which she will forward to the Hatchery Committees for review (Item II-D).*

This item is ongoing. Montgomery forwarded Appendices 5 and 6 to the Hatchery Committees on February 5, 2016, and Appendix 4 on February 9, 2016.

- *Kirk Truscott will discuss internally the acclimation of Methow spring Chinook salmon at Chewuch Acclimation Facility (AF) under the operation of the Yakama Nation (YN) and the 2013 Final Chewuch Acclimation Statement of Agreement (SOA) by Friday, January 22, 2016 (Item IV-B).*
  Truscott sent an email on January 22, 2016, to Tracy Hillman saying this item is ongoing, and Sarah Montgomery forwarded it to the Hatchery Committees that same day. On January 27, 2016, Truscott sent a second email detailing CCT's preferences regarding the acclimation of Methow spring Chinook salmon at Chewuch AF, which Montgomery forwarded to the Hatchery Committees that same day.
- *WDFW will pursue the feasibility of staffing Chewuch AF for the potential acclimation and release of Methow spring Chinook salmon (Item IV-B).*
  Jeff Korth (WDFW) sent an email on February 12, 2016, to Tracy Hillman and Sarah Montgomery stating that WDFW could not successfully recruit qualified candidates for staffing the Chewuch AF this year, which Montgomery forwarded to the Hatchery Committees that same day.
- *Keely Murdoch will send the 2013 Final Chewuch Acclimation SOA to Kirk Truscott (Item IV-B).*
  This item is complete.
- *Keely Murdoch will discuss internally the status of facility improvements at Chewuch AF (Item IV-B).*
  This item is ongoing. Murdoch said she discussed facility improvements with Cory Kamphaus (YN), and YN plans to cost share improvements to coho salmon-rearing facilities, such as the bubbler, with Chelan PUD.
- *Sarah Montgomery will add brood year 2014 spring Chinook salmon acclimation in the Methow Basin to the February 17, 2016, Hatchery Committees meeting agenda (Item IV-B).*
  Montgomery distributed the Hatchery Committees February 17, 2016, meeting agenda, including this item, on February 5, 2016.
- *Bill Gale will ask Ann Gannam (USFWS) about the results of a phosphorus study she presented at the American Fisheries Society 2015 conference (Item IV-C).*

This item is ongoing. Todd Pearsons and Gale both corresponded with Gannam, and they will circulate information received to the Hatchery Committees.

- *Hatchery Committees members will provide comments on the Chelan PUD draft SOA titled, "Improvement Feasibility at Eastbank Hatchery for Wenatchee summer Chinook," to Alene Underwood by Monday, February 1, 2016 (Item IV-C).*
  This item is complete.
- *Alene Underwood will finalize the draft Wenatchee summer Chinook salmon SOA by Wednesday, February 3, 2016, so that it can be a decision item at the February 17, 2016, Hatchery Committees meeting (Item IV-C).*
  Underwood sent the SOA to Sarah Montgomery on February 3, 2016, which Montgomery forwarded to the Hatchery Committees that same day.

II. Joint HCP-HC/PRCC HSC

A. Imprinting and Homing Presentation and Discussion (Tom Kahler/Andrew Dittman)

Andrew Dittman shared a presentation titled, "Effects of Hatchery Rearing and Release Practices on Olfactory Imprinting and Homing" (Attachment B). *(Note: Sarah Montgomery distributed the presentation to the Hatchery Committees on February 18, 2016.)*

Dittman said he works at the Northwest Fisheries Science Center, and this talk in no way represents official NOAA policy; rather, he only presents the biology of imprinting and homing. A summary of the presentation and questions and comments are included in the following sections.

Background (Slides 1 and 2)

Dittman said salmon learn odors associated with natal streams during development and use olfactory cues when returning upstream.

Experimental Evidence (Slides 3-4)

In a study by Scholz et al. (1976)[1], fish groups that were exposed to different odor cues and released in different rivers returned primarily to their release rivers. Hasler and Scholz (1983)[2] found that imprinting is associated with thyroid hormone surges that occur during smolting.

Sequential Imprinting Hypothesis (Slide 5)

Dittman said fish learn a series of olfactory waypoints as they experience inputs from tributaries during downstream migration. These waypoints are hormonal responses, which may be triggered by novel water input, and when fish migrate back upstream, it is thought the olfactory waypoints guide them to their natal sites.

