

FINAL MEMORANDUM

To: Wells, Rocky Reach, and Rock Island
HCPs Hatchery Committees

Date: August 20, 2016

From: Tracy Hillman, HCP Hatchery Committees Chairman

Cc: Sarah Montgomery, Anchor QEA, LLC

Re: Final Minutes of the June 15, 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, June 15, 2016, from 9:30 a.m. to 1:30 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.)*
 - Catherine Willard will draft a summary of the 5-Year Hatchery Monitoring and Evaluation (M&E) Review process (Item I-A). *(Note: this item is ongoing.)*
 - Tracy Hillman will demonstrate a tool that processes data from the National Marine Fisheries Service (NMFS) Salmon Population Summary database during the Hatchery Committees July 20, 2016, meeting (Item I-A). *(Note: this item is ongoing.)*
 - Catherine Willard will incorporate edits from today's meeting into Draft Hatchery M&E Plan Appendices 2, 4, and 6, and send final versions to Sarah Montgomery for distribution to the Hatchery Committees (Item II-C). *(Note: Montgomery distributed final versions on June 24, 2016.)*
 - Todd Pearsons (Grant PUD) will revise Draft Hatchery M&E Plan Appendix 3 and send it to Catherine Willard, who will incorporate edits and send the revised version to the Hatchery Committees for review (Item II-C). *(Note: Montgomery distributed the revised version of Appendix 3 for review on July 12, 2016.)*
 - Catherine Willard and Tracy Hillman will revise Draft Hatchery M&E Plan Appendix 5 and send it to Sarah Montgomery for distribution to the
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Hatchery Committees for review (Item II-C). *(Note: Montgomery distributed the revised Appendix 5 to the Hatchery Committees on July 19, 2016.)*

- The Hatchery Committees will discuss the population structure of Upper Columbia River summer and fall Chinook salmon at the Hatchery Committees August 17, 2016, meeting (Item II-D).
- Keely Murdoch will discuss internally the shortage of natural-origin recruits in the Methow Composite broodstock (Item II-E). *(Note: Murdoch sent an email describing the Yakama Nation's position on this topic, which Sarah Montgomery forwarded to the Hatchery Committees on June 17, 2016.)*
- Todd Pearsons will discuss internally the shortage of natural-origin recruits in the Methow Composite broodstock (Item II-E).
- Mike Tonseth will discuss with Karl Halupka (U.S. Fish and Wildlife Service [USFWS]) and Craig Busack (NMFS) the possibility of using tangle-netting to capture additional natural-origin broodstock for the Methow Composite program (Item II-E). *(Note: Tracy Hillman sent an email to the Hatchery Committees on July 1, 2016, stating that USFWS and NOAA have approved the use of tangle-netting in 2016, and that Tonseth will distribute a plan for broodstock collection.)*

DECISION SUMMARY

- The Hatchery Committees approved Draft Hatchery M&E Plan Appendices 2, 4, and 6.

AGREEMENTS

- There were no agreements during today's meeting.

REVIEW ITEMS

- Sarah Montgomery sent an email to the Hatchery Committees on June 15, 2016, notifying them that the Draft 2015 Chelan PUD and Grant PUD Hatchery M&E Annual Report and appendices are available for a 30-day review period, with edits and comments due to Tracy Hillman by Friday, July 15, 2016.
 - Sarah Montgomery sent an email to the Hatchery Committees on July 12, 2016, notifying them that Revised Draft Hatchery M&E Plan Appendix 3 is available for review before the Hatchery Committees August 17, 2016, meeting (Item II-C).
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- Sarah Montgomery sent an email to the Hatchery Committees on July 19, 2016, notifying them that Revised Draft Hatchery M&E Plan Appendix 5 is available for review before the Hatchery Committees August 17, 2016, meeting (Item II-C).

FINALIZED DOCUMENTS

- Sarah Montgomery sent an email to the Hatchery Committees on June 24, 2016, notifying them that the Hatchery M&E Plan Appendices 2, 4, and 6 are available for download from the Hatchery Committees Extranet site.

I. Welcome

A. Review Agenda, Review Last Meeting Action Items, and Approve the May 18, 2016 Conference Call Minutes (Tracy Hillman)

Tracy Hillman welcomed the Hatchery Committees and asked for any additions or changes to the agenda. The following revisions were requested:

- Sarah Montgomery removed the Hatchery Evaluation Technical Team (HETT) update.
- Catherine Willard removed the Summary of the 5-Year Hatchery M&E Review.
- Tracy Hillman removed his presentation on the National Oceanic and Atmospheric Administration (NOAA) Salmon Population Summary Database Tool, and said it can be added to the Hatchery Committees July 20, 2016, agenda.
- Mike Tonseth added a discussion about broodstock collection for the Methow Conservation Program.

The Hatchery Committees reviewed the revised draft May 18, 2016, conference call minutes. Montgomery said there are no outstanding comments to be discussed.

Hatchery Committees members present approved the draft May 18, 2016, conference call minutes, as revised.

Action items from the Hatchery Committees meeting on May 18, 2016, and follow-up discussions, were addressed (*note: italicized text below corresponds to agenda items from the meeting on May 18, 2016*):

- *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 said the timeline will likely be finished in June 2016.

- *Catherine Willard will draft a summary of the 5-Year Hatchery Monitoring and Evaluation (M&E) Review process (Item I-A).*

This item is ongoing.

- *The imprinting and homing subgroup will visit the Issaquah Salmon Hatchery on May 26, 2016 (Item I-A).*

This item is complete.

- *Craig Busack will resolve outstanding comments in the National Marine Fisheries Service (NMFS) Consultation Update section of the April 20, 2016, Hatchery Committees meeting minutes and send revisions to Sarah Montgomery, who will distribute the minutes to the Hatchery Committees for approval (Item I-A).*

This item is complete. Busack sent the revised version to Montgomery on May 19, 2016, which she distributed to the Hatchery Committees for approval the same day.

