FINAL

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ANCHOR QEA

Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees, and Priest Rapids Coordinating Committee Hatchery Subcommittee

Date: August 23, 2022

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

cc: Larissa Rohrbach and Kristi Geris, Anchor QEA, LLC

Re: Final Minutes of the July 20, 2022, HCP Hatchery Committees and PRCC Hatchery Subcommittee Meetings

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plan Hatchery Committees (HCP-HCs) and Priest Rapids Coordinating Committee's Hatchery Subcommittee (PRCC HSC) meetings were held in person at Douglas PUD Headquarters in East Wenatchee, Washington, on Wednesday, July 20, 2022, from 10:00 a.m. to 2:30 p.m. Attendees are listed in Attachment A to these meeting minutes.

Action Item Summary

Long-Term

Joint HCP-HCs and PRCC HSC

- Mike Tonseth will distribute the analysis showing feasibility of the Methow spring Chinook Salmon Outplanting plan based on historical run size data (Item I-A). (*Note: This item is ongoing; expected completion date to be determined.*)
- Kirk Truscott will work with Confederated Tribes of the Colville Reservation staff to develop a model that addresses the probability of encountering natural-origin Okanogan River spring Chinook Salmon at Wells Dam (Item I-A). (*Note: This item is ongoing; expected completion date to be determined.*)
- Kirk Truscott will determine the number of scales that should be collected from spring Chinook Salmon at Wells Dam for elemental signature analysis to discern Okanogan River spring Chinook Salmon from Methow River spring Chinook Salmon (Item I-A). (*Note: This item is ongoing; completion depends on the outcome of the previous action item.*)
- Keely Murdoch and Mike Tonseth will obtain estimates of pre-spawn mortality from Andrew Murdoch to update the retrospective analysis for Wenatchee spring Chinook Salmon (Item I-A). (*Note: This item is ongoing; expected completion date mid- to late 2022*)
- Members of the HCP-HCs and PRCC HSC will discuss potential hatchery management changes for rearing and release following completion of the 10-year Comprehensive Reports (Item I-A). (*Note: This item is ongoing.*)

Near-Term (To Be Completed by Next Meeting)

Joint HCP-HCs and PRCC HSC

- Todd Pearsons and Catherine Willard will revise Grant and Chelan PUD's draft Statements of Agreement (SOAs) on Sockeye Salmon obligations for approval in an upcoming meeting (Item I-A). (*Note: This item is ongoing.*)
- All PUDs will distribute final versions of their SOAs on recalculated hatchery compensation for release years 2024 to 2033 (Items II A, B, C).
- Mike Tonseth will include effective methods of counting surplus fish in the comprehensive draft 2022 Broodstock Collection Protocols (BCPs; Item II-G). (*Note: This item is ongoing.*)
- Mike Tonseth will distribute the comprehensive draft 2022 BCPs for approval in the August 17, 2022 meeting (Item II-G).
- Tracy Hillman will revise the draft set of questions on recalculation for the Policy Committees to be discussed further in the August 17, 2022, meeting (Item II-D) (*Note: this item is ongoing*).

Wells HCP-HC

- Brett Farman will reach out to Craig Busack (NMFS) to evaluate use of natural-origin fish in broodstock to meet the current production levels and the implications meeting Proportionate Natural Influence targets in Methow Basin conservation areas (Item II-B). (*Note: this item is ongoing.*)

Rock Island/Rocky Reach HCP-HCs

- RI/RR HCP-HC will respond to Catherine Willard with feedback on the proposed Wenatchee Steelhead Escapement Modeling approach, for discussion in the August 17, 2022, meeting (Item II-H) (*Note: this item is ongoing*).
- Catherine Willard will provide additional feedback from WDFW's Fish Health veterinarian to the RI/RR HCP-HC on Chelan PUD's proposal to live-spawn female Wenatchee steelhead at Eastbank Hatchery in 2023 (Item II-H) (*Note: this item is ongoing*).

Decision Summary

- The HCP-HCs and PRCC HSC unanimously approved the SOAs on recalculated hatchery compensation for release years 2024 to 2033.

Agreements

- None.

Review Items

- The *Grant County PUD Hatchery Monitoring and Evaluation Implementation Plan for Spring and Summer Chinook in the Wenatchee Basin and Summer Chinook in the Methow Basin 2023* was distributed July 18, 2022, for 30-day review. Todd Pearsons has requested that comments be provided to him by Friday August 12 for approval of the plan in the August 17, 2022, meeting.
- The YN's *Proposal on the Continuation of the Upper Methow Spring Chinook Acclimation Project* was distributed on July 19 with comments to be provided to Keely Murdoch for further discussion in the August 17, 2022, meeting.

Finalized Documents

- *Rock Island and Rocky Reach HCP Hatchery Committees SOA for Chelan PUD Hatchery Compensation, Release Years 2024-2033, Approved July 20, 2022.*
- *Priest Rapids Coordinating Committee's Hatchery Sub-committee SOA for Grant PUD Hatchery Compensation, Release Years 2024-2033, Approved July 20, 2022. SOA #2022-02.*
- *Wells HCP Hatchery Committee SOA for Douglas PUD Hatchery Compensation, Release Years 2024-2033, Approved July 20, 2022.*

I. Welcome

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

Tracy Hillman welcomed the HCP-HCs and PRCC HSC. In-person attendees announced themselves for attendees on the phone. Hillman reviewed the agenda and asked for any additions or changes to the agenda. The following additions were made to the agenda:

- Grant PUD's Draft 2023 Monitoring and Evaluation Implementation Plan
- Adult Sockeye Salmon passage into Okanagan Lake

The HCP-HCs and PRCC HSC reviewed the revised June 6 and June 15, 2022, meeting minutes. Outstanding comments were reviewed and addressed. HCP-HCs and PRCC HSC representatives that were present at those meetings were approved, as revised.

Action items from the HCP-HCs and PRCC HSC meeting on June 15, 2022, were reviewed *(Note: Italicized text below corresponds to action items from the previous meeting*).

Joint HCP-HCs and PRCC HSC

Long-Term

- *Mike Tonseth will distribute the analysis showing feasibility of the Methow spring Chinook Salmon Outplanting plan based on historical run size data (Item I-A).*
  This item is ongoing; expected completion to be determined.

- *Kirk Truscott will work with CTCR staff to develop a model that addresses the probability of encountering natural-origin Okanogan spring Chinook Salmon at Wells Dam (Item I-A).*
  This item is ongoing; expected completion date to be determined.
- *Kirk Truscott will determine the number of scales that should be collected from spring Chinook Salmon at Wells Dam for elemental signature analysis to discern Okanogan spring Chinook Salmon from Methow spring Chinook Salmon (Item I-A).*
  This item is ongoing; completion depends on the outcome of the previous action item.
- *Keely Murdoch and Mike Tonseth will obtain estimates of pre-spawn mortality from Andrew Murdoch to update the retrospective analysis for Wenatchee spring Chinook Salmon (Item I-A).*
  This item is ongoing; expected completion date to be determined. Murdoch said this is an item that can likely move forward as soon as the recalculation implementation plans have been approved.
- *Mike Tonseth will solicit input from hatchery managers on effective methods to count surplus fish (Item II-G).*
  This item will be completed for incorporation in the comprehensive Broodstock Collection Protocols.
- *Members of the HCP-HCs and PRCC HSC will discuss potential hatchery management changes for rearing and release of Methow summer Chinook Salmon following completion of the 10-year Comprehensive Reports (Item I-A).*
  This item is ongoing.

Near-Term (To Be Completed by Next Meeting)

Joint HCP-HCs and PRCC HSC

- *Todd Pearsons and Catherine Willard will revise Grant and Chelan PUD's draft Statements of Agreement on Sockeye Salmon Obligation for approval in an upcoming meeting (Item I-A).*
  This item is ongoing.
- *Mike Tonseth will distribute updated interim draft Broodstock Collection Protocols no later than June 27, 2022, for email approval by the Committees (Item II-G).*
  Tonseth said a version has been shared between managers for collection of summer Chinook Salmon and steelhead. A complete version will be developed as soon as implementation plans are approved.

Wells HCP-HC

- *Greg Mackey will re-evaluate modeled release size for steelhead in the Twisp River to achieve proportion of hatchery origin spawners (pHOS) targets established by the updated Hatchery and Genetic Management Plan (Item II-B).*
  Kahler said this item is complete and can be discussed in today's meeting.

- *Brett Farman will reach out the Craig Busack (NMFS) to evaluate use of natural-origin fish in broodstock to meet the current production levels and the implications of meeting Proportionate Natural Influence targets in Methow Basin conservation areas (Item II-B).*
  Farman said he spoke with Busack, who spoke with Mackey and Mike Tonseth. This discussion is ongoing.
- *Tom Kahler will examine passive integrated transponder (PIT) tag records for overlapping distributions of spring Chinook Salmon and summer Chinook Salmon spawners in the Methow River (Item II-B).*
  Kahler said this item is complete. The spawners that were reared at Carlton Acclimation Facility are not observed upstream of reach M5 (at Winthrop), and rarely above M4.
- *Tom Kahler and Greg Mackey will distribute additional information and initiate outreach to individual Wells HCP-HC members by June 24, 2022, to resolve outstanding concerns with Douglas PUD's recalculation implementation plan (Item II-B).*
  Kahler said this item is complete.

Rock Island/Rocky Reach HCP-HCs

- *Bill Gale and Kirk Truscott will respond via email to indicate whether they approve Chelan PUD's Draft Statement of Agreement on Hatchery Compensation, Release Years 2024-2033 (Item II-C).*
  This item is complete. Truscott approved the draft SOA via email on June 15. Gale responded via email on June 16 that although USFWS was supportive of Chelan PUD's recalculated hatchery compensation implementation plan, he was unable to approve without additional discussion of the implementation plans for the other PUDs.
- *RI/RR HCP-HC will respond to Catherine Willard with feedback on the proposed Wenatchee Steelhead Escapement Modeling approach (Item III-A).*
  This item is complete. WDFW responded to Chelan PUD's modeling approach with comments distributed via email on July 19, 2022.
- *Tracy Hillman will reach out to Brett Farman and Kirk Truscott to determine whether they support Chelan PUD's proposal to live-spawn female Wenatchee steelhead at Eastbank Hatchery in 2023 (Item I-A).*
  This item is complete. Farman responded via email on June 24 that NMFS approves of the plan to live-spawn Wenatchee steelhead. Truscott responded via email on June 27 requesting additional time to consider fish health concerns. Catherine Willard has reached out to WDFW's Fish Health veterinarian to address those concerns. This topic will be discussed in the August meeting.

PRCC HSC

- *The Joint Fisheries Parties will prepare a draft Statement of Agreement for the recalculated hatchery compensation implementation plan for Grant PUD's programs by June 24, 2022 (Item II-A).*

A draft SOA developed by the Joint Fisheries Parties and Grant PUD was distributed on July 18, 2022. This item is complete.

- *Tracy Hillman will distribute a draft set of questions for the PRCC and PRCC Policy Committee by July 30 for discussion in the July 20 meeting (Item II-D).*
  This item is complete. The draft set of questions was distributed on June 27, 2022. Hillman said he received some comments that will be discussed today.

II. Joint HCP-HC and PRCC HSC

A. DECISION: Grant PUD's Statement of Agreement on Recalculated Hatchery Production

Tracy Hillman reviewed progress since the previous meeting, and noted that the Joint Fisheries Parties shared a draft version via email on June 29, 2022, of an SOA for Grant PUD's recalculated hatchery production. Todd Pearsons subsequently added some text relevant to avoiding precedence-setting by this agreement and made some clarifying edits to dates. Keely Murdoch said the contingency statement regarding YN's approval of an increase in summer Chinook Salmon production at Chief Joseph Hatchery was struck to avoid any perception that the SOA would not be approved by the Joint Fisheries Parties.

Kirk Truscott asked if everyone had time to review the SOA. Truscott asked what the significance was of the statement "or for discussions among parties in the process described..." Pearsons said it is meant to avoid setting precedence based on conversations in the PRCC HSC and this SOA that may be used in the PRCC and PRCC Policy Committee. Bill Gale said he does not have the impression that the PRCC HSC would be able to decide anything that sets a precedent for the PRCC Policy Committee, because the PRCC HSC is junior to the PRCC Policy Committee. Pearsons said that by agreeing to these numbers, Grant PUD wants to make it clear that this is not precedent setting relative to future discussions, whether in the PRCC HSC or the PRCC Policy Committee. (Edits were made in the meeting to make the final revisions more clear.) Mike Tonseth noted there is no reference to a process with the PRCC Policy Committee described in this SOA. The PRCC Policy Committee will need to be engaged to resolve some of the differences in interpretation, but there is no inference to the need for that process. Tonseth said the sentence in question speaks more broadly to all the committees. Conversations regarding this are likely to occur at all three levels of the committees (PRCC HSC, PRCC, and PRCC Policy Committee).

Gale said he is not suggesting more edits, but asked whether the PRCC HSC plans to have discussions to resolve the differences in interpretation of what programs are subject to mitigation to achieve No Net Impact. Hillman suggested that there will be a need for further discussion to clarify the questions that are being sent to the PRCC Policy Committee. Deanne Pavlik-Kunkel noted that the discussion of the issue is not a dispute issue. If this SOA is agreed-to, the dispute is avoided.

All parties of the PRCC HSC approved the SOA on Grant PUD Hatchery Production Objectives, Release Years 2024-2033 (Attachment B).

Truscott thanked everyone for working through the multiple versions and the ability to move forward into the next 10-year period.

B. DECISION: Douglas PUD's Statement of Agreement on Recalculated Hatchery Production

Tracy Hillman showed edits to Douglas PUD's SOA by Kirk Truscott (Truscott sent his edits via email on July 20, 2022). Keely Murdoch agreed with Truscott's edits, which show more detail about a collaborative process to develop formal monitoring and evaluation of summer Chinook Salmon (now split into two groups: one reared and overwintered at Wells Hatchery and one overwintered at Methow Hatchery; both to be released at Carlton). Murdoch asked if there should be some additional text describing a check-in point on trends in summer Chinook Salmon performance. Truscott said the assumption is that check-ins would be written into a monitoring plan. Mike Tonseth agreed. Murdoch said there needs to be a decision point to determine if things are going well. For instance, if Wells Hatchery-reared fish are returning to Wells Hatchery, the overwintering of that group should be shifted to the Methow Basin, but it's uncertain when that should be evaluated. Kahler said the full return of the first brood would not be until 2027. Murdoch asked if there is space for moving fish to the other facility if there is something not going well. Kahler said yes. Kahler said Truscott's edits look fine.