Straying (Slides 6 to 12)

Dittman said straying is natural and may occur for a variety of reasons, such as age, memory loss, signal change over time, or exhaustion. Fish may make tradeoffs between homing and spawning site selection. Hatchery-origin salmon do not necessarily stray more than natural-origin salmon; however, factors such as transport and release strategies; the location, timing, and duration of acclimation; inappropriate release habitat; and the hatchery environment itself may increase straying. Dittman said Lister et al. (1981[3]) studied the effect of transport distance on homing fidelity to release sites and found that stray rates are low when fish are released at the location at which they were reared or at distances greater than 47 kilometers. Craig Busack asked what the operational definition of straying is for Dittman's presentation. Dittman said he considers a fish not returning to its acclimation tributary a stray. Dittman said some studies found that the time of release was more, or equally, important as the location of release.

[1] Scholz, A.T., R.M. Horrall, J.C. Cooper, and A.D. Hasler, 1976. Imprinting to chemical cues: the basis for home stream selection in salmon. *Science* 192:1247-1249.
[2] Hasler, A.D. and A.T. Scholz, 1983. Olfactory imprinting and homing in salmon: investigations into the mechanism of the imprinting process. *Zoophysiology* Volume 14.
[3] Lister, D.B., D.G. Hickey, and I. Wallace, 1981. *Review of the effects of enhancement strategies on the homing, straying, and survival of Pacific salmonids*. Prepared for the Canada Department of Fisheries and Oceans, Vancouver, B.C.

Yakima River Spring Chinook Salmon Imprinting and Homing (Slides 15 to 19)

Dittman shared results from the Yakima River spring Chinook salmon Supplementation Program. He said the sequential imprinting hypothesis explains why fish returned with high fidelity to the Easton Acclimation Site; fish traveling upstream receive familiar input from the hatchery, arrive near the hatchery, then continue receiving familiar input from their acclimation site and, therefore, travel upstream toward their acclimation site. In contrast, fish released from the Jack Creek site reach an olfactory fork in the river during upstream migration, where the Teanaway River flows into the Yakima River, and the hatchery (on the Yakima River) provides more attractive olfactory cues due to early imprinting than their acclimation sites, ultimately resulting in high stray rates.

Strategies to Decrease Straying (Slides 30 to 46)

Tilson et al. (1994[4]) found that thyroid hormone levels in fish surge during two life stages, 1) as embryos at the time of hatching and emergence, and 2) as smolts. Salmon imprint to natal sites during these two life stages. Dittman said strategies such as incubating in natural or distinct waters (olfactory enrichment), embryonic imprinting, artificial imprinting cues, out-of-basin rearing, transport to target sites, and monitoring of physiological development and release timing may help to decrease straying. Larval imprinting proposes collecting water from targeted sites and exposing fish during sensitive developmental windows to their target tributary waters. Dittman said storing and freezing water should be considered if the target reaches of tributaries are difficult to access regularly. Dittman said artificial cues such as morpholine and phenyl ethyl alcohol may help decrease straying, but they are hazardous chemicals and, therefore, permitting may be difficult. He said he is currently studying the potential for natural substances like watercress and algae extract to act as artificial cues. Tom Kahler asked if the addition of artificial cues to increase hatchery-origin homing would

[4] Tilson, M. B., A.T. Scholz, R.J. White, and J.L. Hendrickson, 1995. *Artificial imprinting and smoltification in juvenile kokanee salmon: implications for operating Lake Roosevelt kokanee salmon hatcheries. 1994 Annual Report.* U.S. Department of Energy, Bonneville Power Administration. Project No. 88-63. Contract No. DE-8179-88BP91819.

affect the ability of wild fish to home. Dittman responded that he thinks it would not make a difference for wild fish because they are already imprinting on so many odors, and one more odor would likely not change homing behavior.

Potential Solutions and Experiments in the Methow Basin (Slides 47 to 52)

Regarding incubating in natural waters, Greg Mackey asked if natural waters could be treated for disease without changing their imprinting signature. Dittman said he studied the response of the olfactory system in fish to different odors of collected and stored water from the White River using an electro-olfactogram. Fish had no significant change in response from natural waters to frozen or refrigerated water. Ultraviolet (UV)-treated water elicited a change in olfactory response, but fish exposed to the UV-treated water did not have a behavioral change in homing. Fish exhibited a significant olfactory change in response to freeze-dried and reconstituted water; however, Dittman said commercial freeze-drying units still hold potential for future studies.