- *Kirk Truscott will revise Draft Hatchery M&E Plan Appendix 3 to include information for the Okanogan/Chief Joseph programs, and send it to Keely Murdoch (Item I-A).*

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

- *The Hatchery Committees will discuss Draft Hatchery M&E Plan Appendices 2 through 6 during the June 15, 2016, Hatchery Committees meeting (Item IV-A).*

This item will be discussed today.

- *Chelan PUD and Douglas PUD will research vernacular for straying and homing fidelity, and present definitions that can be used in reports, plans, and minutes at the Hatchery Committees June 15, 2016, meeting (Item V-B).*

This item will be discussed today.

- *Tracy Hillman will demonstrate a tool that processes data from the National Oceanic and Atmospheric Administration (NOAA) Salmon Population Summary database during the Hatchery Committees June 15, 2016, meeting (Item VI-A).*
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This item will be discussed at the July 20, 2016, Hatchery Committees meeting due to time constraints for today's meeting.

- *Kristi Geris (Anchor QEA) will provide support to the Hatchery Committees while Sarah Montgomery is on vacation from May 25 to June 11, 2016. During this time, Hatchery Committees representatives will cc: Geris, Montgomery, and Hillman on all Hatchery Committees communication (Item VI-B).*

This item is complete.

II. Joint HCP-HC/PRCC HSC

A. USFWS Bull Trout Consultation Update (Bill Gale)

Bill Gale said he spoke with Karl Halupka, and Halupka said he is revising the Wenatchee River Steelhead Biological Opinion (BiOp) this week, and he plans to circulate a revised draft, which will at least contain the effects analysis, by June 17, 2016.

Additionally, Gale said Winthrop staff provided an update to him, regarding returning spring Chinook salmon to the hatchery, on June 14, 2016. He said there are approximately 1,200 fish in the pond at Winthrop NFH, and staff have excessed more than 1,000 fish. He said Winthrop NFH also received 243 fish transferred from Methow Fish Hatchery (FH). He said Winthrop NFH staff retained 10 fish that were transferred, and set aside 136 adipose-present hatchery fish for broodstock.

Greg Mackey said staff at Wells Dam are 2 weeks delayed in genetic identification because the genetic sequencer needs repair. He said, as of June 14, 2016, staff at Wells Dam had collected 59 wild spring Chinook salmon broodstock for the Methow Composite program, which is roughly half the fish required.

Gale asked if the Methow FH trap is collecting hatchery-origin returning fish efficiently. Mike Tonseth said he does not have an update on the Methow FH trap. Mackey said staff at the Twisp River trap have recently switched the trap to operate through the night. He said many fish are being collected in the trap, including bull trout purposefully collected for a telemetry study. He said staff are optimizing the trap operations based on the time of day that fish move.

B. NMFS Consultation Update (Justin Yeager)

Justin Yeager said Amilee Wilson (NMFS) sent a Doodle poll in May 2016 to schedule a hatchery consultation strategy meeting at the U.S. Forest Service's building in July 2016. Yeager said the Methow spring Chinook salmon BiOp is currently in quality assurance/quality control review, and the revised permits are available for comment, with comments due back to NMFS on June 22, 2016. He said the environmental assessment is being drafted, and NMFS expects the consultation to be complete in July 2016.

Regarding the Methow steelhead consultation, he said NMFS will be contacting permit applicants about gene flow soon. Catherine Willard asked if Yeager has an update on the Wenatchee River steelhead consultation, and Yeager said he does not have an update.

Tracy Hillman asked if the consultation update Yeager just provided is the new format he mentioned during the Hatchery Committees' May 18, 2016, conference call. Yeager said he prepared a bulleted update in advance of the meeting, which is his plan moving forward for consultation updates. Bill Gale asked if Yeager coordinates with Karl Halupka and USFWS regarding a joint consultation update. Yeager said he, Gale, Craig Busack, and Halupka should all discuss the joint consultation updates.

C. Review Draft Hatchery M&E Plan Appendices 2 through 6 (All)

Appendix 2 –HRR Targets

Catherine Willard displayed the document, "draft Hatchery M&E Appendix 2," which Sarah Montgomery most recently distributed to the Hatchery Committees on May 16, 2016 (Attachment B). Questions and comments were discussed, and edits were made to the document. Keely Murdoch asked if the column titled "5-year HRR" is the target or the 5-year data. Tracy Hillman said it is the target Hatchery Replacement Rate (HRR). Todd Pearsons said the steelhead HRR for the Okanogan conservation program appears very high compared to the Omak program. Hillman reviewed the numbers and said the HRR should be 7.3 (harvest not included) for the Omak steelhead program.

Greg Mackey asked if the HRR for the Wells programs was used for the Twisp River steelhead conservation program, because the time series for the Twisp releases is short.

Hillman said the document will be updated as information becomes available. Mackey also noted that “Eastbank” is the wrong label for Methow basin spring Chinook salmon, which Willard edited.

Hillman noted that some of the numbers in the table do not match the most recent HRR spreadsheet. He checked the numbers and provided updates to Willard, including adding Okanogan summer Chinook salmon to the table.

The Hatchery Committees approved the Draft Hatchery M&E Plan Appendix 2 as revised.

Willard said she would finalize Appendix 2 to include edits discussed today and send it to Montgomery for distribution to the Hatchery Committees.

Appendix 3 – PNI and pHOS Targets and Sliding Scales

Willard displayed the document, “draft Hatchery M&E Appendix 3,” which Montgomery most recently distributed to the Hatchery Committees on May 16, 2016 (Attachment C). Questions and comments were discussed, and edits were made to the document.

Murdoch said the summary table is new, and is organized by species, population, management strategy, and section in the document where each is discussed. Todd Pearsons asked if there are proportionate natural influence (PNI) and percent hatchery origin spawn (pHOS) targets for Okanogan summer Chinook salmon. Kirk Truscott replied yes. Mackey asked for clarity that each number be defined as a PNI or pHOS target with a “greater than or less than or equal to” sign, as appropriate.