All parties of the Wells HCP-HC approved of the SOA on Douglas PUD Hatchery Compensation, Release Years 2024-2033 (Attachment B).

C. DECISION: Chelan PUD's Statement of Agreement on Recalculated Hatchery Production

Tracy Hillman noted that all parties of the Rocky Reach and Rock Island HCP-HCs reviewed Chelan PUD's SOA last month. All parties approved the SOA last month except Bill Gale, who wanted to delay approval until the implementation plans for the other PUDs were approved.

All parties of the Rocky Reach and Rock Island HCP-HCs approved of the SOA on Chelan PUD Hatchery Compensation, Release Years 2024-2033 (Attachment B).

D. Revisions to Recalculation Policy Questions

Tracy Hillman said he received initial comments from each of the PUD's representatives and made revisions (Attachment C). Hillman said he did not think it was correct for him to take the role of interpreting the positions of each of the entities on this topic. Hillman reviewed comments received from representatives. Regarding mitigation for fish reintroduced into the blocked areas, Policy Committees will need to respond to that issue. Mike Tonseth and Keely Murdoch agreed that while

this is an issue that is not relevant to this recalculation, it is an issue that the Policy Committees need to start thinking about. The YN see this as something coming that will need to be addressed in the future by policy and maybe with legal counsel.

Bill Gale said if the issue is with naming production in the blocked areas, language could be revised to state, "newly developed hatchery programs or established populations, for instance, production for fish produced for the blocked areas." The question is what to do when there is a new program. Tonseth agreed but suggested providing the Policy Committees some context. For instance, the production for the blocked areas is something that is more relevant now than it was 10 years ago. Gale said the category that would fit into is "new programs" and it can be used as an example, labeling it a "potential" program, because it's not a concrete plan at this time. Hillman agreed to make those edits with that context.

Hillman said there was a question about including Sockeye Salmon and Coho Salmon in this table. Tonseth said Sockeye Salmon and Coho Salmon were not included because even though they are Plan Species and subject to No Net Impact, they are separate programs and have separate SOAs describing how they are mitigated. For this current recalculation, the current agreements and licenses are the framework to work within and for framing these questions for the Policy committee. Murdoch suggested including them in the Table so Policy Committees don't think they've been forgotten but include a footnote describing how they have been mitigated for in other ways. Murdoch said for Coho Salmon, if certain criteria are met, it's called out that you've met your mitigation, but it's good to acknowledge that they haven't been forgotten. Coho Salmon mitigation is more clear. For Sockeye Salmon mitigation, there is room to change course if there is a better approach identified.

Gale suggested editing the titles (column headers in the Table) to include the word "populations" to make clear that there are questions about mitigating for natural production. Tonseth said he used the word "stock" carefully, as in stocks used to initiate hatchery programs. All agreed to reference natural production as "populations" and hatchery production as "programs."

Murdoch said, similar to Tom Kahler's comment, question #2 is not really the correct question. Murdoch said she has additional edits to suggest after today's meeting. There are sections where the BAMP calculation is not described correctly. It is difficult to describe without getting too technical.

Regarding Question #3, Gale said he thought the Priest Rapids Salmon and Steelhead Settlement Agreement (Settlement Agreement) was clear that the BAMP may be as a guide but it's not a requirement to use the BAMP. Murdoch agreed with Gale, noting that members of this committee have not said the BAMP has to be used, but at this time there is not a better approach for natural-origin fish because there is a lot of variability in data sources for juvenile production from the various tributaries. Catherine Willard agreed that if there is agreement that another approach could be used, then question #3 is not needed. Murdoch said if the data were to exist on juvenile production from tributaries, a decision would still need to be made whether to use the BAMP.

Willard said if these discussions are had in the PRCC Policy Committee only, it will involve several of the same people that are involved in the HCP Policy Committees. The conversations in the PRCC will influence the discussion in the HCP. Tonseth acknowledged that concern, and suggested that for the purposes of this issue, the HCP HC and PRCC HSC could go back to the individual meetings. Willard noted that because it's the same representatives, the discussion will go on in one forum without some of the PUD representatives. Murdoch asked if there is a way to hold joint Policy Committee meetings, noting that it's unclear whether the entities would want to do that but may be worth exploring as a possibility. Gale agreed it would be worth proposing to the Policy groups for their consideration. Murdoch agreed that if one committee meets it can influence the outcome of the others.

Hillman noted there are different Chairs/Facilitators for the different Policy Committees. He noted that different groups may have different questions. Murdoch agreed that they are different agreements, and the language in the agreements differs and they may potentially have different outcomes.

Todd Pearsons said his understanding of this process was it was focused on the PRCC to avoid a dispute by resolving questions in the near-term about production levels that everyone could agree to. That is no longer the case, and it would be worthwhile to take a step back to ensure the questions are correct and identify a suite of questions that apply to all the PUDs. There might also be specific questions that apply to just a single PUD. For instance, Grant PUD has a question about interactions between the Settlement Agreement and the Biological Opinion. Pearsons said he also has a set of questions that also aren't quite ready to add to the document. He said his concern is to ensure the wording is exactly right to get the answers that are needed. Persons recommended developing a list with just the questions that could be reviewed by the HCP-HC and PRCC HSC to decide which are relevant to each of the PUDs and make the language exactly what is wanted. All the other context could be left out at this time. Hillman added that he would ask each entity to give their position statement on each of the questions. That way he is not trying to represent their position without their specific direction.

Hillman agreed it's not critical to finalize this document in the next month and the Committees could devote time to finalizing the wording of the questions. Hillman will make the revisions discussed in today's meeting and continue the discussion in the next meeting.

E. Adult Sockeye Salmon Passage into Okanagan Lake

Tracy Hillman summarized a question that was raised about limitations on the timeline for opening the fishway into Okanagan Lake. Ryan Benson (Okanagan Nation Alliance [ONA]) summarized the approach for opening the fishway, which will depend on flows and Sockeye Salmon numbers, in an email that was forwarded by Catherine Willard on July 19, 2022 (Attachment D).

Keely Murdoch said she appreciated Willard and Hillman resolving the questions that emerged from a discussion within the HCP Habitat Committee. Murdoch said what they understood initially was that the fishway would not open until September 15.

Murdoch said there is a need for the HCP-HC and PRCC HSC to better understand the political landscape for opening fish passage. Murdoch said the Tributary Committee may have found what Benson said confusing. There was conflicting information from Jeff Fryer (Columbia River Inter-Tribal Fish Commission) and Richard Busanich (ONA) that opening the fishway on September 15 was a condition placed by the Canadian Okanagan Basin Technical Working Group (COBTWG) and they have concerns that operators would wait for fish to stack up at the fishway before opening the fishway rather than opening when flows are appropriate for the fishway. Murdoch said the YN wants to better understand the political landscape and what limitations are being placed on opening the fishway. The HCP and PRCC Committees do not want to be telling them how to manage their program; however, as we enter into new hatchery production SOAs, we do need a better understanding of the constraints on reintroduction into Okanagan Lake. Willard said Benson did respond that COBTWG does not want to let full passage into Okanagan Lake at this time in order to capture fish for a tagging and tracking study. Murdoch said planning the fishway opening dates based on previous years might make sense, although this year there is a greater opportunity with an unprecedented run and lack of thermal barrier setting up so far. Murdoch said it would be better to hear more directly from Benson what the plan is for the future and what those constraints are for the future. Willard said Benson said that September 15 is not a hard-set date; fish cannot get into the fishway because flows are too high and stoplogs used to moderate flow can't be put in until flows reduce again. Willard encouraged people to call Benson directly.

Willard noted that some fish can pass through the undershot gates. Tonseth asked if there is any monitoring of how many fish can pass through the undershot gates? Kirk Truscott said he thought it was one of their M&E objectives to better estimate passage efficiency into Okanagan Lake, and if its low, investigate what would be required to improve efficiency. Tonseth asked if fish are being tagged and released below the gates to estimate fish passage metrics. Truscott said no they are not.

Hillman said part of the problem may be coming from COBTWG rather than from the ONA. Hillman said the issue will continue to be tracked and people can reach out to Ryan for information directly.

F. 2023 Goat Wall Acclimation Proposal

Tracy Hillman welcomed Danielle Grundy and Rick Alford (YN) to present a *Proposal: Continuation of Goat Wall Acclimation, Methow Basin* (Attachments E and F). Grundy noted that the acclimation evaluation was set up as 5-year feasibility study and extended for one additional year in 2022 to obtain an additional year of data on returning fish. The YN is now requesting the HCP-HC's and PRCC HSC's approval to continue the spring Chinook Salmon acclimation study in 2023 and to continue collecting data on program performance. The YN is also asking the Committees to consider

expansion of the spring Chinook Salmon program to Early Winters Ponds (2 ponds used to acclimate Coho Salmon since 2019).

Grundy presented the outcomes of three objectives, which are to compare 1) spawner distribution, 2) homing, and 3) project performance between fish reared and released at Methow Hatchery and fish acclimated and released at Goat Wall.

Todd Pearsons noted that in every year except for one, the MH survival was better. Pearsons asked if there are SAR estimates based on PIT tags in addition to those presented that were based on coded wire tags? Grundy said this was calculated to Wells Dam. The results were similar to the coded wire tag estimates for brood year 2015, then the performance for each group flip-flopped for brood years 2016 and 2017.

Grundy showed a visualization of redd distribution across the basin. In 2021 redd density was high in one reach of the Middle Methow and in the Lower Methow near the hatchery. Redds are distributed more broadly in the upper Methow near Goat Wall. For the 3 return years monitored, an average of 6% of redds were superimposed, the majority occurring in the middle region (reach M9). In the majority of cases, approximately 30% of a given redd was estimated to have been superimposed, so egg recruitment was not a complete loss. Mike Tonseth asked if they have looked at trends in superimposition before and after initiation of the Goat Wall acclimation program. Grundy said no they have not.

Grundy summarized observations of desiccation of redds. Five redds were desiccated in 2019, 0 in 2020, and 11 in 2021. At least for the years shown, desiccation does not appear to be a significant issue limiting productivity.

Tonseth asked if there had been any change in age-at-return between Goat Wall and Methow Hatchery returns. Grundy said anecdotally, nothing has stood out, and they have not observed major differences in the number of jacks.

Tonseth said there appears to be large differences between performance to Rocky Reach and asked whether that could be attributed to predation, detection efficiency, or something during rearing that would influence residualism? Grundy said the data represents survival from tagging to Rocky Reach; an underestimate of survival would have been observed in these data. Tonseth noted that regarding the in-pond survival, 2017 was a high-loss year due to predation at Methow Hatchery, as many as 50% of the fish were lost.

Grundy said this year, flows were low and clear versus the waters near Methow Hatchery, which are influenced by the Chewuch River and tend to have more sediment and tannins from recent fires in that basin. Grundy said that if there is a difference in survival or predation, it could be due to differences in these two environments. Rick Alford suggested that if they had known what river

conditions would be like, they would have suggested releasing even later this year. Fish were released when flows were 300 cubic feet per second (cfs) whereas the median is 1,000 cubic feet per second. The release is timed to occur at the same time fish are released at the Methow Hatchery.

Pearsons asked if there had been a longer retrospective look at redd desiccation, how many redds from Goat Wall spawners would have gone dry? This is assuming it can be predicted which reaches go dry at certain flows. Grundy said the data presented today were based on when surveyors observed redd desiccation, which always seems to happen during spawning season. Flows seem to reach the lowest during spawning, then freshets tend to bump flows up by October. Timing is a factor. If the drying occurs before spawning happens, the fish will still be able to spawn in whichever areas they are isolated, but redds will not become desiccated. Pearsons asked if there are data on Methow Hatchery spawner's redds becoming dewatered to be able to make a comparison between Goat Wall and Methow Hatchery redds that become dewatered.

Kahler said a recent Canadian paper[1] looked at adult-to-adult survival using a Bayesian Modeling Approach with a multi-year data set and found that a limiting factor was summer low flows that affected production in three ways: 1) the river going dry before spawning or going low before spawning, which limited spawning habitat, 2) fish spawn and then the river dries, or 3) fry are able to emerge, but subsequent low flows limit available habitat for summer rearing before emigration. Summer low-flow was the primary limiting factor for Chinook Salmon productivity. Kahler said he has a suspicion that a similar condition can occur in the Upper Methow River. He noted that when evaluating the effects of low flows, it is important to look at both the spawn year and the rearing year, including desiccation that occurs after the conclusion of spawner-survey efforts but prior to emergence. For example, for brood year 1992, the upper Methow River went dry from October through April. In 1993, it was from October through March. In 1994, it was from October through February. The upper Methow River has gone dry almost every year at some point and there's no way to address this problem. The Lost River spring Chinook Salmon population was a special group of fish that was upstream of all others and must have had some local adaptation to avoid the mortal effects of that dewatering phenomenon, such as early adult migration to avoid the barrier, or perhaps limited or upstream fry dispersal. We don't know much about this population because an adequate level of monitoring and evaluation was not being done at that time and the population is now very small. In the 1980s, the redd counts averaged 80 redds while the average now is approximately 5 fish. The population dropped in the mid-1970s, and again in mid-1990s, after Methow Hatchery came on line, and then dropped again when compositing started to occur. In 1996 and 1998, nearly all natural-origin spawners were intercepted at Wells Dam. We may have lost that local adaptation.

[1] Warkentin, L., Parken, C. K., Bailey, R., and J. W. Moore. 2022. Low summer river flows associated with low productivity of Chinook Salmon in a watershed with shifting hydrology. Ecological Solutions and Evidence. 3:e12124

Rick Alford said in the past it's been hypothesized that those Lost River fish were even a different species. This acclimation program could be a way to assess the distribution of the spawning activity in the Lost River. Grundy said this year there were 10 to 20 redds, which was a good year for the Lost River.