Peter Graf said there might be tradeoffs between release date and homing and asked if there are data available regarding release date, survival, and homing. Dittman said he believes that the earlier a fish is released into its natal watershed, the better it will imprint and home. However, if the fish does not survive, it also will not return to its natal watershed. He said maximizing survival is likely more important to managers than maximizing imprinting and homing.

Graf asked if fish should still be acclimated to natal water if they are exposed to it during embryonic development. Dittman said it probably would not be a problem to acclimate the fish, but it might be easier to truck release the fish instead. However, he said acclimation and its merits are worth considering.

Mackey asked if fish are unified in thyroid hormone escalation levels when they are nearing release date in the hatchery. He said it might be possible to find an optimal date for stocking fish if the hormone levels in fish peaked at the same time. Dittman said some species are more conducive to a single release date than others, and with wider ranges in size, there would likely be wider ranges in hormone levels. He said the profile of hormone levels across

the population might be similar; however, it is largely dependent on their rearing environment (hatchery effects).

Kahler asked if environmental conditions in the Teanaway River were accounted for and corrected in the Yakima River study. Dittman said the numbers of fish spawning in Jack Creek are correlated with flow, and the passive integrated transponder (PIT)-tag results show that some fish migrated into the Teanaway River and back out later in the season. In this study, bigger fish were more likely to stray out of the Teanaway River, and 2015 was a particularly bad year for habitat conditions (and straying) in the Teanaway River.

Tracy Hillman asked why fish that home all the way to the Easton Acclimation Site (responding to smoltification olfactory cues) do not then, in a sequential manner, search for rearing olfactory cues and travel back downstream to the hatchery. Dittman said once the fish have reached the Easton Acclimation Site, they cannot detect any cues coming from the hatchery because it is downstream. Keely Murdoch compared fish homing to the Easton Acclimation Site to White River spring Chinook salmon that reliably swim past their natal hatchery. She said it appears they home to the highest familiar upstream input.

Dittman suggested that Methow spring Chinook salmon may home better if they were reared in a hatchery much farther away from their natal sites, and then acclimated and released, in order to prevent familiar olfactory inputs from the hatchery confusing them as they migrate upstream. Murdoch said Wells Fish Hatchery (FH) and Eastbank Hatchery are both downstream of natal acclimation sites and perhaps far enough away to increase natal homing.

B. Methow Spring Chinook Salmon Gene Flow Sliding Scale (Charlene Hurst)

Charlene Hurst shared a spreadsheet titled, "Methow spring Chinook Gene Flow Analysis" (Attachment C), which Sarah Montgomery distributed to the Hatchery Committees on February 19, 2016. Hurst reviewed the updated spreadsheet. She said the cutoff at which wild fish should not be collected as broodstock is set at 100 fish. She said partial proportion of hatchery-origin spawners (pHOS) is calculated differently by NMFS and the PUDs, and inputting the natural run, or an estimate of it in the spreadsheet, results in an output of both pHOS values. She said NMFS would like to see an overall proportionate natural influence

(PNI) value of 0.5 or higher. She said Winthrop NFH broodstock currently has an assumed 75 percent contribution of Methow FH returns in the model, and if the contribution of Methow FH to Winthrop NFH broodstock increased, the overall 3-population PNI would also increase. She said the three-population gene flow model can also be used as a two-population model if the Winthrop program is input as zero.

Craig Busack said the Hatchery Committees need to agree on management standards for their program based on the three-population gene flow model. He said NMFS is proposing a sliding scale for PNI and pHOS for the PUD program and a percentage for PNI and pHOS for the Winthrop program. Bill Gale said adult management is a joint operation between the programs, and the permits need to fit together to meet that requirement. Todd Pearsons asked why a sliding scale is not proposed for the Winthrop program. He said it does not make sense to have the same percentage of hatchery-origin fish on the spawning grounds regardless of their abundance, especially for a program that is not expected to contribute to natural populations. Tom Kahler asked how the tool and sliding scales translate to management. He said aggressive adult management would be necessary to maximize removal of hatchery returns (particularly those from WNFH) in all but the worst return scenarios. Busack said the tool would inform when adult management should be less or more aggressive.