Hillman asked if Wenatchee spring Chinook salmon will move to a 3-population sliding scale at some point. Murdoch said she is not aware of any planned changes. Pearsons said there are many strays from the Chiwawa River in Nason Creek, so the 3-population model might be a good fit. Murdoch said the 3-population sliding scale was not developed when the permits or Hatchery Genetic Management Plans (HGMPs) were written for Wenatchee spring Chinook salmon, but they could change in the future.

Hillman said he analyzed Wenatchee spring Chinook salmon data using the 3-population model. He said he compared the PNI weighting approach used in the past to the 3-population model approach, and the results were similar, although the 3-population model provides more accurate results.

Bill Gale noted that Methow spring Chinook salmon are listed with a 2-population sliding scale strategy, which should be a 3-population sliding scale. Gale said he wants to make sure that information in Appendix 3 matches the permits. Murdoch said she compiled the appendix based on information directly from the permits, but it should be checked. Mackey said the appendix has extra information that is not included in the permits. Murdoch said when permits are issued, the appendix may need to be updated.

Hatchery Committees members reviewed each section of Appendix 3.

Murdoch said, regarding Wenatchee steelhead, the language in the appendix is from the HGMP and not the draft permit, because the draft permit refers back to the HGMP. Mike Tonseth explained that there is a two-zone management approach, because adult management can be more precise above Tumwater Dam but not below it. Murdoch said the PNI for Wenatchee steelhead above Tumwater Dam can vary and is based on what is occurring in the rest of the Wenatchee basin.

Kirk Truscott said, regarding Okanogan steelhead, the appendix will have to be revised when the permit is issued. Murdoch suggested adding a header to the document stating that it is a “living document” and will therefore change as permits expire and are reissued.

Pearsons said, regarding Priest Rapids fall Chinook salmon, the PNI listed is accurate, but it should be noted that Grant PUD does not have full control of meeting the PNI goal because the U.S. Army Corps of Engineers has a hatchery program in the same area. Pearsons said he will revise Section 13 in Draft Hatchery M&E Plan Appendix 3 and send it to Willard, who will incorporate edits and send the revised version to the Hatchery Committees for review.

Appendix 4 – Spatial Distribution of Spawners

Willard displayed the document, “draft Hatchery M&E Appendix 4,” which Montgomery most recently distributed to the Hatchery Committees on May 16, 2016 (Attachment D). Questions and comments were discussed, and edits were made to the document.

Peter Graf said he updated Appendix 4 by adding a column for rationale with text from approved Statements of Agreement (SOAs). Hillman summarized that there are only two programs—Carlton and Dryden summer Chinook salmon—where conservation programs are intended to have a spawning distribution that does not completely overlap with the natural-origin spawning distribution.

Gale said the rationale behind the Carlton management target is that overlap between summer and spring Chinook salmon in the Methow basin should not be increased by the hatchery program. Murdoch said she is not sure if the Hatchery Committees have discussed this management target for the Wenatchee basin, where summer Chinook salmon have expanded their range and now overlap with spring Chinook salmon. Tonseth said the overlap in the upper Wenatchee River is largely driven by wild fish. Murdoch said perhaps the change is driven by climate, and summer Chinook salmon are increasingly seen even in the lower Nason Creek. Gale asked if their expanded distribution is an indication of generally increasing abundances, or a shift in location. Tonseth said he thinks it may be due to an increase in abundance and said high numbers of spawners tend to occur in years when the Wenatchee River is warmer than average, so the fish move into other tributaries.

The Hatchery Committees approved Draft Hatchery M&E Plan Appendix 4.

Willard said she would finalize Appendix 4 to include edits discussed today and send it to Montgomery for distribution to the Hatchery Committees.

Appendix 5 – Stray Rate Objectives

Willard displayed the document, “draft Hatchery M&E Appendix 5,” which Montgomery most recently distributed to the Hatchery Committees on May 16, 2016 (Attachment E). Questions and comments were discussed, and edits were made to the document.

Hillman said most of Appendix 5 appears to be taken from the main Hatchery M&E Plan. Pearsons asked if the information should be included in Appendix 5 if it is already located in the main plan. Gale asked if stray rates are annual targets. Willard said stray rates are annual targets. (Note: there are also brood year cohort stray rates that are not an annual target.) Hillman said there is also another stray rate metric to consider, which is that the spawning escapement of the recipient population should not consist of more than 10 percent of strays annually. He said the Technical Recovery Team (TRT) came up with this criterion and uses it for assessing recovery. Gale said these are ambitious metrics, which many hatchery programs probably do not meet all the time. He said Wenatchee steelhead, for example, stray into the Entiat River at high rates, but how programs are managed can affect these stray rates.

Gale said coded wire tags (CWTs) are specific to Chinook salmon programs, and another paragraph should perhaps be added for steelhead. Hillman said in the annual M&E report he uses both CWT and passive integrated transponder (PIT)-tag information to assess straying. With PIT tags, the last detection point is assumed to represent spawning location, which may or may not be true. Gale said he is not certain these stray rate targets can be measured for steelhead. Willard said the objectives included in this appendix are directly from the M&E Plan. Hillman said a lot of steelhead are last detected at Wells Dam, which makes it difficult to analyze straying.

Murdoch suggested that because the information in this appendix is already included in the M&E Plan, which includes additional information and a preamble, perhaps Appendix 5 should focus on the definitions of straying and homing. Willard said Chelan PUD's concern is that they want their programs to be held to stray rates laid out in permits. She said the Wenatchee permit's definition of straying is consistent with the Monitoring and Evaluation Plan for PUD Hatchery Programs-2013 Update (a.k.a. M&E Plan), but the Monitoring and Evaluation of the Wells and Methow Hatchery Programs 2014 Annual Report defines stray rates differently than in the M&E Plan. Murdoch said genetic strays are important to consider for meeting permit conditions, but there are other management goals in the Methow basin that are distinct from genetics, which depend on spatial scales.