Pearsons asked about the number of redds that are observed in Early Winters Creek and how many are from the Goat Wall fish. Grundy said there were a handful of spawners in Early Winters Creek with some fish from Goat Wall. Pearsons asked if that was the case for all 3 years of study. Grundy said no. In previous years there were no fish from Goat Wall in Early Winters Creek.

Tonseth asked about the Early Winters acclimation pond—currently Coho Salmon are acclimated there. Would the addition of spring Chinook Salmon mean species would be comingled during rearing? Alford said the Coho Salmon program has been reduced by 30%. The site was designed for 50,000 Spring Chinook Salmon and 75,000 Coho Salmon to be reared in the two separate ponds without comingling. Tonseth asked if there has been any Coho Salmon acclimation at Goat Wall. Alford said no. Tonseth asked what Coho Salmon redd activity has been observed in spring Chinook Salmon spawning areas. Alford said they have not seen this. Coho Salmon presence in Early Winters is minimal. Selection for habitat types is considerably different between spring Chinook Salmon and Coho Salmon in that area. Tonseth asked if redd superimposition has been observed. Alford said no, not between spring Chinook Salmon and Coho Salmon.

Keely Murdoch said the next steps in the YN's proposal would be to continue the program in 2023 at the current numbers to allow the program to continue while also collecting monitoring data on the returning adults. The hope is to continue with the Goat Wall releases as they are. Coded wire tagging is happening now. The YN would need a decision before PIT tagging occurs in November. In the August meeting, the YN can answer any outstanding questions, then prepare for a vote at the September meeting (or October at the latest).

Kirk Truscott said the last agreement was to extend the acclimation for an additional year, which was a heavy lift to obtain approval within the CTCR. This will be a political challenge to obtain approval for this additional proposal. Truscott said he does have some concern about the dewatered areas in the Methow River that fish could be returning to or through. Truscott said he will not have an understanding of the CTCR position by the August meeting. He will have to take this to their Fisheries Committee and think about the best way to propose this through the CTCR.

All members of the HCP-HCs and PRCC HSC agreed to review the YN's proposal and send comments to Murdoch. This item will be discussed in the next meeting.

G. Broodstock Collection Protocols

Mike Tonseth said he will distribute the information necessary for hatchery managers to move forward with broodstock collection and retention based on the SOAs approved today. In the interim,

he will work with the PUD representatives to develop the comprehensive BCPs for approval in the August meeting, or shortly thereafter via email. It will require members to review updates to the BCPs but should not require significant amounts of discussion.

III. RI/RR HCP-HC

A. Wenatchee Steelhead Escapement Modeling

Written comments on the proposed Wenatchee steelhead escapement model were provided from WDFW to Chelan PUD and distributed to the HCP-HC and PRCC HSC on July 19, 2022 (Attachment G).

Kirk Truscott said he has asked Casey Baldwin to review the model. Truscott said the HCP-HCs have been moving along over the last several years with a method that has been seeking to reduce the level of bias in escapement assessments and this approach may reintroduce some of the biases that we are trying to eliminate with the existing methods.

Catherine Willard said Chelan PUD will plan to respond to these comments in writing and discuss them next month. Willard said she expects there may be more comments after Chelan PUD provides their written responses to WDFW's comments. This topic will continue to be discussed in the coming months.

IV. PRCC HSC

A. Grant PUD's 2023 Draft Monitoring and Evaluation Implementation Plan

Grant PUD distributed their draft 2023 M&E implementation plan (*Grant County PUD Hatchery Monitoring and Evaluation Implementation Plan for Spring and Summer Chinook in the Wenatchee Basin and Summer Chinook in the Methow Basin 2023*) on June 18, 2022. Todd Pearsons said the implementation plan is the same as last year. Years have been updated and the numbers of fish that have been adjusted anticipating approval of the recalculated production numbers. Pearsons said the changes to release goals does not change the M&E activities. Pearsons noted that the Summer Chinook Salmon production at Dryden Pond for Chelan PUD's program will need to be updated.

Pearsons asked if the plan could be approved in the August meeting. Keely Murdoch asked what the review period should be since the time between meetings leaves less than a 30-day review. It was agreed that comments should be returned to Pearsons by Friday, August 12 for approval in the August 17, 2022, meeting.

Pearsons said the draft Priest Rapids Fall Chinook Salmon Implementation Plan may also be distributed early enough to be voted on in August. No major changes are anticipated.

V. Administrative Items

A. COVID

COVID risk rates recently rose to high levels in Chelan and Douglas counties according to the Center for Disease Control's risk rating by county.[2]

- Brett Farman said there are no major differences in protocols for NMFS at this time.
- Kirk Truscott said protocols for the CTCR are unchanged at this time. It is staff members' discretion whether to travel.
- Catherine Willard said there are no changes for Chelan PUD.
- Todd Pearsons said there are no changes for Grant PUD.
- Mike Tonseth said there are no changes for WDFW.
- Keely Murdoch said there are no changes for the YN.
- Kahler said there are no changes for Douglas PUD.

B. Next Meetings

The next regular HCP-HCs and PRCC HSC meetings will be held on Wednesday, August 17; Wednesday September 21; and Wednesday October 19, 2022.

The August meeting will be held online with Webex due to elevated COVID-19 risk in the region.

The HCP-HC and PRCC will plan to hold the September and October meetings in person with a WebEx virtual attendance option. The HCP-HC and PRCC HSC agreed they would consider meeting virtually in the winter because of travel challenges (from November through February).

VI. List of Attachments

Attachment A List of Attendees
Attachment B Final SOAs Hatchery Production Objectives, Release Years 2024-2033
Attachment C Revised Recalculation Policy Questions
Attachment D Email from Ryan Benson (ONA) on Sockeye Salmon Passage into Okanagan Lake
Attachment E YN Proposal for Expanded Acclimation at Goat Wall
Attachment F YN Presentation on the Continuation of Goat Wall Acclimation, Methow Basin
Attachment G WDFW's Comments on Chelan PUD's Proposed Change to Wenatchee Steelhead Escapement Modeling

[2] https://www.cdc.gov/coronavirus/2019-ncov/your-health/covid-by-county.html

Attachment A
List of Attendees

Name	Organization
Larissa Rohrbach	Anchor QEA, LLC
Tracy Hillman	BioAnalysts, Inc.
Scott Hopkins*º	Chelan PUD
Catherine Willard*	Chelan PUD
Kirk Truscott*‡º	Confederated Tribes of the Colville Reservation
Tom Kahler*º	Douglas PUD
Rod O'Connor‡	Grant PUD
Deanne Pavlik-Kunkel	Grant PUD
Todd Pearsons‡	Grant PUD
Tim Taylorº	Grant PUD
Brett Farman*‡º	National Marine Fisheries Service
Katy Shelbyº	Washington Department of Fish and Wildlife
Mike Tonseth*‡º	Washington Department of Fish and Wildlife
Keely Murdoch*‡	Yakama Nation
Matt Cooper*‡º	U.S. Fish and Wildlife Service
Bill Gale*‡º	U.S. Fish and Wildlife Service

Notes:
* Denotes HCP-HCs member or alternate
‡ Denotes PRCC HSC member or alternate
º Joined by phone

Attachment B
Final SOAs Hatchery Production Objectives, Release Years 2024-2033

Rock Island and Rocky Reach HCP Hatchery Committees

Statement of Agreement

Chelan PUD Hatchery Compensation, Release Years 2024-2033
Approved July 20, 2022

Statement

The Rock Island and Rocky Reach Habitat Conservation Plans' (HCP) Hatchery Committees (HC) approve the recalculated hatchery compensation levels in Table 1 to meet Chelan PUD's No Net Impact and Inundation obligations for release years 2024-2033. Further adjustments in production levels may occur as described in the Rock Island and Rocky Reach HCPs [Section 8.4]. The methodology underlying this Agreement applies to this Agreement only and does not influence the methodologies that may be utilized in future recalculations.

***Table 1**. Rock Island and Rocky Reach HCP recalculated hatchery production objectives, 2024-2033.*

Species	Facility	Chelan Smolt Production Target	Project(s)	Purpose
Spring Chinook	Chief Joseph	113,806 (12.65% of CJH production)	RIS/RRH	NNI
	Chiwawa	144,000	RIS	NNI/Species Trade[1]
	Methow	61,000	RRH	NNI
Summer Chinook	Chief Joseph/Similkameen	164,387(12.65% of CJH production)	RIS/RRH	NNI
	Chief Joseph/Similkameen	169,615	RIS/RRH	NNI
	Chief Joseph (sub-yearling)	94,570 (13.51% of CJH production)	RIS/RRH	NNI
	Chelan Falls	400,000	RRH	Inundation
	Chelan Falls	135,283	RRH	NNI/Species Trade[2]
	Dryden	293,776	RIS	NNI/Species Trade[3]
Steelhead	Chiwawa	165,000	RRH	Inundation
	Chiwawa	70,490	RIS/RRH	NNI
Sockeye	Wenatchee	L. Wenatchee Sockeye Salmon M&E	RIS	Species trade[1,2,3]
	Penticton Hatchery	Okanagan Reintroduction Program	RIS/RRH	NNI
Coho	Yakama Nation Coho Program	184,772	RIS/RRH	NNI

[1] Includes species trade of 22,911 of the 43,652 recalculated sockeye production plus 121,089 NNI production.
[2] Includes species trade of 18,780 of the 43,652 recalculated sockeye production plus 133,322 NNI production.
[3] Includes species trade of 1,961 of the 43,652 recalculated sockeye production plus 274,996 NNI production.

Background

The HCs initiated discussion on the second adjustment of hatchery compensation under the HCPs (calculated for the 2024 releases) during April, 2021, and agreed to a methodology to calculate the adjustments (SOA dated June 16th, 2021). A data set was compiled and approved (SOA dated February 16th, 2022) for use in the hatchery compensation adjustment efforts. Following the methodology, the data set was used to calculate the various components of the adjusted hatchery compensation (i.e., "Sensitivity Analysis"); the Sensitivity Analysis was distributed on March 14th, 2022. Chelan PUD provided an initial proposal for adjusted hatchery compensation during the March, 2022 meeting. The Joint Fisheries Parties provided an amended hatchery compensation proposal on May 27th, 2022 which Chelan PUD agreed to during a conference call on June 6th, 2022.

Wells HCP Hatchery Committee

Statement of Agreement

Douglas PUD Hatchery Compensation, Release Years 2024-2033

Approved July 20, 2022

Statement

The Wells Habitat Conservation Plan (HCP) Hatchery Committee (HC) approve the recalculated hatchery compensation levels in Table 1 to meet Douglas PUD's No Net Impact and Inundation obligations for release years 2024-2033. Further adjustments in production levels may occur as described in the Wells HCP [Section 8.4]. The methodology underlying this Agreement applies to this Agreement only and does not influence the methodologies that may be utilized in future recalculations.

***Table 1**. Wells HCP recalculated hatchery production objectives, 2024-2033.*

Species	Facility	Program	Douglas Smolt Production Target	Purpose
Spring Chinook	Chief Joseph	Yearling	35,640 (3.96% of CJH production)	NNI
	Methow	Conservation Yearling	24,728	NNI
Steelhead	Wells	Methow/Twisp Conservation	17,111	NNI
	Wells	Methow/Twisp Conservation	2,889	Inundation
	Wells	Methow/Twisp Conservation	20,000	Inundation
	Wells	Methow Safety-Net	77,111	Inundation
	Wells	Columbia Safety-Net	200,000	Inundation
Summer Chinook	Chief Joseph	Yearling Equivalent	58,410 (3.96% of CJH production)	NNI
	Wells/Methow	Conservation Yearling	35,437	NNI
	Wells	Yearling	320,000	Inundation
	Wells	Sub-yearling	484,000	Inundation
Coho	Wells	Yakama Nation Coho Agreement	27,909	NNI

Background

The HCs initiated discussion on the second adjustment of hatchery compensation under the HCPs (calculated for the 2024 releases) during April 2021, and agreed to a methodology to calculate the adjustments (SOA dated June 16th, 2021). A data set was compiled and approved (SOA dated February 16th, 2022) for use in the hatchery compensation adjustment efforts. Following the methodology, the data set was used to calculate the various components of the adjusted hatchery compensation (i.e., "Sensitivity Analysis"); the Sensitivity Analysis was distributed on March 14th, 2022. Douglas PUD provided an initial proposal for adjusted hatchery compensation during the March 2022 meeting. The Joint Fisheries Parties provided an amended hatchery compensation proposal on May 27th, 2022. Douglas PUD agreed to the following on July 20, 2022:

Chief Joseph Hatchery Spring Chinook and Summer Chinook will continue to be produced under the terms of the "Chief Joseph Hatchery Cost Sharing Agreement by Confederated Tribes of the Colville Reservation, Bonneville Power Administration, and Public Utility District No.1 of Douglas County, Washington" (2011).

Douglas PUD Methow spring Chinook will be produced at the Methow Hatchery for planting in the Twisp and Methow rivers.

Douglas PUD summer steelhead production for the Methow Subbasin would be modified to include 40,000 conservation program fish (17,111 NNI and 22,889 from the lower Methow inundation release). Under this plan, Douglas PUD will produce 20,000 Twisp S1 and 20,000 S1 Methow conservation smolts. Winthrop NFH will in turn produce 20,000 Twisp S2 conservation fish for release into the Twisp River to provide for an aggregate annual release goal of 40,000 smolts in the Twisp River. Douglas PUD will coordinate with Winthrop NFH for the release of the 20,000 S1 Methow conservation smolts. Additionally, the JFP commit to jointly, with Douglas PUD, developing a formal evaluation of the conservation programs currently operating in the Twisp and upper Methow, as well as an evaluation of the Wells Methow Safety-net and Columbia River Safety-net releases. This evaluation will include off-ramps should data suggest continuance of the current strategy poses a risk to the population.

The Wells Hatchery summer Chinook NNI production for the Methow Subbasin (35,437) will be split into two groups. The first group (17,719) will be overwinter acclimated at Methow Hatchery starting in October, and the other group (17,718) will continue to be reared at Wells Hatchery until mid-April. Both the overwinter acclimated and direct planted groups will be released in Carlton in mid-April.