Gale said, using this tool, Winthrop National Fish Hatchery (NFH) would always need to aggressively remove adults in order to meet its PNI and pHOS goals, which requires both Methow FH and Winthrop NFH to be operating their respective weirs and traps. He said the weirs and traps would have to be operated to full capacity in order to manage Winthrop NFH goals and still allow Methow program fish to reach spawning grounds. Keely Murdoch said if these fish had higher homing fidelity, fewer would return to the hatchery overall. Tom Kahler said that if that were the case, it would be even more difficult to achieve the desired pHOS targets. Gale said the extraction rates at Winthrop NFH and Methow FH would be very high compared to historical rates, and it might be difficult to meet targets.
Mike Tonseth said hatchery returns will be fewer for the next 10-year period (due to decreased program size), which means there will be fewer adults overall, but aggressive extraction would still be needed. Pearsons said the sliding scale makes sense for the PUD

programs because when there are fewer natural-origin spawners, hatchery-origin fish provide a demographic boost, and when there are more natural-origin spawners, the proportion of hatchery-origin fish should decrease. Tonseth said there are not enough data to determine how effective adult management can be at variable spawning escapements. Kirk Truscott said low flow in the Methow River and thus relatively high discharge from Methow FH may have made the hatchery more attractive to returning fish, making adult management more successful in 2015 compared to an average year. Truscott asked what the ramifications would be of not meeting the gene flow targets defined in the spreadsheet. Busack said he will put flexibility in the permit language, and recognizes that the standards are high and may not be achievable in the 10-year period. Gale said changes in the program so far have made a big difference in the number of hatchery fish removed using adult management, and hopefully the natural population will respond.

Referring to the gene-flow analysis spreadsheet, Truscott said "wild run" and "wild escapement" are not the same metric and asked if pre-spawn loss is accounted for. Greg Mackey said the 100-fish limit for natural-origin broodstock collection should be, "100 fish after pre-spawn mortality," because not all of the fish will convert to the Methow River. Tonseth suggested footnoting the spreadsheet to better define "wild run." Mackey said the Hatchery Committees could vote on the sliding scale, which only applies to the PUD programs. Gale said he will need more time to review the gene flow standards before agreeing to the standards for either the PUD or the Winthrop programs. Kahler said approval of the standards affects Douglas PUD's contract with WDFW, and contract negotiations need to be completed in June 2016.

Hurst said she will revise the gene flow sliding-scale spreadsheet and send it to the Hatchery Committees. Busack said he and Hurst will send an email to the Hatchery Committees describing the gene flow standards that NMFS proposes for Methow spring Chinook salmon, which will be a decision item during the Hatchery Committees conference call in early March 2016.

C. 5-Year Hatchery M&E Review Planning – Objectives 4, 5, 7, and 1 (All)

Objective 5

Keely Murdoch shared a paper titled, "Twisp and Chewuch Homing Fidelity Study Options" (Attachment D), which Sarah Montgomery distributed to the Hatchery Committees on January 26, 2016. Murdoch said the paper addresses two options for improving homing fidelity: 1) sequential imprinting; and 2) embryonic imprinting.

Sequential Imprinting

Murdoch said an example of sequential imprinting from Andrew Dittman's presentation occurred when fish returned to the Easton Acclimation Site, passing the hatchery they were reared in, on their way upstream. In the Twisp and Chewuch rivers, fish appear to be confused from the olfactory cues coming from the Methow River, where the Methow FH is located, and instead of returning to their acclimation sites in the Twisp and Chewuch rivers, they stray into the Methow River. Methow FH is not in sequence with the Twisp and Chewuch AFs. She said fish acclimated in the Chewuch River have particularly poor stray rates, which could be attributed to the short distance between the confluence of the Chewuch and Methow rivers and Methow FH. Murdoch said rearing the fish farther downstream and outside of the Methow Basin would allow for sequential imprinting; fish returning upstream would be less likely to stray into the Methow River because the only familiar olfactory cue is the acclimation site (i.e., Twisp or Chewuch rivers). She said a paired release at both Twisp and Chewuch AFs could be a good sequential imprinting study.

Embyronic Imprinting

Murdoch said other methods to increase homing to the Chewuch and Twisp rivers could involve bringing in natal river water during embryonic development (using isobuckets) or setting up temporary incubation facilities in the Twisp River before transfer to the chosen hatchery. She said her paper discusses different methods for marking and detecting study fish, such as spawning-ground surveys, recoveries of coded wire tags, and PIT tags.