Hillman said the original targets in this appendix and plan are for genetic straying within and among populations, and the targets are from the TRT and Upper Columbia River spring Chinook salmon and steelhead Recovery Plan. He said the TRT includes straying as a component of the spatial structure and diversity matrix for assessing recovery. The Methow programs not only include these TRT criteria but discussions have occurred that contemplate extending the stray metrics to assess management objectives. Under this paradigm, the Methow programs would assess straying at a finer spatial scale than did the TRT.

Gale said Nason Creek and Chiwawa River strays have different targets, because the hatchery programs in the Wenatchee use a composited population. Murdoch said a composite is used for Nason Creek, but there is greater genetic risk for Nason fish straying into Chiwawa River than the opposite. Gale said there is higher risk because the composite is not released into Chiwawa River. Hillman said Murdoch's point is interesting, because Chiwawa River fish straying into Nason are considered a within-population stray from a genetic standpoint, but if it is a composite program, there may be less concern. Gale said there would be less concern if the same composite stock was released in both tributaries, but the composite stock is only released in Nason Creek. Hillman said, in the annual M&E report, he treats Nason Creek as an independent spawning aggregate. Straying and PNI are therefore estimated assuming that the Chiwawa River and Nason Creek spawning aggregates are independent genetically. The 3-population gene flow model is also used to estimate PNI.

Murdoch suggested adding a sub-category to the appendix for homing fidelity. She said, in the Chiwawa River, for example, there should be a management goal (not a permit requirement) that fish released return to the Chiwawa River, even though there is not a genetic component to that goal. Gale said he agrees, and out-of-basin straying may even be a greater concern than in-basin straying. He said out-of-basin straying to the Entiat River, and from the Okanogan River to the Methow River are both concerning. He said it is important that Chief Joseph hatchery programs meet their goals because it is a high risk program for genetic straying. Hillman said straying from the Okanogan River into other populations has the lowest acceptable percentile (5 percent) because the TRT recognizes that among-population straying is a greater risk than within-population straying. Gale said if a stray rate

reaches a level of concern, the Hatchery Committees should discuss specific steps for a program to solve that concern, rather than just reporting it.

Hillman asked if Appendix 5 is necessary, and if the Hatchery Committees would prefer the HETT revise and discuss the appendix. Willard stated that the HC should revise and discuss the appendix versus the HETT. Murdoch recommended that definitions for straying and homing, also on the agenda for today’s meeting, could go in Appendix 5 instead of straying goals, which are already included in the M&E Plan. Mackey said he has reviewed several papers and reports to survey what is used for stray rate terminology and found that many definitions for straying and homing are very wordy and depend on the surrounding text of a report.

Willard brought up Table 2.8 (Figure 1) from the Wells Hatchery and Methow Hatchery M&E 2014 Annual Report, which provides definitions for straying.

Table 2.8. Categories and definitions used to evaluate homing and straying of hatchery fish.

Category	Definition
Donor population	Hatchery population being evaluated; grouped by species, brood, and release location.
Recipient population	Spawning population of species being evaluated; may be at the tributary (e.g., Methow, Twisp, Chewuch), or basin scale (e.g., Entiat, Wenatchee).
In-basin homing	Fish homed to its release stream (population).
In-basin stray	Fish strayed to another population within its release basin.
Out-of-basin stray	Fish strayed to a population in a different release basin.

Figure 1. Table 2.8 of the Douglas PUD 2014 Annual M&E Report

Pearsons asked Mackey if Douglas PUD is comfortable with using the definitions in this table for all programs. Mackey replied yes. Murdoch suggested adding “non-genetic management stray” to the table for Appendix 5. Hillman suggested the Hatchery Committees use TRT definitions for genetic straying and the definitions in the table for management straying. Pearsons asked if this table is going to be the revised Appendix 5. Hillman said it could be, and that someone should provide definitions for genetic and management straying. Gale asked how these definitions apply to summer Chinook salmon, because within-population spawning aggregates are not defined. Hillman said in the annual M&E report, each subbasin is identified as an independent population. The report does not identify separate spawning

aggregates within each population. Gale said he thought the subbasins in the Upper Columbia River were a single population. Hillman said in that case, the stray rate would be 10 percent, not 5 percent, which is currently used. Pearsons said the populations may have been grouped geographically, but there were not statistical differences in the population structure. Pearsons said if the summer Chinook salmon in the Upper Columbia River are not genetically distinct from each other, then there would be no genetic strays; however, there could still be management targets. Hillman said according to Utter's work¹, fall and summer Chinook salmon in the Upper Columbia River are not genetically distinct, so the Hanford Reach would be part of the Upper Columbia River summer Chinook salmon population. Hillman added that Appendix M of the annual M&E report also describes genetics of Upper Columbia River summer Chinook salmon. Gale said the proceedings of a workshop about summer Chinook salmon management, held approximately 5 years ago, contained useful information and suggested a management framework, which could be a good resource for future discussions. Gale said this would be a good topic for future discussion. Hillman agreed and suggested it be discussed in August 2016.

The Hatchery Committees will discuss the population structure of Upper Columbia River summer and fall Chinook salmon at the Hatchery Committees August 17, 2016, meeting.

Willard said she and Hillman will revise Draft Hatchery M&E Plan Appendix 5 and send it to Montgomery for distribution to the Hatchery Committees for review.

Appendix 6 – Rearing Targets

Willard displayed the document, “draft Hatchery M&E Appendix 6,” which Montgomery most recently distributed to the Hatchery Committees on May 16, 2016 (Attachment F). Questions and comments were discussed, and edits were made to the document.

¹ Utter, F.M., D.W. Chapman, and A.R. Marshall. 1995. Genetic population structure and history of Chinook salmon of the Upper Columbia River. *American Fisheries Society Symposium* 17:149-165.

Willard said Appendix 6 includes rearing targets for Upper Columbia River hatchery programs, and some of the targets are presented as ranges. Hillman asked if the ranges will change in the future. Pearsons said the targets should be a single target eventually. Hillman said if targets vary among years, he can include those in the annual M&E report if Hatchery Committees members let him know during the review process.