Marking schemes for the two summer Chinook NNI release groups will facilitate comparisons of SARs, migration behavior, and spawner distribution between the two Douglas PUD release groups and with Grant PUD's fish released from the Carlton Acclimation Facility. The JFP and Douglas PUD commit to jointly developing a formal monitoring and evaluation plan for the Douglas PUD Methow Basin summer Chinook releases. Further, Douglas PUD will be responsible for monitoring their Methow Basin summer Chinook releases, and the JFP and Douglas PUD commit to evaluating the performace of the releases annually on the comparisons described above to determine if either strategy warrants continuation or whether or not an alternate strategy is required. Annual evaluations will begin with juvenile releases in 2024 and adult returns in 2025.

The Wells Hatchery Coho NNI production for the Twisp River will be acclimated in the Twisp Pond and released in the Twisp River.

SOA #2022-02

Priest Rapids Coordinating Committee's Hatchery Sub-Committee

Statement of Agreement

Grant PUD Hatchery Production Objectives, Release Years 2024-2033

July 20, 2022

Statement

The Priest Rapids Coordinating Committee (PRCC) Hatchery Subcommittee (HSC) approves the recalculated hatchery compensation levels outlined in Table 1 to meet Grant PUD's No Net Impact and Inundation obligations for release years 2024-2033. During this ten year period, further adjustments in production levels may occur as described in the Priest Rapids Salmon and Steelhead Settlement Agreement. The approach (e.g., methodology, sensitivity analysis) used to derive the production obligations outlined in this Agreement applies to this Agreement only and does not set precedence for approaches that may be used in future recalculations or for future discussions among parties as described below.

Additionally, the Parties agree, within the next ten year period prior to the next recalculation, to resolve differences related to NNI that originated during the first recalclulation (and persisted through this second recalculation cycle).

Table 1. Priest Rapids Project (Wanapum and Priest Rapids dams) recalculated hatchery production objectives, 2024-2033.

Species	Facility	Smolt Production Obligation	Purpose
Spring Chinook	Chief Joseph	110,000	NNI
	Methow	134,000	NNI
	Nason	203,650	NNI
Summer Chinook	Chief Joseph	305,000	NNI
	Carlton	164,533	NNI
	Dryden	206,224	NNI
Fall Chinook	Priest Rapids	5,000,000	Inundation
		127,306	NNI
		273,961	Flow Mitigation
Steelhead	Wells/Okanogan	100,000	NNI
Sockeye	Penticton Hatchery	Fund ONA Reintroduction Program	NNI
Coho		Fund Yakama Nation Coho Reintroduction Program	NNI

Background

The HSC initiated discussion on the second adjustment of hatchery compensation under the Prest Rapids Project Salmon and Steelhead Settlement Agreement (calculated for the 2024-2033 releases) during April, 2021, and agreed to a methodology to calculate the adjustments (SOA dated June 16th, 2021). A data set was compiled and approved (SOA dated February 16th, 2022) for use in the hatchery compensation adjustment efforts. Following the methodology, the data set was used to calculate the various components of the adjusted hatchery compensation (i.e., "Sensitivity Analysis"); the Sensitivity Analysis was distributed on March 14th, 2022. Grant PUD provided an initial proposal for adjusted hatchery compensation for the March 21st, 2022 meeting. Based upon input from the HSC, Grant PUD provided a revised implementation plan on April 13th, 2022. The Joint Fisheries Parties (JFP) provided an amended hatchery compensation proposal on May 27th, 2022. The amended hatchery compensation proposal included production from obligations from each of the three mid-Columbia PUDs (CPUD, DPUD, & GPUD). The use of facility sharing agreements necessitated the need to consider production from all sources to fully consider facility capacities and management objectives. Grant PUD provided a counter proposal on June 6th, 2022. The JFP provided a final amendend proposal on June 13th, 2022 and Grant PUD provided edits to that proposal on July 18, 2022.

Attachment C
Revised Recalculation Policy Questions

Questions for PRCC from the PRCC Hatchery Subcommittee

As described in the Priest Rapids Project Salmon and Steelhead Settlement Agreement (SSSA), every ten years, the PRCC Hatchery Subcommittee (PRCC HSC) is required to review production levels to determine if adjustments are necessary to achieve and maintain "No Net Impact" (NNI). Adjustments are made based on changes in average adult returns, adult-to-smolt survival rates, and smolt-to-adult survival rates (SARs) from the hatcheries relative to the survival rates used to establish the initial production levels that were based on the Biological Assessment and Management Plan (BAMP). The PRCC HSC is responsible for recommending adjustments in program levels and strategies considering the methodologies described in the BAMP and recommending modified implementation plans for Grant PUD funding. The last (which was the first) review of production levels (referred to as "Recalc") occurred in 2013. The PRCC HSC began the second Recalc process in early 2021.

As the PRCC HSC worked through the second Recalc process, it became clear that there were differences in interpretation of some of the language within the SSSA. These differences in interpretation greatly slowed the Recalc process, raised questions about initiating the dispute resolution process, and resulted in at least an additional six months of discussion and negotiations. In an effort to avoid disputes and help the PRCC HSC more easily calculate production numbers in a reasonable period of time, the PRCC HSC is asking the PRCC and/or the PRCC Policy Committee to provide responses to the following questions. Importantly, responses to these questions are intended to facilitate the next Recalc process, which will occur prior to 2033.

1. **What fish stocks and hatchery programs are subject to NNI calculations?**

   To avoid a future dispute, the PRCC HSC needs to know what stocks of Covered Species are included in the definition of NNI. For example, do the definitions include mitigation for inundation (e.g., mitigation for the production of summer Chinook and steelhead produced in Chelan and Douglas PUD-funded hatcheries to mitigate for inundation [loss] of spawning habitat created by the construction of Rock Island, Rocky Reach, and Wells dams), full mitigation for fish released from Chief Joseph Hatchery, and full mitigation for fish produced in blocked areas (e.g., upstream from Chief Joseph and Grand Coulee dams)? The following table identifies the hatchery programs and stocks that currently exist or may exist in the future. The PRCC HSC is asking the PRCC or PRCC Policy Committee to identify which stocks and hatchery programs are included in NNI Recalc.

Table 1. Listing of populations and/or hatchery programs by type, origin, and species/race that are subject to NNI. HO = hatchery origin.

Species/Race	Population or Program	Covered under NNI	
		Yes	No
Spring Chinook	Blocked Area Natural Origin		
	Blocked Area Reintroduction (HO)		
	Okanogan Natural Origin		
	Methow Natural Origin		
	Entiat Natural Origin		
	Wenatchee Natural Origin		

Species/Race	Population or Program	Covered under NNI	
		Yes	No
	Okanogan Reintroduction (HO)		
	Chief Joseph Harvest (HO)		
	Methow NNI Conservation (HO)		
	Winthrop Safety Net (USFWS, HO)		
	Chiwawa NNI Conservation (HO)		
	Nason NNI Conservation (HO)		
	Nason NNI Safety Net (HO)		
	White River NNI Conservation (HO)		
	Leavenworth Harvest (USFWS, HO)		
Summer Chinook	Blocked Area Natural Origin		
	Blocked Area Reintroduction (HO)		
	Okanogan Natural Origin		
	Methow Natural Origin		
	Entiat Natural Origin		
	Wenatchee Natural Origin		
	Okanogan NNI Supplementation (HO)		
	Chief Joseph Harvest (HO)		
	Methow (Carlton) NNI Supplementation (HO)		
	Wells Inundation (HO)		
	Chelan Falls Inundation (HO)		
	Chelan Falls NNI Harvest (HO)		
	Entiat Harvest (USFWS, HO)		
	Wenatchee NNI Supplementation (HO)		
Fall Chinook	Priest Rapids Inundation (HO)		
	Priest Rapids Fry Conversion (HO)		
	Priest Rapids NNI (HO)		
Steelhead	Blocked Area Natural Origin		
	Blocked Area Reintroduction (HO)		
	Okanogan Natural Origin		
	Methow Natural Origin		
	Entiat Natural Origin		
	Wenatchee Natural Origin		
	Okanogan NNI Conservation (HO)		
	Winthrop Conservation (USFWS, HO)		
	Methow NNI Conservation (HO)		
	Wells Inundation (HO)		
	Rocky Reach Inundation (HO)		
	Wenatchee NNI Conservation (HO)		
Sockeye	Okanagan Natural Origin		
	Skaha Lake/Lake Okanagan Reintroduction (HO)		
	Blocked Area Natural Origin		

Species/Race	Population or Program	Covered under NNI	
		Yes	No
	Blocked Area Reintroduction (HO)		
	Wenatchee Natural Origin		
	Wenatchee NNI Supplementation (HO)		
Coho	Blocked Area Natural Origin		
	Blocked Area Reintroduction (HO)		
	Methow Natural Origin		
	Methow Reintroduction (HO)		
	Wenatchee Natural Origin		
	Wenatchee Reintroduction (HO)		

2. What are the project effects that need to be mitigated?

Currently, mitigation for natural-origin Covered Species is calculated using SARs from tagged hatchery-origin fish and then applying those SARs to natural-origin adult returns (measured at each project). This calculation, which is described in the BAMP, estimates the number of natural-origin smolts entering the project areas. The BAMP uses hatchery-origin fish tagged with CWTs to estimate SARs. In this case, all adults detected (i.e., on target spawning grounds, strays in non-target spawning areas, in fisheries, and in broodstock) are included in the SAR calculation.

> Advantages: A large percentage of the hatchery fish are tagged (>95%) and therefore there is assumed to be no tagging bias, there is a long-term data set, and this approach was agreed to by parties to the BAMP.
>
> Disadvantages: Not all adult returns are detected (this underestimates the true SAR) and SARs based on CWTs include agents of mortality independent of project effects (e.g., adult migration and pre-spawn losses upstream and unrelated to passage through the project areas)[1].

The PUDs offered an alternative method that uses hatchery-origin fish tagged with PIT tags to estimate SARs. In this case, adults detected at the projects (same locations where enumeration of natural-origin returns occur) are used to calculate SARs. The intent is to capture only project effects, not non-project-related effects that occur upstream from the project areas (e.g., in tributaries).

> Advantages: This approach matches adult enumeration sites with PIT-tag detection sites (thus, it is algebraically correct), it does not include agents of mortality upstream and independent of project effects, and it provides mature data sets within a short period of time (i.e., there is no long-term delay in reporting tag detections; thus, results from recent brood years are available).

[1] Although there may be carryover effects from passage of adults through the project areas, these effects have not been measured and therefore cannot be included in the Recalc process. In addition, any carryover effects resulting from passage through Grant PUD projects are confounded by the fish passing through non-PUD projects.

Disadvantages: A relatively small percentage of hatchery-origin fish are tagged (5,000-20,000 hatchery fish from each stock/program are PIT tagged annually), the percentage of hatchery-origin fish tagged may not be representative of the entire population of hatchery-origin fish released (only fish of a certain size are PIT tagged), and detections are made at the dams.

Currently, there is a difference of opinion among members on whether SARs, which are used to calculate the number of natural-origin smolts entering the project area, should include only project effects or additional effects beyond the project (also referred to as a "full life cycle SAR").

The full life cycle SARs were used in the BAMP; however, the SSSA does not require the PRCC HSC to use the methods described in the BAMP. The SSSA states that the PRCC HSC needs to "consider" the methods described in the BAMP. To avoid a future dispute, the PRCC HSC would like to know what are the project effects that need to be mitigated (i.e., do they include effects upstream from the project area?).

Attachment D
Email from Ryan Benson (ONA) on Sockeye Salmon Passage into Okanagan Lake

Larissa Rohrbach

From: Catherine Willard <Catherine.Willard@chelanpud.org>
Sent: Tuesday, July 19, 2022 1:14 PM
To: Tracy Hillman; Brett Farman; Deanne Pavlik-Kunkel; Keely Murdoch; Kirk Truscott; Larissa Rohrbach; Matt Cooper; Michael.Tonseth; Rolland O'Connor; Scott Hopkins; Todd Pearsons; Tom Kahler; Tom Scribner; William Gale
Subject: RE: [External] Fish Passage into Okanagan Lake

Good afternoon,
In the email below, Ryan attempted to further clarify passage into Okanagan Lake for this return year, which admittedly is still in its infancy. I think we should keep in mind that ONA has been successfully managing this program for 23 years and navigating the political challenges that have come with reintroducing Sockeye into the Okanagan Sub-basin. ONA is not the sole decision maker for the program; oversight is provided by COBTWG. Ryan encourages anyone with further questions to reach out to him at RBenson@syilx.org. He is not available to call into the HC meeting tomorrow.
Catherine

Good Morning,

The proposed timeline for Okanagan Dam fishway operation presented at COBTWG was based on operations from 2019-2021. In 2019, the first year of operation, the fishway wasn't fully activated until October 11. After a couple weeks of monitoring, no Sockeye used the fishway or were captured in the net pen in the upstream bay.

In 2020 and 2021, first Sockeye captures occurred in the second week of September. Deployment date was based on the number of adults at the base of the dam, and other constraints such as scheduling and logistics. 2021 was a very low adult run and very low river flows, which probably reduced the number of Sockeye at the dam and also delayed the run timing.

In all years, there seemed to be a critical date after which Sockeye would not continue their migration. We tagged adults collected from both the broodstock collection site and Shingle Creek, and all of them dropped back downstream shortly (within a day or two) after release into OK Lake. I suspect this was a physiological response; likely that "time was running out" for spawning, and they needed to stop migrating and begin the spawn. This is just my own hypothesis, it could be that they were homing back to where they were originally captured.

Currently, OK Dam flows are extremely high and the gates are opened to the maximum. In 2020, with similar flows during July and August, an unknown number of Chinook and Sockeye made it upstream and were confirmed in OK Lake. They probably made in under the gates, but could have swam up the fishway, which wasn't activated at the time; the flows actually washed over the stop logs which were raised the previous fall.

We suspect that both Sockeye and Chinook could enter the lake right now. Flows are too high (safety issues) to activate the fishway or to safely net them at the base of the dam. There is no way to effectively catch or tag them, however, flows are forecasted to drop significantly by the end of August. We will monitor the number of salmon at the base of the dam, and activate the fishway when flow conditions are good and salmon numbers have built up. With the current run size and optimal flows, this might even happen in August.

One final note: this study was originally proposed to last for three years. We extended it for an additional year (2022) because there was no movement data in 2019. Following this year, COBTWG will discuss the results of all years, then make decisions on the next steps and direction for full passage at the dam.