Questions and Comments

Todd Pearsons asked where Murdoch proposes to incubate and rear fish. Murdoch said she would propose incubating and rearing fish at Eastbank Hatchery or Wells FH and avoid keeping fish at Methow FH altogether, unless they were transferred from Methow FH as

unfertilized gametes. She said embryonic imprinting at Methow FH could confound the study and should be avoided. Pearsons asked if temperature would be a problem for the study at Eastbank Hatchery or Wells FH. He said fish could be incubated at Eastbank Hatchery or Wells FH and transferred as fry to avoid temperature issues affecting precocious maturation. Murdoch replied that initial rearing at Eastbank Hatchery with overwintering at Carlton Ponds and final acclimation upstream in Chewuch or Twisp rivers would fit the sequential imprinting model, but not every Hatchery Committees member supports using Carlton Ponds, and that would also involve more fish transport. Jayson Wahls said Wells FH has similar temperatures to Methow FH but may not currently have space for these study fish.

Murdoch said in this study, the early rearing period would be split; half of the fish would be reared at Methow FH, and half elsewhere. Murdoch said spawning would be done at Methow FH, and then eggs and milt would be transferred to another facility to avoid an eyed-egg transfer. Murdoch said the chosen rearing facility should be downstream of the final AF, and Wells FH would make sense because it is more than 50 river miles away. Wahls asked if the fish should be reared on well water or surface water. Dittman said distance is a more important factor than water source, but they should be reared on well water as much as possible. Mike Tonseth said the fish cannot overwinter at Eastbank Hatchery due to temperatures, and adult management also cannot be performed at Eastbank Hatchery, in contrast to Wells FH, where the volunteer trap can be operated. Greg Mackey said, because water exits the Wells FH through the volunteer channel, it is always open and would be highly attractive to fish. Murdoch asked if the volunteer channel trap is operated during the time of year that spring Chinook salmon would pass Wells FH during upstream migration. Wahls said yes, because the trap is operated for steelhead.

Craig Busack asked how many fish Murdoch proposes to use in this study. Murdoch said half of the Chewuch River release group (about 30,000 fish) and half of the Twisp River release group (15,000 fish) would serve as treatment fish. The other half of the release groups would serve as controls.

Mackey said Wells FH would not be available for this study until brood year 2018 because of construction. Tracy Hillman said it may make sense to start with the embryonic imprinting study in 2016 and 2017 and then consider the sequential studies when Wells FH facility is up and running. Mackey said the embryonic imprinting study may result in more management tools, because it would theoretically allow for acclimating fish to more locations. Murdoch said the study could be performed for 5 years, like the Goat Wall agreement. Bill Gale said the straying difference between the two release groups might not be statistically measurable due to uncertainties introduced by the number of returning adults, out-of-basin straying, and carcass recovery. He said it would be inefficient for the Hatchery Committees to partake in a 5-year study that might not produce statistically significant results. Murdoch said an alternative to a 5-year study would be a before-and-after style study in which the whole program is subjected to the treatment and compared to the previous 15 years of data. She also said that even though the programs and sample sizes are small, which increases the risk of producing statistically insignificant results, the Hatchery Committees should still aim to improve homing fidelity. Hillman said replication, and, therefore, statistical power in this study, would come from the number of years it is performed and the recapture rate of the fish. Dittman asked how reliable PIT-tag detection arrays are in the proposed study area. Murdoch replied that antennas are in place in the Chewuch, Twisp, and Methow rivers. Mackey said spring Chinook salmon likely migrate through the areas that have PIT-tag arrays during high water, which is associated with low detection rates.

Tom Kahler said adult management should not be performed on study fish because they should be allowed to explore and potentially turn around. Murdoch said conservation study fish should be adult-managed, and it is unlikely that Chewuch- or Twisp-acclimated fish that migrate to Methow FH are merely exploring—they would be straying in response to olfactory cues from the hatchery, and are no longer exposed to olfactory cues from their natal sites (confluence is downstream).

Gale asked if all adult-managed fish are bio-sampled for coded wire tags. Tonseth said the study fish could be distinguished using a secondary mark, an elastomer, or a body tag. Gale asked how the logistics of sorting, handling, and collecting data from study fish would work. Murdoch said Methow FH fish are marked differently than Winthrop NFH fish, which

allows for samplers to target Methow FH fish for data collection. Gale said he would need to understand the impact of data-collection efforts on Winthrop NFH staff before approving a study design. Murdoch said the cost-benefit analysis of hatchery staff effort versus the cost of additional markings on fish can be decided by the Hatchery Committees once a detailed study plan is developed.