Gale suggested that Winthrop NFH steelhead be called “2-years” instead of “yearlings” because they are part of a 2-year program. Willard made that change, and also changed Dryden summer Chinook salmon to 18 fish per pound.

The Hatchery Committees approved Draft Hatchery M&E Plan Appendix 6.

Willard said she would finalize Appendix 6 to include edits discussed today and send it to Montgomery for distribution to the Hatchery Committees.

D. Straying and Homing Fidelity Vernacular (Catherine Willard)

Catherine Willard shared a document titled, “Homing, Straying, and Colonization,” (Attachment G) by Thomas Quinn (University of Washington), which is a chapter in a NOAA Technical Memorandum². Sarah Montgomery distributed Quinn’s chapter to the Hatchery Committees on June 17, 2016. Willard said the chapter stems from a 1995 workshop.

Willard said, on page 2 of the document, Quinn defines hatchery versus wild homing differently. She said spatial scale is also important to consider. She said for wild fish, “home” is essentially the redd (where they were “born”) in the natal stream, but with fish used in homing studies, the definition of “home” is influenced by how and where juvenile fish are

² W. Stewart Grant (editor). 1997. Genetic effects of straying of non-native fish hatchery fish into natural populations: proceedings of the workshop. U.S. Dep. Commerce, NOAA Tech Memo. NMFS-NWFSC-30, 130p. Available at: <https://www.nwfsc.noaa.gov/publications/scipubs/techmemos/tm30/tm30.html>.

collected and marked, and how they are recaptured as adults. For hatchery fish, “home” could either be their ancestral stream, or the hatchery where they are reared, or where they were released.

Greg Mackey said Quinn has also made distinctions about the causes of straying in his book, *The Behavior and Ecology of Pacific Salmon and Trout*³. He said one cause of straying is the failure to home and the other is a sort of decision to purposefully return to somewhere other than a natal stream. Kirk Truscott said environmental conditions in natal streams can force or encourage straying. Mackey agreed and said some fish may physically or physiologically not be able to home, and some appear to choose not to home. Tracy Hillman said the TRT discusses homing and straying in many documents from a genetic standpoint, but the M&E Plan should perhaps include discussions about “management strays” that can be defined in Appendix 5. Management straying is defined at a spatial scale finer than genetic straying.

Mackey said, for the Wells and Methow program Annual M&E reports, he would like to present a matrix of recipient and donor populations, which is an easy and effective way to convey the stray data. He said a standard reporting style or summary table for the two to three different kinds of straying would be helpful. He said each report can then provide context about genetics and management for specific programs to help understand the tables.

In regards to the challenges of categorizing “straying” for the undifferentiated summer Chinook salmon aggregates, Mike Tonseth shared a document titled, “Genetic Structure of Upper Columbia River Summer Chinook and Evaluation of the Effects of Supplementation Programs.” Montgomery distributed it the Hatchery Committees following the meeting on June 15, 2016 (Attachment H). Tonseth said Figure 1 shows the relationship of natural- and hatchery-origin summer Chinook salmon collections from the Upper Columbia River basin. Tonseth said the “MEOK” program is the Methow-Okanogan program operated out of

³ Quinn, Thomas P. *The Behavior and Ecology of Pacific Salmon and Trout*. American Fisheries Society, Bethesda (Maryland), in association with University of Washington Press, Seattle (Washington). 2005.

Eastbank FH. He said there is not a high degree of differentiation in the basin, but managers choose to manage summer Chinook salmon at a tributary or subbasin level. Hillman said this document will be useful when the Hatchery Committees discuss the population structure of Upper Columbia River summer and fall Chinook salmon at the Hatchery Committees August 17, 2016, meeting.

(Note: the genetic structure of a population can change due to multiple causes. One cause is genetic straying from outside populations. Another cause is a change in the equilibrium between hatchery- and natural-selective forces, determined by gene flow. That equilibrium is approximated by the proportionate natural influence ratio [PNI]. In addition to discussing definitions of straying and the population structure of Upper Columbia River Summer Chinook salmon, the Hatchery Committees discussed the 3-population model, which is used to determine PNI.) Bill Gale asked how the 3-population model fits with the current Wenatchee spring Chinook programs. Keely Murdoch said the permit references the HGMP. Gale said the language in the permit, in annual reports, and in the HGMP should be connected more clearly. Hillman said the PNI target is 0.67, and this is calculated using the 3-population model. Gale said the description of how PNI is calculated in the permit does not agree with the 3-population model, so the permit should clearly state what is being calculated and how. Murdoch agreed and said it would be helpful for Craig Busack to write clear language regarding the 3-population model and calculating PNI so it is clear for anyone else who might work with these permits and plans. Hillman said these are good comments for the draft annual Wenatchee M&E report, which he will incorporate. Tonseth said even though language for the 3-population model is not included in the Wenatchee permit, it can be put in the Broodstock Collection Protocols and monitoring plans, which NOAA approves. In addition, he said the Wenatchee basin spring Chinook salmon management plan is a living document, so that can also be updated.

E. Broodstock Collection for Methow Programs (Mike Tonseth)

Mike Tonseth said he has an update on spring Chinook salmon broodstock collection for the Methow programs, and a discussion topic regarding backfilling the Methow conservation program broodstock. He said, as of June 14, 2016, WDFW has collected 90 adults, which are

presumed wild, at Wells Dam. He said 9 percent are unmarked hatchery fish, 22 percent are out-of-basin natural-origin recruits, and the remainder are Methow River-origin fish. He said they are 2 weeks behind on processing genetic data, and he expects some of the fish to assign to out-of-basin sources, leaving approximately 60 natural-origin recruits that can be used as broodstock for the Methow conservation program. He said the run is nearly finished at Wells Dam, and they have not collected enough natural-origin fish to meet this year's target of 122 natural-origin fish. He said most of the spring Chinook salmon passed Wells Dam in a 2-week period, and given trapping constraints, staff have not been able to collect the target number of broodstock. He asked the Hatchery Committees whether they would consider tangle-netting in the Chewuch River or Methow River to acquire natural-origin recruits for the Methow program. He said there would be a lot of coordination work needed with USFWS and NMFS, so he wants to get input from the Hatchery Committees before pursuing this action.