I hope this clarifies things.

From: Tracy Hillman <tracy.hillman@bioanalysts.net>
Sent: Monday, July 18, 2022 3:30 PM
To: Brett Farman <Brett.Farman@noaa.gov>; Catherine Willard <Catherine.Willard@chelanpud.org>; Deanne Pavlik-Kunkel <Dpavlikkunkel@gcpud.org>; Keely Murdoch <murk@yakamafish-nsn.gov>; Kirk Truscott <Kirk.Truscott@colvilletribes.com>; Larissa Rohrbach <lrohrbach@anchorqea.com>; Matt Cooper <matt_cooper@fws.gov>; Mike Tonseth <Michael.Tonseth@dfw.wa.gov>; Rolland O'Connor <Roconnor@gcpud.org>; Scott Hopkins <Scott.Hopkins@chelanpud.org>; Todd Pearsons <Tpearso@gcpud.org>; Tom Kahler <tomk@dcpud.org>; Tom Scribner <scribner@easystreet.net>; William Gale <william_gale@fws.gov>
Subject: [External] Fish Passage into Okanagan Lake
Importance: High

Hello all,

I was asked by a committee member to consider reaching out to ONA regarding their recent decision to limit fish passage into Okanagan Lake this year. This was revealed to the PRCC Habitat Subcommittee meeting last week and the news spread to some of the hatchery members. Given your interests in the Okanagan sockeye program, it does seem appropriate to have Howie describe the reasons for the reduced time period for fish passage. As such, I cobbled together the email below for Howie. Please let me know by tomorrow (Tuesday morning) if you have edits and whether I should send the email to Howie at this time.

Thanks!

Hi Howie!

I trust you are doing well and enjoying summer. I am the chair of the HCPs Hatchery Committees and the PRCC Hatchery Subcommittee.

The Hatchery Committees and Subcommittee asked me to reach out to you regarding the apparent decision to only allow fish passage into Okanagan Lake for a relatively brief period of time this year. If true, this is unfortunate given the large run of sockeye salmon returning this year. Although the Committees/Subcommittee have heard that the fishway may be opened for a brief period this year, they have not heard why the fishway is not opened for a longer period of time. As you know, the Hatchery Committees are interested in expanding sockeye production into the lake. They are now concerned that their current and future investments may be minimized with the decision to allow fish passage for only a brief time period. Would you be willing to call into our Hatchery Committees meeting on Wednesday, 20 July for a short question and answer session? Alternatively, you could respond to this email with reasons why the fishway is only open for a relatively brief period this year and what the fish passage plans are for the future.

Please let me know if this is something you can do or if you have questions.

Thanks,
Tracy Hillman
Chair of the HCPs HC and PRCC HSC

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Attachment E
YN Proposal for Expanded Acclimation at Goat Wall

Proposal: Continuation of the Upper Methow Spring Chinook Acclimation Project

Upper Columbia Spring Chinook and Steelhead Acclimation Project (BPA Project #1996-040-00)

July 2022

Prepared by Danielle Grundy and Rick Alford, Yakama Nation Fisheries

1.0 Background

1.1 Yakama Nation's Acclimation Project

YN's Upper Columbia Spring Chinook and Steelhead Acclimation Project, herein "the Project", is part of a larger Upper Columbia Production Project, funded through Bonneville Power Administration (BPA Project #1996-040-00). The Project is based on the premise that acclimating salmon and steelhead in a manner that mimics natural systems can increase the effectiveness of integrated (conservation) hatchery programs by enhancing homing of adult fish to target reaches and can be used to improve the Viable Salmonid Population (VSP) status of ESA listed spring Chinook and steelhead (Murdoch, 2015).

Since 2014, as a result of the HCP No-Net-Impact (NNI) recalculation, spring Chinook smolt release numbers from most conservation hatchery programs in the Methow and Wenatchee basins were significantly reduced. Because of this reduction, we believe it is crucially important that each program be operated in a manner that maximizes efficacy of the supplementation effort by acclimating and releasing smolts in locations where they will return to high-quality spawning and rearing habitat (Murdoch, 2015).

The Project began short-term acclimation of spring Chinook in the upper Methow basin in 2017 and has continued through the spring of 2022. The annual releases of 25,000 juveniles from Goat Wall Pond have produced comparable results to Methow Fish Hatchery (FH) on-site releases, in regards to juvenile survival, juvenile travel time, and smolt to adult returns (SARs). In addition, adult returns from acclimated releases are homing to targeted upper Methow river reaches with high quality habitat and low density of hatchery released spawners. These results confirm that short-term acclimation at Goat Wall has the ability to shift spawning distribution in the Methow River as hypothesized

The initial proposal for acclimation of 25,000 spring Chinook included five years of releases. This concluded in 2021; however, we do not have the complete dataset of adult returns from those five releases. The three return years (2019-2021) that we do have data for have demonstrated that short-

term acclimation is successful in meeting Project objectives. Therefore, the Project requests a continuation of acclimation at Goat Wall of 25,000 spring Chinook while more data is compiled. Releases are requested to continue with potential for expansion in spring 2024.

2.0 Goat Wall Results

2.1 Original Project Objectives

The fundamental assumption behind supplementation is that hatchery fish returning to the spawning grounds are 'reproductively similar' to naturally produced fish. Inherent in the supplementation strategy is that conservation hatchery fish released from acclimation ponds and naturally produced fish are intended to spawn together and in similar locations (Murdoch, 2015). If supplemented fish are not fully integrated into the naturally produced spawning population, the goals of supplementation may not be achieved (Hays et al., 2007). For this reason, Objective 5 within the Monitoring and Evaluation plan for PUD Hatchery Programs (Hillman et al., 2013) is focused on evaluating if hatchery and natural-origin fish have similar run timing, spawn timing, and spawning distribution, or are meeting management expectations (Murdoch, 2015).

The original proposal for the Project stated three objectives to demonstrate that acclimation can support supplementation programs by returning adult spawners to suitable habitat and through improved homing fidelity. These objectives stated below are addressed in the following section.

1) *To determine if conservation hatchery fish spawner distribution can be altered through short–term spring acclimation in the Upper Methow basin.*

Success for objective 1 will be a measurable change in spawning location for acclimated hatchery fish compared to hatchery fish released from Methow FH.

2) *To determine what proportion of acclimated hatchery fish home back to Methow FH and are collected during adult management activities*

There is no success or failure metric for Objective 2. Rather hatchery return rate data will be used to develop any future acclimation plans (beyond this proposal) and will be used to determine appropriate release numbers of spring Chinook in the upper Methow such that we do not exceed PNI/PHOS targets through an inability to attract fish back to the hatchery.

3) *To compare project performance indicators (tagging-Rocky Reach survival, SARs) between acclimated and non-acclimated releases.*

We consider success for Objective 3 to be either no change or an increase in survival rates for acclimated releases compared to non-acclimated releases.

2.1.1 Objective 1: Spawning Distribution

The initial proposal compared spawning distribution of the Methow River subbasin among natural origin and hatchery fish by regions: Upper, Middle, and Lower. The upper region includes Lost River, Early

Winters, and Methow river reaches above Suspension Creek. The middle region includes Hancock, Suspension Creek, and Methow river reaches from Wolf Creek to Suspension Creek. The lower region includes hatchery outfalls and Methow river reaches below Wolf Creek.

Spring Chinook released from Goat Wall started returning as non-jack adults during the 2019 spawning season. Spawning distribution between acclimated and Methow FH fish is notably different among regions of the Methow River. Acclimated fish tend to spawn in the upper and middle reaches of the Methow Subbasin whereas Methow FH fish are recovered in the middle and lower regions. Figure 1 displays the summed carcass counts by region for return years 2019 thru 2021. Data for return year 2021 is preliminary and subject to change.

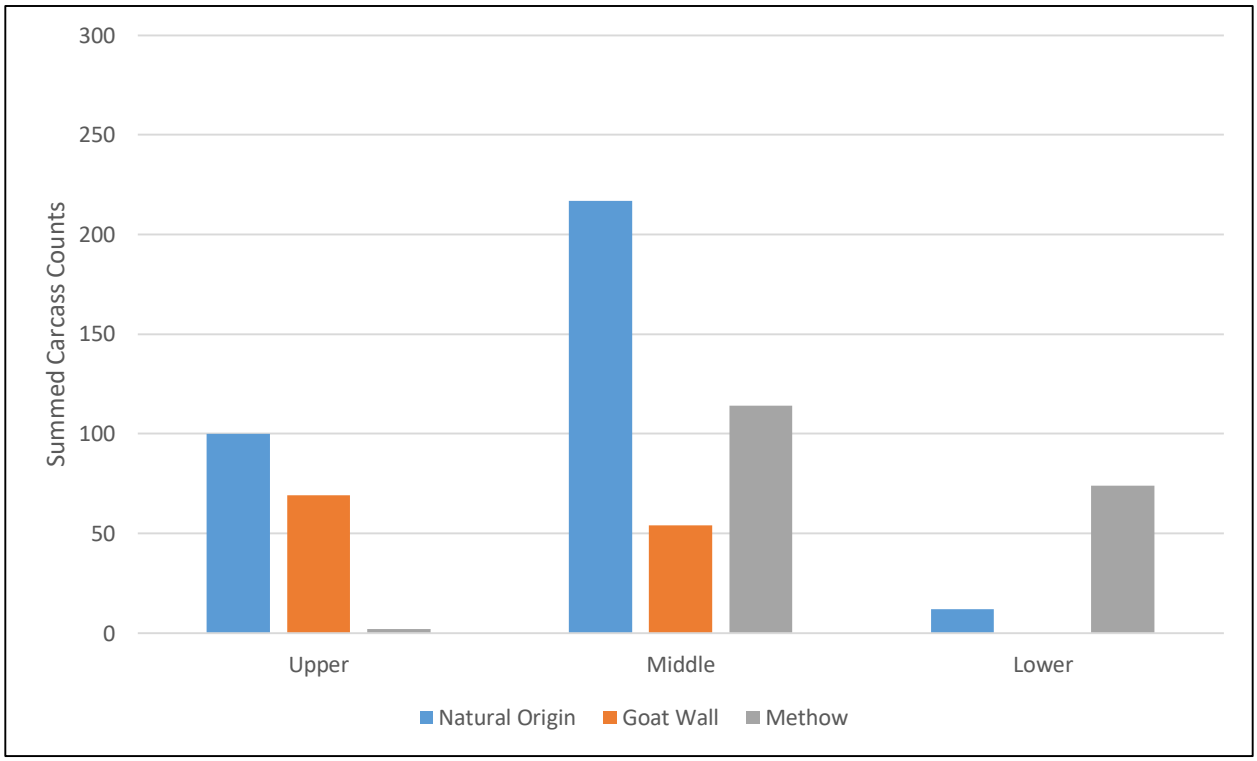


Figure 1. Summed carcass recoveries for return years 2019 thru 2021 in the Methow subbasin.

At a finer scale, the river kilometers (RKM) of female carcasses are compared by origin. Females guard their redds after spawning and their carcasses are found relatively nearby. Acclimated female fish, overall, spawn higher in the basin as compared to Methow FH females. Figure 2 displays the distribution and mean RKM for each year assessed. The lines represent the total distribution for the year and the dot represents the mean.

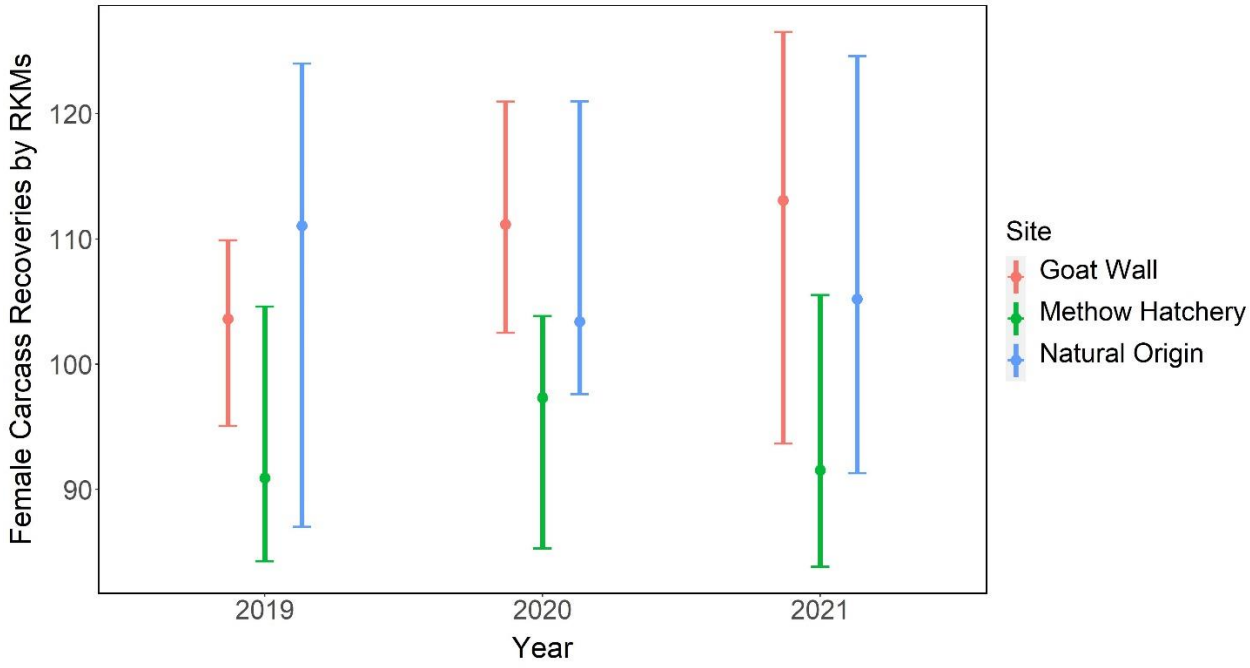


Figure 2. The total distribution of female carcasses is separated by origin for return years 2019, 2020, and 2021. Distribution is given in river kilometers (RKM). The dot represents the mean RKM. Data for return year 2021 is preliminary and subject to change.