Mackey said the Hatchery Committees should also consider the potential effort put into this study and its potential gains. He said a statistical difference in homing may be detectable, but might not result in biologically meaningful differences. He said extreme results such as 100% decreases in straying are unlikely, and straying may not matter compared to the ultimate goal of promoting the recovery of spring Chinook salmon. Murdoch said extreme decreases in straying, such as down to 5%, are possible, and recalled Dittman's example of the Easton Acclimation Site in the Yakima River study.

Peter Graf said this study would take multiple years, and in the meantime, straying issues continue. He asked if more immediate actions can be taken to address homing fidelity. Murdoch said the rearing location of the entire program could be changed, but that likely would not be approved. Graf asked if fish could be truck planted in the Chewuch River. Murdoch said the current numbers of fish in the Chewuch River are unknown, so deciding on the number to truck plant would be difficult. She said the benefit of beginning the sequential imprinting study in 2018 would be that it gives the Hatchery Committees time to see if programs in the Methow Basin are meeting targets with adult management. She said she will develop her draft, "Techniques to Improve Homing Fidelity for Chewuch and Twisp River Releases of Spring Chinook Salmon," into a study plan and coordinate with Chelan, Douglas, and Grant PUDs regarding feasibility.

Objective 4

Pearsons shared the Grant PUD proposal, "Target HRR Proposal" (Attachment E), which Montgomery distributed to the Hatchery Committees on February 9, 2016. Pearsons said the proposal includes maintaining the same HRR targets for 20 years. Tonseth said HRR is a metric in the M&E Plan, which is subject to review and modification every 5 years, including its appendices, so it would not make sense to propose a 20-year constraint on HRR

targets. He said a radical program modification, for example, would result in a change in HRR performance, which should change HRR targets. Pearsons said Grant PUD does not support making the targets harder to achieve every time a program modification is made, and he said changing the HRR targets frequently only makes it more likely that targets are not met. Tonseth said setting a target for 20 years could limit adaptive management, which is already very difficult with HRRs. Gale said demanding incremental program improvements by updating HRR targets frequently should be avoided, but a bad program's underperformance would be perpetuated if HRR targets are not updated frequently enough. Mackey said the Hatchery Committees should revise HRR targets during recalculation.

Murdoch said some programs should be held to targets from other in-basin programs that are performing better. Specifically, she said one standard should be set for Methow spring Chinook salmon programs because they are all capable of achieving the same HRRs and differ only in factors such as transfer methods and crowding at acclimation ponds. She said the differences between programs can be compared and improved upon. Mackey said size-at-release differs between programs, for example, but the Hatchery Committees are already aware of the differences, and HRR does not need to be assessed to look into size-at-release differences. He said the Methow and Chewuch programs are both Methow Composite (MetComp) stock and should share a target, but the Twisp program should have its own target. Mackey said Okanogan and Omak steelhead are separate stocks and should also have separate targets.

Mackey said the most important piece of assessing HRRs is making sure they are above natural replacement rates. He said HRR is useful only as a quick way to assess the hatchery program and is not very informative. HRR includes a conglomeration of factors such as fecundity, in-hatchery survival with multiple components, and out of hatchery survival which also includes multiple components. The components should be looked at individually when considering management changes.

The Hatchery Committees representatives present and Grant PUD agreed to the following HRR targets and edited Grant PUD's Target HRR Proposal *(note: Sarah Montgomery*

distributed the revised Target HRR Agreement to the Hatchery Committees on February 19, 2016.):

- Use the estimated 40th percentile HRR target during 5-year evaluation periods.
- Use varying degrees of action depending on the number of years that the HRR deviates from the target; green light (below 40th percentile for 2 years or fewer, with no action) and red light (below 40th percentile for 3 years or more, investigate the cause of the performance issue, and potentially adapt the program if the cause can be attributed to the hatchery program).
- Each program will have its own HRR target, with the following exceptions:
  - Nason Creek will use the Chiwawa spring Chinook salmon target because there are no data for the Nason Creek program to calculate its target.
  - The Methow spring Chinook and Chewuch spring Chinook programs will use the higher of their two targets, because they both include MetComp stock and should be assessed together.