Keely Murdoch asked why they have not collected enough natural-origin broodstock. Tonseth said the run size was smaller, the run period was smaller, there are trapping constraints, and, despite retaining every fish staff thought were wild, there are still not enough. Bill Gale asked how effective tangle-netting in the Chewuch River has been in the past. Tonseth said it has been very effective. Catherine Willard said it has taken 7 to 8 days in the past, with zero bull trout encounters (one was observed but not encountered). She said they collected approximately 35 fish, and some were hatchery-origin.

Murdoch said the Yakama Nation (YN) position on tangle-netting depends on the factors (such as run size) involved in why enough fish were not collected. She said the safety-net program is designed to backfill the conservation program, and she generally does not support tangle-netting. Kirk Truscott said the estimated natural-origin run size over Wells Dam is approximately 580 to 590, which is close to the pre-season projection. Tonseth said collecting the full natural-origin recruit complement of 122 fish would not exceed the permit conditions of 33 percent of the run size. He said there are sufficient natural-origin fish in the population, but not enough have been collected at Wells Dam for the Methow program. Murdoch said tangle-netting could also raise issues with USFWS permitting, which is a process the Hatchery Committees do not want to delay or jeopardize. Tonseth said he hopes

that this request would be considered independent of the overall consultation process because it is a special situation, and he will have to discuss this with Karl Halupka and Craig Busack. Tonseth said if this situation is going to be more common in the future, perhaps alternative types of broodstock collection should be built into the permit for flexibility before the permit is issued, but he thinks that is separate from a potential request to tangle-net in the Chewuch River this year.

Todd Pearsons asked if any natural-origin fish returned to Methow trap or Twisp Weir. Tonseth said not a significant number were sampled at Methow Hatchery, and they cannot rely on this trap to collect natural-origin broodstock (note: the Twisp trap is used to trap Twisp-origin natural brood for the Twisp Program). He said they need to request that Methow FH retain sufficient hatchery origin adult returns to satisfy production obligations in the event that no more natural-origin broodstock are collected. Gale asked how many adult returns have already been retained, noting not many have been transferred to Winthrop NFH. Greg Mackey said there are also some hatchery-origin fish at Wells Dam that are waiting genotype results, which could potentially be retained. Mackey said the Methow composite program can use hatchery-origin fish to backfill broodstock up to the full program production size, but the Twisp River program cannot (note: the Twisp would be limited to a minimum pNOB of 0.5 under the current HGMP and pending permit). Therefore, the MetComp program would be commensurately larger if the Twisp River program is brood limited in order to satisfy production obligations.

Gale said he has concerns that using a large proportion of hatchery-origin fish will have a large impact on meeting the 3-population PNI target in the first year the target is used. Murdoch said it would have a greater effect on years when the hatchery-origin fish are returning to the basin. Tonseth said draft permit language recently distributed by Charlene Hurst (NMFS) says that the Methow program will collect natural-origin fish at specific sites, and other Hatchery Committees-approved sites.

Gale said he recalls that Halupka performed a gap analysis for USFWS consultation in the Methow basin, and the only feature not covered under the 2012 Wells Dam Federal Energy Regulatory Commission relicensing Bull Trout BiOp that could have adverse effects would be

tangle-netting in the Chewuch River. Tonseth agreed, and said he would discuss this with Halupka and Busack if the Hatchery Committees think it is a viable option for collecting natural-origin broodstock.

Murdoch said YN does not currently support tangle-netting in the Chewuch River despite the desire to use natural-origin fish for broodstock, because there is a back-up plan to use hatchery-origin fish. Murdoch asked what the targets are for proportion of natural-origin broodstock using the sliding scale. Tonseth said the target is 122 wild broodstock, which would be less than 33 percent of the run. Pearsons suggested using the existing natural-origin fish, and putting their descendants into acclimation outside of Methow FH (into the Chewuch River or Goat Wall acclimation sites); fish descended from hatchery-origin fish would be released from Methow FH, then subsequently targeted for removal (increasing the effective proportion of hatchery broodstock [pNOB]). Tonseth said another option would be to live-spawn all natural-origin males at Methow FH and transfer surplus gametes to WNFH, increasing the natural-origin component on spawning grounds, which can be plugged into the 3-population model. Gale said a pNOB of 0.5 is too low, and he wishes they could reach a higher value such as 0.7. Tonseth said the program will likely not achieve a pNOB of greater than 0.5 without tangle-netting.

Gale said he will defer to Halupka on whether the proposed action of tangle netting to ensure adequate collection of natural origin fish is consistent with current permitting considerations.

Tom Kahler asked if enough fish are being collected at the Twisp Weir to populate the Twisp River program. Tonseth said the trapping efficiency at the weir is good, and the problem at the moment is only with MetComp broodstock.

Murdoch said she will discuss internally the shortage of natural-origin recruits in the Methow Composite broodstock. She asked if there was a local response to tangle-netting, and suggested the Hatchery Committees also consider the social implications of collection actions. Tonseth said he is not aware of a local response to tangle-netting when it was

performed previously; however, the Methow valley had a large fire that year and people may have been preoccupied.

Kahler asked if the fish trap at Foghorn Dam could be used for broodstock collection. Tonseth said that might be a possibility. Kahler said the trap does not collect Chinook salmon very effectively, and tends to attract bull trout.

Tonseth said a broader discussion can also be had about better flexibility in trapping operations at Wells Dam. He said WDFW is limited to three, 16-hour days per week for a total of 48 hours, and Douglas PUD have been adamant that trapping not exceed 3 days per week. Murdoch asked if it would be beneficial to instead target key times for fish collection on more days, and still not exceed 48 hours per week. Tonseth said there is a narrow period during which fish move through the trap that could be natural or dam-related. He said assurances in the future that annual broodstock collection goals can be met is a necessary discussion.