For all three years combined, the location of female carcass recoveries was found to be significantly different among the three groups ($H(2) = 33.9$, $p < 0.001$). Further post hoc pairwise comparisons determined that acclimated fish (Mean = 110.8, SD = 9.9) spawned significantly higher in the basin than Methow FH fish (Mean = 92.3, SD = 7.1) ($p < 0.001$). In contrast, the distribution of acclimated fish was not found to be significantly different from natural origin fish (Mean = 105.3, SD=10.5) ($p = 0.1$). A violin plot is given below demonstrating the distribution and frequency of female carcasses locations via RKMs for all three years combined (Figure 3).

The data from these return years confirm that short-term acclimation does indeed shift spawner distribution. Additionally, acclimated spawner distribution is similar to natural origin spawner distribution and dissimilar to non-acclimated releases. This demonstrates that acclimation is an important tool for hatchery supplementation, which encourages hatchery fish to spawn in high-quality habitat among natural spawners rather than habitat adjacent to hatchery sites that sees high densities of hatchery returns.

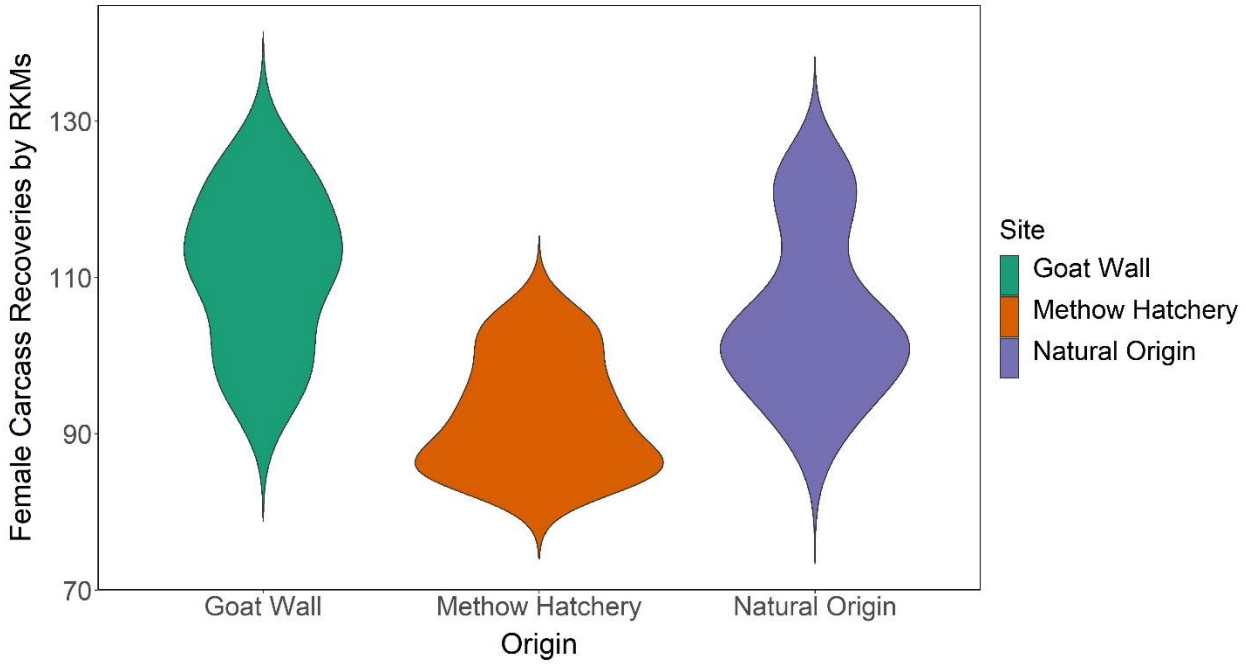


Figure 3. Violin plot of female carcass distribution by RKM for Goat Wall releases, Methow Hatchery releases, and natural origin.

2.1.2 Objective 2: Adult Management activities and homing

At both Winthrop National Fish Hatchery and Methow Hatchery, fish that volunteer into the facilities are either collected for broodstock or removed for adult management to aid in PHOS/PNI goals. Goat Wall acclimated fish volunteer at a reduced rate as compared to on-site releases (Table 1). For brood years 2015 thru 2017, Goat Wall fish removal rate averaged 4 % while Methow FH fish averaged 65%.

Notably, acclimated fish are less likely to stray into the adjacent Twisp and Chewuch basins. Methow FH carcasses were recovered in the Chewuch River (average rate of 1.6%), while all Goat Wall fish recoveries were from the upper Methow River.

Table 1. Removal rates at Winthrop and Methow Hatchery for brood years 2015-2017.

Brood Year	Release Size		Escapement		Estimated Removal		Removal Rate	
	GW	Met	GW	MH	GW	MH	GW	MH
2015	25,792	58,705	33	45	1	115	0.03	0.72
2016	26,851	122,995	20	26	1	76	0.05	0.72
[1]2017	28,429	120,654	78	118	4	125	0.05	0.50
Avg.	25,632	102,047	44	63	2	105	0.04	0.65

[1] Data preliminary and subject to change.

2.1.3 Objective 3: Project performance indicators

Spring Chinook were successfully acclimated at Goat Wall pond in the spring of 2017 thru the spring of 2022. Largely, acclimated fish were found to be similar to on-site releases from Methow FH (Table 2). Fish Per Pound (FPP) average estimates are 16.9 for Goat Wall and 15.2 for Methow FH fish. Both are well within the FPP release target of 15-18 FPP. Average length for both groups is within a two mm difference while average weight is within a 4 gram difference. Survival is similar between the two groups except for a mortality event in 2017 at Methow FH. In-pond survival is estimated by combining known mortality and estimated predation at both sites. This method is used because detections at Goat Wall were poor in some years which gave unreliable survival estimates.

Table 2. Release information for Goat Wall and Methow Hatchery from 2017 thru 2022.

Release Year	# Transferred	FPP @ Release		Average Length (mm)		Average Weight (g)		In-pond survival	
		GW	Met	GW	Met	GW	Met	GW	Met
2017	25,978	16.6	16.2	136	133	28.0	28.0	99.7 %	73.7 %
2018	28,535	18.9	15.0	129	133	23.9	30.3	97.5 %	98.1 %
2019	29,810	16.1	16.7	137	134	28.2	27.2	99.4 %	98.4 %
2020	27,217	15.8	14.1	139	139	28.8	32.0	94.0 %	99.2 %
2021	24,598	14.9	15.2	136	136	27.9	29.9	99.1 %	92.8 %
2022	24,642	18.9	14.7	129	136	23.9	30.9	99.5 %	99.6 %
AVG	26,797	16.9	15.2	134	136	26.8	30.1	98.2 %	93.9 %

After fish are released from Methow FH and Goat Wall pond, they are evaluated via PIT tag detections at the Columbia River dams. Annually, approximately 5,000 fish are PIT tagged within each release group. Data collected from PIT tag detections include travel time and survival through the hydro system.

Goat Wall fish's mean travel time to Rocky Reach Dam is 1.6 days longer when compared to the Methow FH travel time. This can be attributed to the added distance the fish have to travel to reach the dam since Goat Wall pond is located 31 RKMs upriver of the Methow FH. When travel time is averaged over distance (rate of travel), travel time becomes similar between both groups (Table 3) ($t(5) = 0.84$, $p = 0.22$).

Table 3. Travel rate for each year in kilometers per day for Goat Wall and Methow FH releases. Tagging-to-Rocky-Reach CJS survival estimates are also given for each year. Standard error is shown in parenthesis.

Juvenile Indicators				
Release Year	Rate of Travel km/day		Survival to Rocky Reach (SE)	
	GW	MH	GW	MH
2017	14.8	13.5	0.497 (0.047)	0.706 (0.069)
2018	18.9	14.1	0.604 (0.066)	0.674 (0.078)
2019	13.4	16.0	0.694 (0.039)	0.731 (0.038)
2020	13.7	14.0	0.729 (0.060)	0.676 (0.041)
2021	16.1	14.6	0.699 (0.031)	0.753 (0.039)
2022	12.4	12.2	0.384 (0.046)	0.689 (0.048)
AVG	**14.9**	**14.1**	**0.601**	**0.705**

Tagging to Rocky Reach Dam survival is also comparable between the two release groups (Table 3). Survival is calculated via Cormack-Jolly-Seber estimates from Columbia River DART. A paired t-test found no significant difference in survival to Rocky Reach between the two groups ($t(5) = -1.96$, $p = 0.11$). The mean survival for Goat Wall and Methow FH for the six release years is 60.1% and 70.5%, respectively.

From 2019 to 2021, acclimated smolt-to-adult returns (SAR) to the Methow Basin have averaged 0.17%, while Methow FH returns have averaged 0.19% (Table 4). SAR values are calculated from expanded CWT recoveries on the spawning grounds as well as recoveries from the hatcheries. They do not include harvest. Returns averaged 46 fish per year for Goat Wall and 171 fish for Methow FH.

Table 4. Smolt-to-adult returns by brood to the Methow Basin for both Methow Hatchery and Goat Wall releases. SAR values are based on CWT expanded recoveries.

Brood Year	**Release Size**		**SARs to Methow Basin (%)**		**Return to Methow Basin**	
	GW	Met	GW	MH	GW	MH
2015	25,792	58,705	0.13	0.27	34	160
2016	26,851	122,995	0.08	0.09	21	105
[2]2017	28,429	120,654	0.29	0.21	82	248
Avg.	25,632	102,047	0.17	0.19	46	171

[2] Data preliminary and subject to change.

2.2 PHOS AND PNI TARGETS

Proportion of hatchery fish on spawning grounds (pHOS) and proportionate natural influence (PNI) within the Methow basin are gene flow guidelines used to assess hatchery-influenced selection on the natural population. Guidelines for acceptable hatchery influence on the natural population are calculated annually for both and are based on the natural origin run. When the natural run is below 300, pHOS targets are calculated. When the natural run is above 300 fish, hatchery influence is evaluated based on a PNI target.

Return years 2019 and 2020 were low for spring Chinook and management of the Methow program (PUD) was based on a PUD partial pHOS. Partial pHOS goals for return years 2019 and 2020 both met target. In contrast, return year 2021 NOR escapement was 454 fish so hatchery influence was evaluated with a partial PNI target. The PUD PNI minimum target was not met for this year (Table 5).

Table 5. Estimated PHOS and PNI values for return years 2019 thru 2021 for the Methow Basin. Green fill indicates targets were met, while red fill indicates targets were not met.

Return Year	NORS		Goat Wall SAR @ Wells	Goat Wall Esc.	Proportion of Escapement		PUD pHOS Methow Basin	PUD PNI Methow Basin
	Basin Total	Methow			NORS	GW		
2019	114	40	0.13%	33	0.20	0.05	0.48	0.55
2020	165	75	0.08%	20	0.36	0.05	0.30	0.66
2021	454	223	0.29%	78	0.40	0.07	0.43	0.57

3.0 Project Proposal

Acclimating fish at Goat Wall is shown to be successful and objectives of the Project are being met. Juvenile survival and adult returns show comparable results. Site fidelity of acclimated fish results in spawning in high quality habitat upriver of Methow FH fish. However, more time is requested to allow for more data collection to better inform on appropriate release sizes at Goat Wall and Methow FH for broodstock collection and pHOS/PNI targets.

Therefore, the YN proposes to continue acclimating 25,000 Chinook pre-smolts from Methow Fish Hatchery at Goat Wall acclimation site (Figure 4). In addition, the proposal also addresses the possibility for expansion of acclimation to 50,000 pre-smolts in spring 2024. The additional fish would be acclimated at the Early Winters Acclimation Pond which has successfully acclimated Coho salmon for four years.

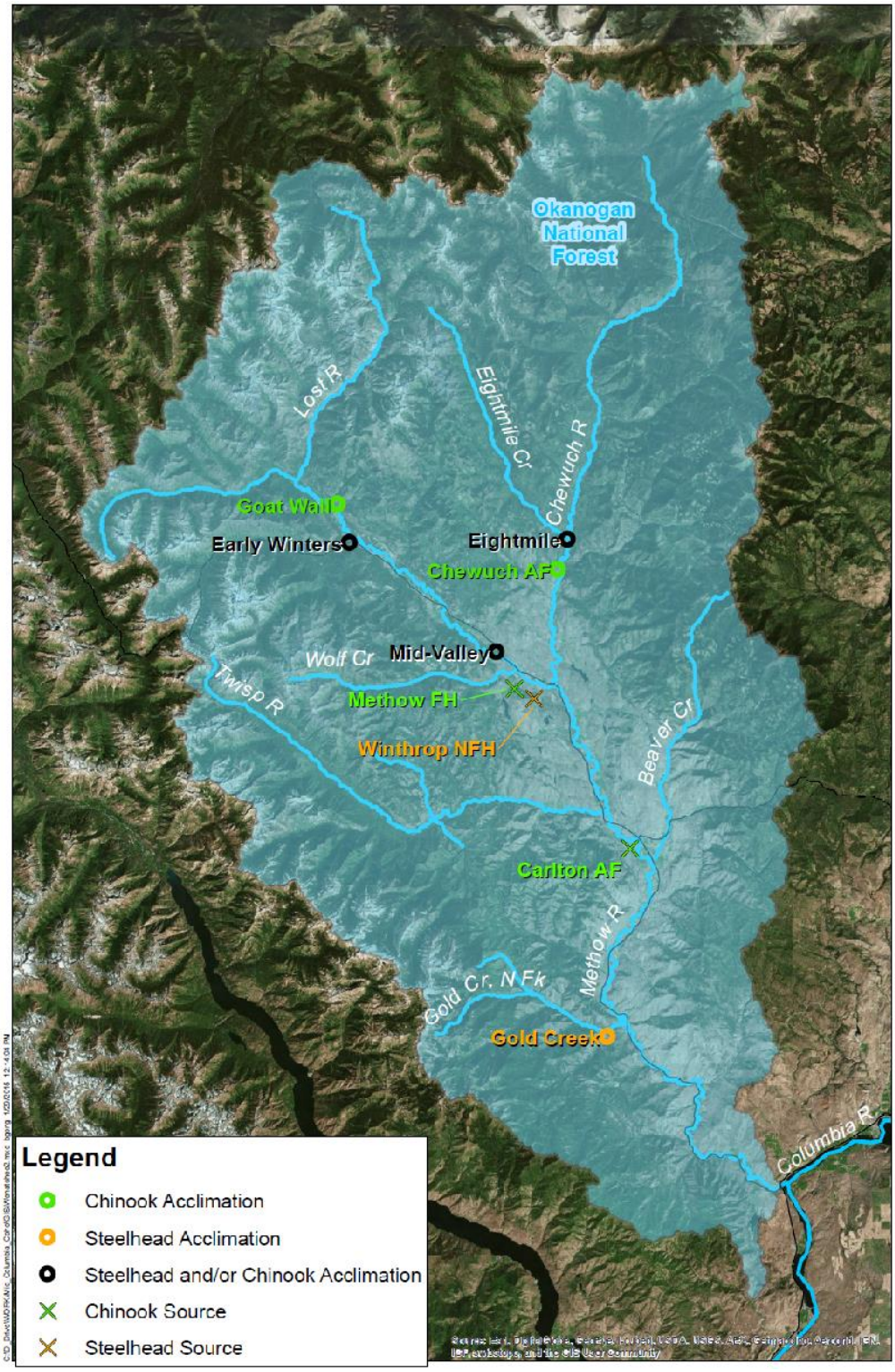


Figure 4. Locations of the Goat Wall Acclimation site and Early Winters site relative to Methow Fish Hatchery, Winthrop NFH and other potential acclimations sites in the Methow Basin.