Objective 7

Hillman said the biggest issue identified by the Hatchery Committees for assessing Methow spring Chinook salmon freshwater productivity is that there are only a few years of data available for juvenile productivity. Mackey said more data are being collected to better assess the effects of pHOS on juvenile productivity.

Objective 1

Pearsons said that he recommended the Hatchery Committees discuss Objective 1 in order to confirm that programs are not negatively affecting the abundance of natural-origin spawners. Murdoch said several changes have been made to programs that may increase the abundance of natural-origin spawners. Pearsons said HRRs, stray rates, and other objectives should be put into the context of Objective 1 in order to ensure hatchery programs have a positive effect on the population.

Mackey said the review of Hatchery M&E Report objectives should be documented. Murdoch said the recommendations included in the Hatchery M&E Report are recommendations of the report authors only, and not of the Hatchery Committees. Pearsons

said the Hatchery M&E Report can be cited and put into appropriate context in the Hatchery Committees' review of the report.

Montgomery said she will compile all Hatchery Committees discussions regarding the 5-Year Hatchery M&E Review process into one document organized by objective and send it to Catherine Willard. Willard said she will draft a summary of the 5-Year Hatchery M&E Review process.

D. NMFS Consultation Update (Craig Busack)

Craig Busack said he does not have an update from Amilee Wilson (NMFS) regarding the Wenatchee River Steelhead Biological Opinion (BiOp). He said, for the Methow spring Chinook salmon BiOp, the gene flow standards will be decided during the March 2016 (date to be determined) Hatchery Committees conference call, and the consultation will move forward with an approximate target completion date of May 2016. Regarding the bull trout coverage for both BiOps, Busack said he discussed with Karl Halupka (USFWS) whether the 2012 Wells Relicensing Bull Trout BiOp adequately provides bull trout coverage for the Methow Basin, and Halupka said it likely provides adequate coverage. Busack said Halupka also said the YN acclimation sites should have adequate bull trout coverage under the coho salmon BiOp. Bill Gale said USFWS believes the effects of acclimating other species like Methow spring Chinook salmon would be less than the effects already considered in the coho salmon BiOp. Busack said Alene Underwood is working on the revised Hatchery and Genetic Management Plan. He said any sites potentially involved in the proposed imprinting study should also be included in the consultations currently underway.

E. USFWS Consultation Update (Bill Gale)

Bill Gale said the Ecological Services branch of the USFWS is working on a draft Winthrop BiOp for review and should finalize Endangered Species Act Section 7 coverage for effects to bull trout in March 2016. This consultation will provide coverage for the spring Chinook and steelhead programs at Winthrop NFH.

F. Broodstock Collection Protocols (Mike Tonseth)

Mike Tonseth shared a document titled, "Draft Upper Columbia River Broodstock Collection Protocols," which Sarah Montgomery distributed to the Hatchery Committees on

February 11, 2016 (Attachment F). Tonseth said the protocols will be discussed at the PRCC HSC meeting on February 18, 2016. Tracy Hillman asked if sockeye salmon broodstock collection should be included in the protocols. Tonseth said only stocks utilizing a PUD facility are included in the protocols. Kirk Truscott said coho salmon historically used a PUD facility and, therefore, are included as a placeholder.

G. HETT Update (Sarah Montgomery)

Sarah Montgomery provided an update on the Draft Hatchery M&E Plan Appendices:

- Appendix 1 does not currently have a deadline, and Tracy Hillman said Appendix 1 is not a critical part of the M&E documentation.
- McLain Johnson (WDFW) will complete Appendix 2 now that the Hatchery Committees have decided how to calculate and assess HRR targets.
- Keely Murdoch is working on Appendix 3.
- Peter Graf completed Appendix 4, which Montgomery distributed to the Hatchery Committees for review on February 9, 2016.
- Catherine Willard completed Appendix 5, which Montgomery distributed to the Hatchery Committees for review on February 5, 2016.
- Matt Cooper completed Appendix 6, which Montgomery distributed to the Hatchery Committees for review on February 5, 2016.