Pearsons asked how many fish will be released from Goat Wall acclimation site. Murdoch said 25,000 fish will be released.

Truscott said the Colville Confederated Tribes support tangle-netting for the full complement of natural-origin broodstock this year. He said water conditions this year might be more similar to 2015, low and warm, than when tangle-netting last occurred in 2014. He said it would be important to make sure water temperatures are not so high that they expect to see unacceptable mortality.

Tonseth said WDFW supports tangle-netting for the full complement of natural-origin broodstock this year, with conditions. Justin Yeager said NMFS abstains from providing support for tangle-netting until he can discuss this with Busack. Willard said Chelan PUD supports the action with conditions. Mackey said Douglas PUD supports the action with conditions.

Pearsons said he will discuss this internally before providing support or not. He said he might prefer using hatchery-origin fish for a population of on-station releases at Methow FH, and descendants of natural-origin fish could be distributed in release locations away from Methow FH. He said he would want to calculate PNI for that situation. He said he does not have concerns with the effects of tangle-netting on natural resources, because the effects can be managed by snorkeling the system beforehand and by taking precautions. He said he has more concern for the potential effects on consultations and permitting, and for social issues. Gale said Pearsons' idea to remove returning adults would essentially expand the size of the Winthrop NFH program by making a bigger safety-net program. He said that would confuse the relationship between the Winthrop NFH and Methow FH programs. He said he is not opposed to this option if absolutely necessary, but acquiring more natural-origin fish so that the Methow program has a broodstock composition more in line with what is described in the HGMP should be a higher priority. Murdoch said she appreciates Pearsons' input on social and permitting constraints, and said the Hatchery Committees do not want to delay permitting for the Methow programs.

Tonseth said if the Hatchery Committees want to pursue tangle-netting as an option for broodstock collection this year, it will take time to coordinate with USFWS and NMFS and prepare staff for the effort. He said a target start date would be in approximately 30 days.

Truscott said the Hatchery Committees should also consider that with ocean conditions changing, it is possible that in the future they may not want to remove any of the returning hatchery-origin fish, which would result in a high pHOS. Tonseth said to offset some of those genetic concerns, another option would be to live-spawn natural origin males (with natural origin females) and retain them to cross with hatchery females. He said the hatchery-by-wild fish would be released from Methow FH. He said he thinks Methow FH would be able to keep these family groups separate through the rearing stages. Truscott said there are currently about 30 natural-origin males, and using them twice would result in a low effective population size and a pNOB of about 0.8 for the conservation program.

Hillman summarized that some groups need to discuss this matter internally, and Tonseth said he will not pursue tangle-netting without Hatchery Committees support. Mackey said

there is a back-up plan to use hatchery-origin fish as broodstock if an agreement is not reached. Truscott said ideally hatchery fish would only be incorporated into broodstock if there are not enough natural fish, which is not the case. He said the run size is large enough, but the trapping period is not sufficient to collect enough of them. Tonseth suggested, in the future, adding a fourth day of trapping to collect more fish at Wells Dam. Kahler said it is important to trap during the crepuscular period, so 16-hour days would still apply. He said he thinks the Coordinating Committees should discuss the trapping schedule. Gale said he agrees with Truscott, and that the program is set up to meet a pNOB of 0.8 at a run size of 500. He said if other tools are available for collecting broodstock to meet these targets, they should be pursued.

III. USFWS

A. Presentation: History of Entiat River Chinook Salmon (Greg Fraser)

Greg Fraser said he is a fisheries biologist with the USFWS, and has been working there for approximately 1 year. Fraser shared a presentation titled, “The unnatural history of the Entiat River and its impact on population trends of Chinook salmon,” which Sarah Montgomery distributed to the Hatchery Committees on June 17, 2016 (Attachment I). A summary of the presentation and questions and comments are included in the following sections.

Background (Slides 1 through 12)

In the 1800s and early 1900s, there were many dams and mills blocking anadromous fish access to the Entiat River, extirpating any endemic fish runs. A flood in 1948 destroyed the remaining dams and opened up the river to anadromous fish. A natural barrier to some anadromous fish from 1948 to 1961 was located in the lower Entiat River. Spring Chinook salmon could ascend the natural falls during high-flow conditions, but the falls were likely impassable to summer and fall Chinook salmon due to low flows. Rocky Reach Dam inundated the natural barrier in 1961, and it is now passable to fall and summer Chinook salmon in addition to spring Chinook salmon.

Entiat NFH (Slides 13 through 20)

Entiat NFH was constructed in 1941, initially used for research, and later converted to a production facility in 1961. It was reconstructed in 1979. Entiat NFH has produced Summer Chinook salmon, spring Chinook salmon, sockeye salmon, coho salmon, and rainbow trout sourced from many different populations and hatcheries throughout its period of use. From 1974 to 2007, the hatchery produced spring Chinook salmon (last return in 2010), and from 2009 to present, the hatchery produces summer Chinook salmon (first release in 2011).

Surveys in the Entiat River (Slides 21 through 41)

Historically, WDFW surveyed for spring Chinook salmon redds in middle reaches of the Entiat River, and Chelan PUD surveyed for summer Chinook salmon redds in lower reaches of the river. Most recently, USFWS has conducted weekly redd surveys from late July to late November for spring and summer Chinook salmon throughout areas of the Entiat River with suitable spawning habitat, as well as in the Mad River.

Survey Results (Slides 42 through 47)

The number of spring Chinook salmon redds peaked in mid-August in 2015, and redds were mostly in upstream reaches of the river. Though the distributions overlapped some, summer Chinook salmon redds were concentrated more in downstream reaches. Where the distributions overlap in middle reaches of the Entiat River, superimposition of summer Chinook salmon redds on spring Chinook salmon redds can occur. In areas around river kilometer 30, the area with the most overlap, approximately 60 percent of spring Chinook salmon redds were imposed on by summer Chinook salmon.