3.1 Changes in Upper Methow River Spawning Distribution with Acclimation

The dataset of returning adults that include Goat Wall acclimated fish is small and likely not fully representative of potential returns. For this reason, SARs from a decade of returns was used to predict a wider array of outcomes. The SARs utilized are from brood years 2005-2014 and are matched to returns of natural origins based on a 4-year age class. These returns are prior to Goat Wall releases, so SARs estimated for Methow FH are applied to this group. Table 6 shows what returns from these years would look like based on a release of 25,000 fish at Goat Wall and a release of 109,126 fish from Methow FH. Rate of removals for broodstock and adult management for both these groups is based on the average from the return years 2019-2021; MH = 65 % and GW = 4%.

With a 25,000 fish release size, mean Goat Wall escapement to the spawning grounds would equate to 105 adults and constitute 0.07% of the run. This is similar to the value calculated for the last three returns, as well (2019-2021). Target PUD pHOS is estimated for return years where natural origin returns were below the 300 fish threshold. In this scenario, target PUD pHOS goals would be met for 2017 and 2018, but are exceeded in 2012 and 2013. Given a PNOB range of 0.75-1.0, the mean PUD PNI would range from 0.57 to 0.63 for this decade. The PNI values fall short of their targets; however, the PUD PNI as well as the three population PNI are generally above 0.50 leaving the majority of genetic influence to natural origins.

Table 6. Estimates of Goat Wall returns with a release of 25,000 pre-smolts given Methow Hatchery SARs for return years 2005 thru 2014. Red fill indicated PUD PHOS goals were not met, while green fill indicates that PHOS goals were met.

Return Year	NORs		Methow Hatchery SAR	Goat Wall Return	Removal Rate at Hatchery	Goat Wall Escapement	Proportion of Run		Target PUD Basinwide pHOS	PUD PNI (PNOB = 0.75)	PUD PNI (PNOB = 1.0)
	Basin Total	Methow					Goat Wall	NOR			
2009	261	564	0.208	52	4%	50	0.02	0.26	--	0.59	0.65
2010	290	601	0.717	179		172	0.08	0.28	--	0.57	0.63
2011	432	961	0.429	107		103	0.04	0.34	--	0.60	0.66
2012	103	261	0.524	131		126	0.10	0.20	0.46	0.51	0.57
2013	113	241	0.215	54		52	0.06	0.26	0.49	0.53	0.59
2014	250	508	0.545	136		131	0.08	0.32	--	0.57	0.64
2015	154	398	0.872	218		209	0.14	0.27	--	0.55	0.61
2016	159	320	0.585	146		140	0.15	0.34	--	0.59	0.65
2017	94	176	0.119	30		29	0.06	0.38	0.57	0.62	0.68
2018	135	265	0.154	39		37	0.06	0.47	0.46	0.67	0.73
Mean	**199**	**430**	**0.437**	**109**		**105**	**0.07**	**0.30**	--	**0.57**	**0.63**

As per the original proposal, if the Methow River's minimum escapement target (2000) is allocated via the distribution of natural origin spawners then we can estimate the minimum escapement for each region. Minimum abundance for the Methow River is 920 spawners. When broken up by regions, minimum abundance is 405 for the upper, 436 for the middle, and 79 for the lower region.

To compare what Goat Wall returns would look like at the region level, Table 9 compares historical escapement to hypothetical returns involving acclimated fish. The left side of the table shows actual returns from 2011 thru 2018. The right side of the table indicates what would occur if Goat Wall acclimated fish were part of those return years.

Looking at returns from 2011-2018, additional spawners are needed in the upper and middle regions while the lower region exceeds the estimated density threshold. When Goat Wall fish are included in these returns spawning would increase by 14% in the upper region, 25% in the middle region, and decrease in the lower region by 26%. Overall, spawning would increase by 5% in the Methow subbasin. This increase is due to Goat Wall fish estimated removal rates at the hatchery being lower than Methow FH removal rates.

Table 7. Spawning distribution of NOR and HOR fish divided by region.

	Returns from 2011 - 2018					**With Goat Wall Acclimation**		
Region	Mean number of Spawners		PHOS	Estimated Minimum Spawner Abundance Needed	Additional Spawners Required for Min Abundance	Mean Number HOR Spawners	Percent change	PHOS
	NOR	**HOR**						
Upper Methow	67	87	0.56	405	251	108	14%	0.62
Middle Methow	93	276	0.75	436	67	370	25%	0.80
Lower Methow	15	271	0.95	79	-207	198	-26%	0.93
Combined	175	634	0.78	920	111	676	5%	0.79

PHOS values are given for each region for both situations. As expected, PHOS would rise in the upper and middle regions and decrease in the lower region; however, PHOS for the river as a whole would increase by only 1 percent.

Further evidence of how acclimation shifts the distribution of spawners is displayed in Figure 5. This graph breaks up the hatchery component into Goat Wall releases, Methow FH releases, and other

hatchery fish. With acclimation, the presence of hatchery fish increases in the upper and middle regions due to an increase in Goat Wall escapement in those regions. The increase of spawning in the middle region occurs even with a marked decrease in Methow FH presence. In contrast, spawning decreases in the lower region because Goat Wall fish have not been identified spawning in those reaches. This outcome would alleviate any density-dependent interactions occurring in that region.

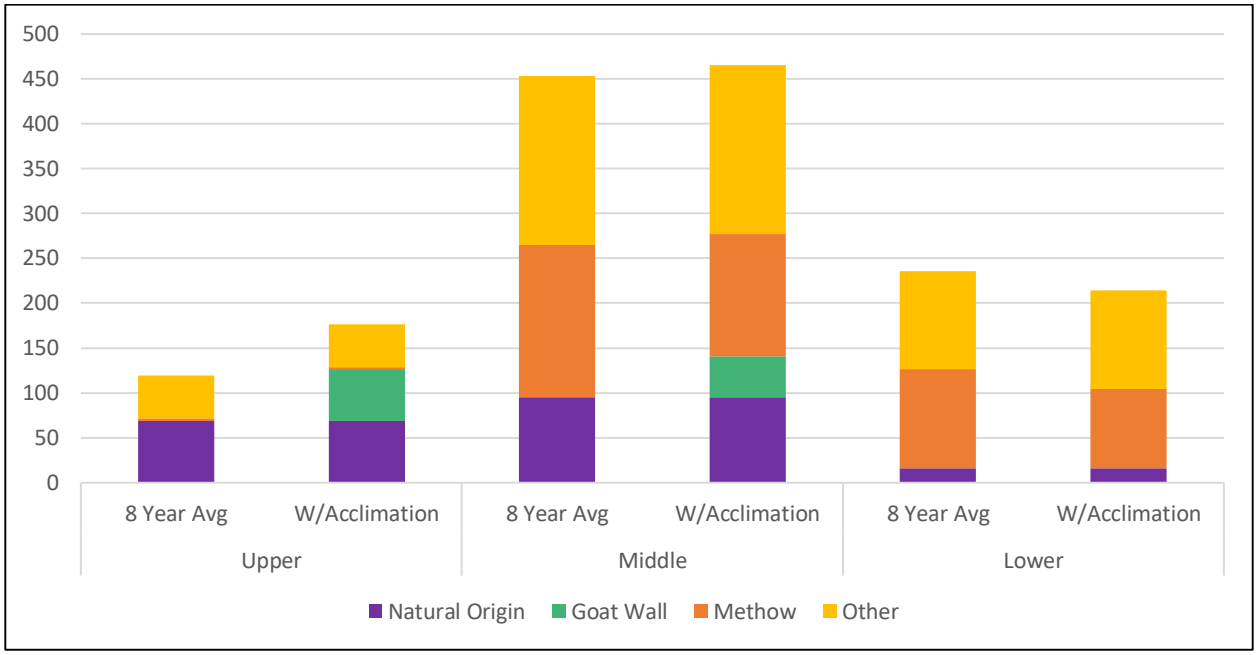


Figure 5. Distribution of spawning escapement by region. The hatchery component is split up into Goat Wall releases, Methow Hatchery on-site releases, and other hatchery fish.

3.2 Review of the Goat Wall Acclimation Site

The Goat Wall acclimation site is accessed through privately owned property and consists of a watered slough located downstream from the Lost River. Water to the pond is supplied through a diversion on Gate Creek and through natural groundwater seepage (Cold Creek). A temporary seine net system is used to contain hatchery spring Chinook during the acclimation period. The Lost River Rd provides access to the site and is plowed during the winter. The site measures 0.08 acres (30' x 110') and is approximately 9,500 cu ft. The site has a capacity to hold up to 30,000 fish at 16 FPP at densities less than 0.06 lbs./cu ft./in

3.2.1 Fish Transportation Procedures

Spring Chinook pre-smolts will be transported in March by YN personnel from Methow FH to the Goat Wall location. Current fish-transport procedures include crowding and loading into distribution trucks via a fish pump. Water will be tempered as appropriate. Fish are tempered to within 3°C of the receiving water prior to release. Loading densities may range from 0.3 to 0.5 pounds of fish per gallon of water consistent with IHOT standards.

3.2.2 Fish Condition, Growth, and Health Monitoring

A pre-transfer fish health examination will be conducted by WDFW fish health specialists. Once in the acclimation site, fish will be monitored daily by staff for signs of disease symptoms (lethargic behavior, skin coloration, visible lesions, caudal fungus, etc.) through visual observations, feeding behavior, and monitoring of daily mortality trends. Additionally, staff will estimate weekly growth by measuring how many fish are in a pound (FPP). Weekly sampling will include a general assessment of fish condition and stage of smoltification. A fish health specialist will be contacted if any disease symptoms are noted. If required, YN staff under the direction of the fish health specialist will provide treatment for disease.

3.2.3 Release

Spring Chinook would be released as close as possible to the agreed upon size target (15 FPP). Targets are subject to change at the discretion of the HCP and PRCC Hatchery Committees. Spring Chinook will be volitionally released from the acclimation site by removing the barrier net in mid-to-late April. Release typically begins when > 90% of the acclimated group is displaying visual signs of smoltification (identified by transitional and/or smolt stage), target FPP is met as well as favorable river conditions (high water events). The release will truly be volitional; no fish will be pushed out of the pond. Spring Chinook leave volitionally within 7 days of removal of the barrier net.

4.0 Monitoring and Evaluation

The following describes the monitoring and evaluation approach for this project and is similar to the original proposal's methods.

Objective 1: To determine if spawner distribution continues to be expanded through short-term spring acclimation in the Upper Methow Basin.

To accomplish Objective 1, all spring Chinook acclimated and released from Goat Wall will be marked with a unique CWT. Methods for collecting spawner location data based on carcass recovery and analytical details can be found in the Monitoring and Evaluation Plan for PUD Hatchery Programs: 2013 Update (Hillman et al., 2013). All spawning ground, carcass recovery data, and CWT extraction and reading will be completed by WDFW during implementation of the Douglas and Grant PUDs regular M&E activities (Objective 5 in Hillman et al., 2013).

Hypothesis:

- H_0: The distribution of hatchery origin redds from acclimated releases (Goat Wall Acclimation Site) = The distribution of hatchery origin redds from non-acclimated *releases (Methow Fish Hatchery)*

Measured Variables:

- Location (GPS coordinates) of female salmon carcasses observed on spawning grounds (Hillman et al, 2013)

Derived Variables:

- Location of female salmon carcasses at the historic reach scale and at the 0.1 km scale

Data Analysis:

- Graphic analysis and ANOVA/Kruskal-Wallis of RKMs.

We will consider Objective 1 successfully achieved if acclimated carcass recoveries are distributed in statistically greater numbers/proportions in the 'upper' reaches than would have occurred if acclimation was not implemented.

Objective 2: To determine what proportion of acclimated spring Chinook home back to Methow Fish Hatchery and are collected during adult management or broodstock collection activities.

As described above, all spring Chinook acclimated at Goat Wall will be marked with a unique CWT tag. CWT recovery necessary to meet objective 2 will occur at Methow FH by WDFW during spawning and adult management activities as normal to meet reporting and M&E objectives described in Hillman et al 2013, and by USFWS at WNFH. Alternatively, detection of PIT tagged fish from both treatments (acclimated and non-acclimated) at the hatchery and at Wells Dam can be used to address Objective 2.

Hypothesis:

No hypothesis is being tested under Objective 2

Measured Variables:

- Count of CWT recovered by code at Methow FH
- Counts of CWT recovered by code at WNFH
- Counts of CWT recovered by code on the spawning grounds

Derived Variables:

- Estimates of fish return by code to Methow Fish Hatchery
- Estimates of fish return by code to Winthrop NFH
- Estimates of fish return by code to spawning grounds in the Methow Basin

Data Analysis:

CWT Analysis: The number of CWT fish from the acclimated release group recovered at the hatchery will be expanded based upon the in-hatchery sample rate and pre-release tag retention rate. The estimated proportion back to Methow Fish Hatchery will then be calculated based upon all in-basin tag recoveries for the acclimated release.

PIT Tag Analysis: The proportion of PIT tagged returns to Methow FH for the acclimated and non-acclimated release can be estimated by dividing the number of PIT tag detections/recovery at the hatchery by PIT tag detections over Wells.