III. Chelan PUD

A. DECISION: Approve 2016 Action Plan (Catherine Willard)

Catherine Willard shared a document titled, "Rock Island and Rocky Reach 2016 Action Plan" (Attachment G). Rocky Reach and Rock Island Hatchery Committees members present approved the hatchery portion of Chelan PUD's 2016 Action Plan as follows: Chelan PUD, USFWS, WDFW, NMFS, YN, and CCT approved on February 17, 2016. *(Note: this item is also a decision item at the HCP Coordinating Committees meeting on February 24, 2016.)*

B. DECISION: Approve Wenatchee Summer Chinook SOA (Catherine Willard)

Catherine Willard said comments were received and incorporated into the Draft Wenatchee Summer Chinook SOA. The Rock Island and Rocky Reach Hatchery Committees

representatives approved Chelan PUD's Wenatchee Summer Chinook SOA, *Improvement Feasibility at Eastbank Hatchery for Wenatchee summer Chinook* (Attachment H), as follows: Chelan PUD, USFWS, WDFW, NMFS, YN, and CCT approved on February 17, 2016. *(Note: Sarah Montgomery distributed the Final Wenatchee Summer Chinook SOA to the Hatchery Committees on February 18, 2016.)*

C. BY 2014 Methow Spring Chinook Salmon Acclimation (Catherine Willard)

Catherine Willard said the YN will operate the Chewuch AF in 2016 (according to email correspondence from Kirk Truscott and Jeff Korth).

D. 2016 Draft Steelhead Release Plan (Catherine Willard)

Catherine Willard shared two documents—"Draft 2016 Wenatchee Steelhead Release Plan" (Attachment I) and "Preliminary Results from the 2015 Wenatchee Steelhead Release"—which Sarah Montgomery distributed to the Hatchery Committees on February 18, 2016. She said the plan is the same as last year, except for the exact number of fish that will be released from each location. She also said Chelan PUD did not meet its 2015 steelhead release obligation; it was short by approximately 50,000 hatchery-by-hatchery steelhead for the Wenatchee steelhead program.

IV. HCP Administration

A. Accessibility of Public HCP-HC Documents

Tracy Hillman said he often receives requests for Hatchery Committees' documents, such as annual and 5-year reports. He asked if there is a central website where these are located. Tom Kahler said Douglas PUD posts the reports to its website. Catherine Willard said Chelan PUD does not have a suitable website for posting these documents. Todd Pearsons said he would look into the possibility of Grant PUD posting annual and 5-year reports on its website.

B. Next Meetings

Sarah Montgomery said she would schedule a conference call in March 2016 for the Hatchery Committees to discuss two decision items: 1) gene flow standards for Methow spring Chinook salmon; and 2) Chelan PUD's 2016 Draft Steelhead Release Plan. The next

regularly scheduled Hatchery Committees meetings are on March 16, 2016 (Douglas PUD), April 20, 2016 (Chelan PUD), and May 18, 2016 (Douglas PUD).

V. List of Attachments

Attachment A	List of Attendees
Attachment B	Effects of Hatchery Rearing and Release Practices on Olfactory Imprinting and Homing
Attachment C	Methow spring Chinook Gene Flow Analysis
Attachment D	Twisp and Chewuch Homing Fidelity Study Options
Attachment E	Target HRR Proposal
Attachment F	Draft Upper Columbia River Broodstock Collection Protocols
Attachment G	Draft 2016 Rock Island and Rocky Reach HCP Action Plan
Attachment H	Improvement Feasibility at Eastbank Hatchery for Wenatchee summer Chinook Draft SOA
Attachment I	Draft 2016 Wenatchee Steelhead Release Plan

Attachment A
List of Attendees

Name	Organization
Tracy Hillman	BioAnalysts, Inc.
Sarah Montgomery	Anchor QEA, LLC
Catherine Willard*	Chelan PUD
Greg Mackey*	Douglas PUD
Tom Kahler*	Douglas PUD
Todd Pearsons	Grant PUD
Peter Graf	Grant PUD
Deanne Pavlik-Kunkel†	Grant PUD
Justin Yeager*	National Marine Fisheries Service
Craig Busack*†	National Marine Fisheries Service
Charlene Hurst†	National Marine Fisheries Service
Andrew Dittman	National Marine Fisheries Service
Bill Gale*	U.S. Fish and Wildlife Service
Matt Cooper*	U.S. Fish and Wildlife Service
Mike Tonseth*	Washington Department of Fish and Wildlife
Charlie Snow†	Washington Department of Fish and Wildlife
Jayson Wahls	Washington Department of Fish and Wildlife
Kirk Truscott*	Colville Confederated Tribes
Keely Murdoch*	Yakama Nation

Notes:
* Denotes Hatchery Committees member or alternate
† Joined by phone