Genetics (Slides 48 through 56)

USFWS is also studying the genetic distribution of spring and summer Chinook salmon in the Entiat River, and their hybrids, as well as the proportions of hatchery versus wild carcasses recovered in the river. The proportion of hatchery-origin fish is greater in the lower reaches of the river, and natural-origin fish are in greater abundance in the upper reaches of the river. Overall, natural-origin fish make up a greater proportion of total carcass recoveries for spring and summer Chinook salmon than hatchery-origin fish.

Spring Chinook salmon were last released from Entiat NFH in 2007, and age-5 fish were the last from that release to return to the hatchery in 2010. Unexpectedly, there was an increase in the proportion of hatchery-origin fish compared to wild fish in 2011 and 2012. The proportion of hatchery-origin spring Chinook salmon was relatively lower in 2013, 2014, and 2015. Hatchery-origin spring Chinook salmon in the Entiat River come from many different hatcheries. Most notably, from 2011 to 2013, many hatchery-origin fish released in the Chiwawa River showed up in the Entiat River. Tracy Hillman asked if the number of fish was expanded based on sampling rate. Fraser said yes. Matt Cooper said, in 2014, USFWS had an approximately 10 percent carcass recovery rate.

Summer Chinook salmon were first released from Entiat NFH in 2011. Hatchery-origin summer Chinook salmon returning to the Entiat River come from many different hatchery programs in addition to the Entiat NFH, including mid-Columbia programs, Dryden Ponds, Snake River programs, and Methow-Okanogan programs. After the first release in 2011, there was a large reduction in the number of out-of-basin hatchery fish returning to the Entiat River. Todd Pearsons asked how many summer Chinook salmon are released from Entiat NFH. Fraser said approximately 400,000 fish are released. Overall, there is a much greater proportion of natural-origin summer Chinook salmon upstream of Entiat NFH than downstream.

Ongoing Work and Conclusions (Slides 57 through 58)

Fraser said the USFWS will monitor the spatial distribution of both runs in order to evaluate the impact (superimposition and composition) of Entiat NFH summer Chinook salmon releases on spring Chinook salmon. In addition, this work could help target areas for habitat restoration that would best benefit spring Chinook salmon, which are an ESA-listed species. It will also be important to continue relating the studies to genetic work and consider the impacts of climate change.

Dams extirpated all endemic runs in the Entiat River, and summer Chinook salmon may not be endemic. Hatchery and stray fish colonized the river. Spring and summer Chinook salmon have spatial and temporal differences in spawning, and the composition of both runs differs annually and with production.

Questions and Comments

Hillman asked why there is no surveying in the middle reach of the river—between river kilometers 15 and 25. Fraser said that area is the end of the terminal moraine, and is surveyed periodically. He said the river is faster, steeper, does not have good spawning habitat, and has larger substrate in that area.

Justin Yeager asked what the impetus is for releasing summer Chinook salmon from the Entiat NFH. Bill Gale said it is a hatchery reform measure, used to meet a mitigation goal for Grand Coulee Dam. Under previous conditions, USFWS released Carson Hatchery spring Chinook salmon, but concerns for impacts to wild spring Chinook salmon, and because of ESA concerns in the Upper Columbia River the fish released were not available for local harvest, so the program was converted to summer Chinook. He said shifting to summer Chinook salmon allowed for a program that now contributes to a local fishery. Cooper commented the effects of the program on the number of strays in the Entiat River are interesting. Catherine Willard asked if the genetic stock of the natural-origin fish is from Carson Hatchery. Cooper said genetically identifying the fish to stock was difficult because there are many stocks and low certainty for juveniles. Gale added that the Entiat River does not have a unique stock because salmon in it were extirpated like many others in the region.

Pearsons asked about the numbers (as compared to the percentage) of natural-origin spring Chinook salmon in the Entiat River. Fraser said he did not include the numbers in this presentation. Cooper said USFWS calculates escapement based on the number of redds. Pearsons asked which years would have non-Entiat NFH origin returns of spring Chinook salmon. Fraser said 2010 included a few age-5 Entiat NFH origin fish, but after that, there are no spring Chinook salmon returns from Entiat NFH hatchery releases. Cooper said he expected the proportion of hatchery-origin spring Chinook salmon to decrease after 2010, but it did not, especially due to the strays from the Chiwawa River. Pearsons said there does not seem to be a decrease in natural-origin returning fish after the end of spring Chinook salmon production releases from Entiat NFH. Hillman commented that the NOAA Salmon Population Summary database shows the number of natural-origin recruits returning to the Entiat River. He said there were 254 in 2011, 246 in 2012, and 130 in 2013. Yeager

added that the number of recruits per spawner was below 1.0 for those years. Hillman said recruits per spawner was above 1.0 for brood years 2005 and 2006.

IV. HCP Administration

A. Next Meetings

The next Hatchery Committees meetings are on July 20, 2016 (Douglas PUD), August 17, 2016 (Chelan PUD), and September 21, 2016 (Douglas PUD).

V. List of Attachments

Attachment A	List of Attendees
Attachment B	Draft Hatchery M&E Appendix 2
Attachment C	Draft Hatchery M&E Appendix 3
Attachment D	Draft Hatchery M&E Appendix 4
Attachment E	Draft Hatchery M&E Appendix 5
Attachment F	Draft Hatchery M&E Appendix 6
Attachment G	Homing, Straying, and Colonization
Attachment H	Genetic Structure of Upper Columbia River Summer Chinook and Evaluation of the Effects of Supplementation Programs
Attachment I	The unnatural history of the Entiat River and its impact on population trends of Chinook salmon

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
Bill Gale*	U.S. Fish and Wildlife Service
Matt Cooper*	U.S. Fish and Wildlife Service
Greg Fraser	U.S. Fish and Wildlife Service
Justin Yeager*	National Marine Fisheries Service
Mike Tonseth*‡	Washington Department of Fish and Wildlife
Keely Murdoch*	Yakama Nation
Kirk Truscott*	Colville Confederated Tribes

Notes:

* Denotes Hatchery Committees member or alternate

† Joined at 12:00 pm

‡ Joined by phone