There are no success or failure criteria for Objective 2. Hatchery return rate data for both acclimated and non-acclimated releases will be used to develop future acclimation proposals and make recommendations. Proportions of acclimated releases returning to the rearing facility will be used to recommend appropriate release numbers for spring Chinook in the upper Methow such that we do not exceed PNI/PHOS targets should the resource managers decide to continue acclimation beyond this 5-year plan.

Objective 3: To monitor project performance indicators and where appropriate, compare performance indicators to an on-station reference group.

Fish Condition and Growth

To monitor fish growth, FPP will be estimated from collecting multiple 5 pound samples and taking the average. Weekly sampling will include a general assessment of fish condition and visual assessment of smoltification so that growth rates and condition factors may be assessed.

Success will be considered meeting size targets assuming fish are transferred to the pond at the appropriate size. There is no success criterion for fish condition (k-factor). K-factor will be used to retrospectively understand any observed differences in survival rates.

Release Monitoring and In-Pond Survival

Up to 5,000 spring Chinook will be PIT tagged by YN. YN will design and install a PIT tag detection system at the sloughs' outlet to determine out-migration timing as well as produce an estimate of in-pond survival (following the volitional release and downstream migration). Additionally, daily predator observations will be recorded so that YN can respond in real-time to increased predation.

There is no success criterion for this metric. Data from release monitoring will be used to identify predation rates at the pond and make changes if necessary (see Tagging to Rocky Reach Survival for metrics from which we plan to measure juvenile survival success)

Tagging-to-Rocky Reach Survival

Equal groups of approximately 5,000 PIT tags will be applied to both the acclimated hatchery fish and the on-station release. Tagging will occur during the fall prior to acclimation and release. Because tagging occurs prior to transfer, the Tagging-to-Rocky Reach survival metric is inclusive of in-pond survival, and downstream migratory survival. Theoretically, Release-to-Rocky Reach Survival should be greater for acclimated releases than non-acclimated releases, therefore a potentially higher in-pond mortality rate could be ameliorated at later life stages. Therefore, comparing Tagging-to-Rocky Reach survival rates for both on-station and acclimated releases are a better comparison of overall juvenile

survival than a Release-to-Rocky Reach metric.

Tagging-to-Rocky Reach Dam survival will be measured with PIT tags. Survival estimates for both tagging and release will use Cormack-Jolly-Seber estimates with associated standard errors for both survival and detection probabilities (Columbia River DART). These survival rates will be compared to like metrics from the Methow FH on-station release.

Hypothesis

- H_0: Tagging-to-Rocky Reach survival for acclimated fish = Tagging-to-Rocky Reach survival for Methow FH on station releases.

Measured Variables:

- Unique PIT tags at tagging
- Unique PIT tag detections at Rocky Reach
- Unique PIT tag detections at John Day or Bonneville Dam

Derived Variables:

- Cormack-Jolly Seber estimates and standard error for both survival and detection probabilities using Columbia River DART

Data Analysis:

- Paired T-test by year for acclimated and on-station releases

We will consider this metric successful if the tagging-to-Rocky Reach survival rates are equal to or greater than the on-station releases.

Smolt-to-Adult survival

Smolt-to-Adult Return (SAR) rates will be calculated using the unique CWT for each acclimated release. SARs are typically reported in the PUD annual M&E report. SARs for the acclimated release can be compared to the on-station release by brood year.

Hypothesis

- H_0: Smolt-to-Adult survival rates for acclimated fish >= Smolt-to-adult survival rates for Methow FH on station releases.

Measured Variables:

- Numbers of CWTs recovered at the hatchery, spawning grounds, and fisheries

Derived Variables:

- Estimated return to the basin with and without harvest.

Data Analysis:

- SARs for acclimated and non-acclimated release can be compared with a paired T-test by year.

We will consider this metric successful if the SARs for acclimated hatchery returns are equal to or greater than the on-station releases.

5.0 Project Timeframe

Releases would continue at the Goat Wall acclimation site through 2023 while in-pond and in-hatchery assessments would continue. Field assessment of adult return rates and spawning distribution would occur through 2023. Data collected from the spawning grounds and from the hatchery will occur during regular M&E activities as described in Hillman et al. 2013.

Pending results, the HCP HC and PRCC HSC may consider future opportunities to expand acclimation of Methow FH spring Chinook production in 2024 based upon available information while the adult return data is collected through 2023. Acclimation of the additional pre-smolts would occur at the Early Winters Acclimation Pond.

5.1 Early Winters Ponds

Early Winters Ponds is located on Early Winters creek, approximately .5 miles from the confluence with the Methow River. The confluence is approximately three river miles downstream of the Goat Wall Pond on the upper Methow River. The site was constructed in 2017 and includes two separate ponds initially designed to rear and release up to 75,000 coho and 50,000 spring Chinook at a conservative 0.06 density index for both groups (Figure 6). The ponds are currently used to release 73,000 juvenile coho as part of the Upper Columbia Production Projects: Mid-Columbia Coho Reintroduction Program. Since the Project utilizes the Goat Wall Pond location for spring Chinook releases, one pond is available for additional rearing space. The water source is primarily surface water delivered to the ponds via 2 surface water pumps, with a third for back up should an issue arise. There are also two well pumps for a backup water supply and a propane generator in case of a power outage. The site is staffed 24/7 with a cabin onsite for housing during the acclimation season.

Figure 6. Aerial of Early Winters Pond.

6.0 Adaptive Management

Information collected through this project may be used by YN in the development of future proposals and can also be used by the resource managers to make decisions about spawner distribution, desired escapement levels, and hatchery release locations. Management decisions that may result from this data are within the purview of the resource managers and therefore will not be included in this research proposal. Similarly, decisions pertaining to hatchery operations are within the purview of the HCP Hatchery Committees and the PRCC Hatchery Sub Committees and therefore are not included within this proposal.

7.0 Literature Cited.

Hays, S., T. Hillman, T. Kahler, R. Langshaw, B. Lenz, A. Murdoch, K. Murdoch, and C. Peven. 2007. Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs. Prepared for: Habitat Conservation Plans Hatchery Committees.

Hillman, T., T. Kahler, G. Mackey, J. Murauskas, A. Murdoch, K. Murdoch, T. Pearsons, and M. Tonseth. 2013. Monitoring and Evaluation Plan for PUD Hatchery Programs: 2013 Update. Prepared for: HCP and PRCC Hatchery Committees.

Murdoch, K. 2015. Upper Methow Spring Chinook Acclimation Proposal. Prepared for: HCP and PRCC Hatchery Committees.

Appendix A

Wells/Rocky Reach HCP HC

Goat Wall Acclimation SOA

Wells and Rocky Reach HCP Hatchery Committees

Statement of Agreement

Goat Wall Acclimation Plan

March 4, 2015

Statement

The Wells and Rocky Reach Hatchery Committees agree to acclimate 25,000 Methow spring Chinook at the Goat Wall Acclimation Site as part of Yakama Nation's Upper Columbia Spring Chinook and Steelhead Acclimation Project's (BPA Project# 2009-00-001) beginning with the 2016 release (BY2014) Goat Wall, as described in the Upper Methow Spring Chinook Acclimation Proposal (March 04, 2015). The smolts would be short-term acclimated annually between March and May. Releases will continue through 2020 , contingent upon HC annual review and concurrence of acceptable juvenile survival and/or concurrence of acceptable remediation actions to address unacceptable juvenile survival. Annual reports and monthly updates will be provided to the HCP HC.

Background

Yakama Nation's Upper Columbia Spring Chinook and Steelhead Acclimation Project is based on the premise that acclimating and releasing salmon and steelhead smolts in select locations can increase the effectiveness of integrated (conservation) programs Additional details can be found in Attachment 1 (Upper Methow Spring Chinook Acclimation Proposal). This SOA is also contingent upon approval of a similar SOA from the PRCC HSC.

Appendix B

PRCC HSC-Goat Wall Acclimation SOA

SOA 2015–01

PRCC Hatchery Sub-Commitee

Statement of Agreement

Goat Wall Acclimation Plan

Submitted to PRCC Hatchery Subcommittee: March 5, 2015
Approved by PRCC Hatchery Subcommittee: March 11, 2015

Statement

The Priest Rapids Coordinating Committee Hatchery Sub Committee (HSC) agrees to acclimate 25,000 Methow spring Chinook at the Goat Wall Acclimation Site as part of YN's Upper Columbia Spring Chinook and Steelhead Acclimation Project (BPA Project# 2009-00-001) beginning with the 2016 release (BY2014) at Goat Wall. The smolts would be short-term acclimated annually between March and May. Releases will continue through 2020, contingent upon HSC annual review and concurrence of acceptable juvenile survival and/or concurrence of acceptable remediation actions to address unacceptable juvenile survival. Annual reports and monthly updates will be provided to the HSC.

Background

YN's Upper Columbia Spring Chinook and Steelhead Acclimation Project is based on the premise that acclimating and releasing salmon and steelhead smolts in select locations can increase the effectiveness of integrated (conservation) programs. Additional details can be found in Attachment 1 (Upper Methow Spring Chinook Acclimation Proposal). This SOA is also contingent upon approval of a similar SOA from the HCP-HC.

Attachment F
YN Presentation on the Continuation of Goat Wall Acclimation, Methow Basin

Proposal: Continuation of Goat Wall Acclimation, Methow Basin

Danielle Grundy
Rick Alford

Yakama Nation Fisheries

Concerns

- Objective 5 of the Monitoring and Evaluation Plan for PUD Hatchery programs (Hillman et al. 2019) states that spawning distribution should be similar for hatchery and wild spawners.

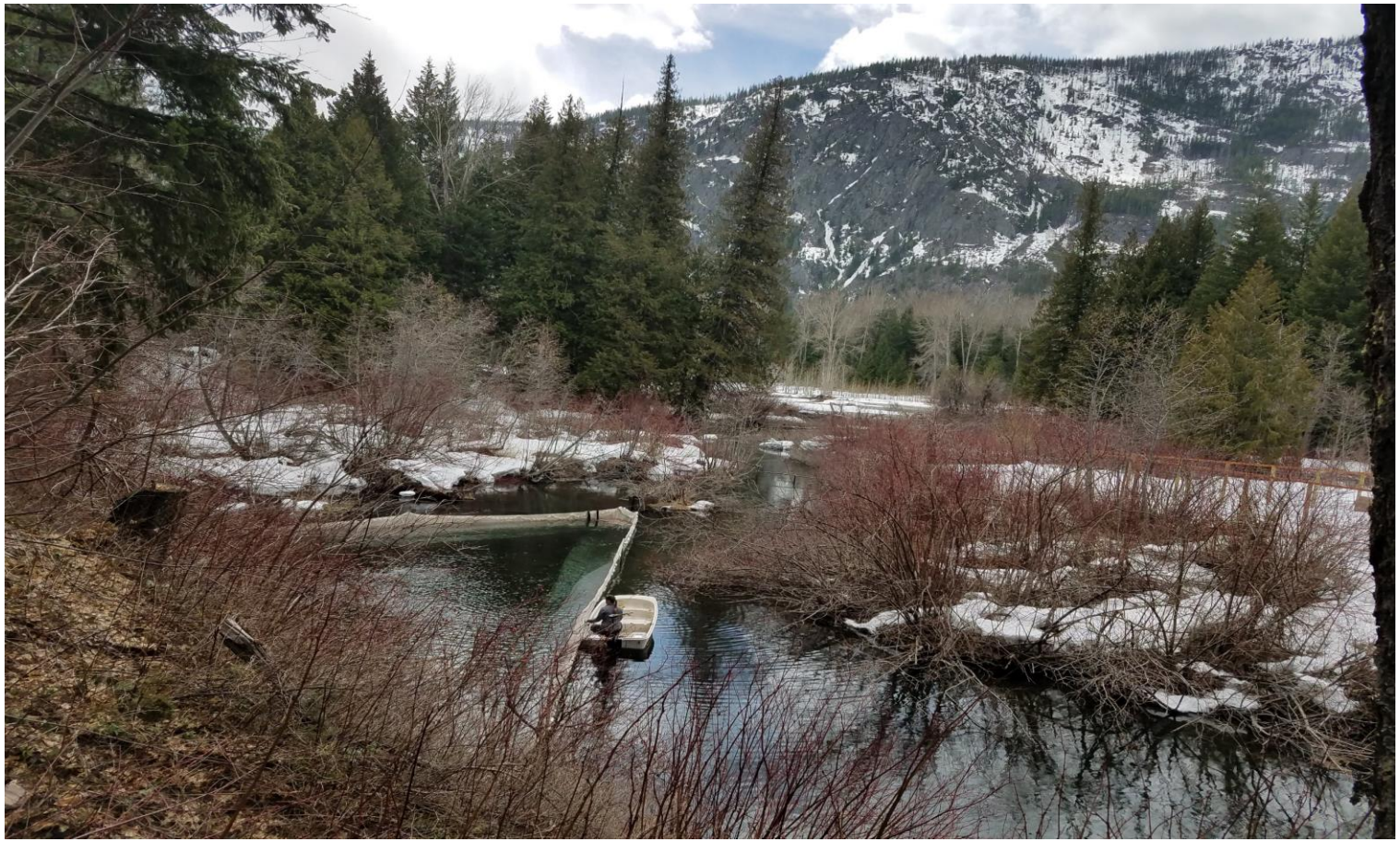
- Spawning distribution of Methow Fish Hatchery (Methow) and Winthrop National Fish Hatchery (WNFH) was found to be significantly different from natural origin fish (Murdoch et al., 2011)

  - Salmon released from hatcheries home back to the hatcheries rather than high-quality spawning reaches resulting in a high proportion of hatchery spawners in some reaches and a low proportion in other reaches.
  - High densities of hatchery fish spawning in reaches surrounding the hatchery can result in density-dependent factors and lowered productivity
  - Few hatchery fish reach key upstream habitat areas

- Goals of an integrated program may not be realized if supplemented fish are not fully integrated with the population they are intended to supplement.

Goat Wall Acclimation

- Acclimation has been ongoing since 2017
- Annual releases of 25,000 spring Chinook smolts
- Returning adults 2019-2021
- Objectives have been met
- Proposed continuation of the Project

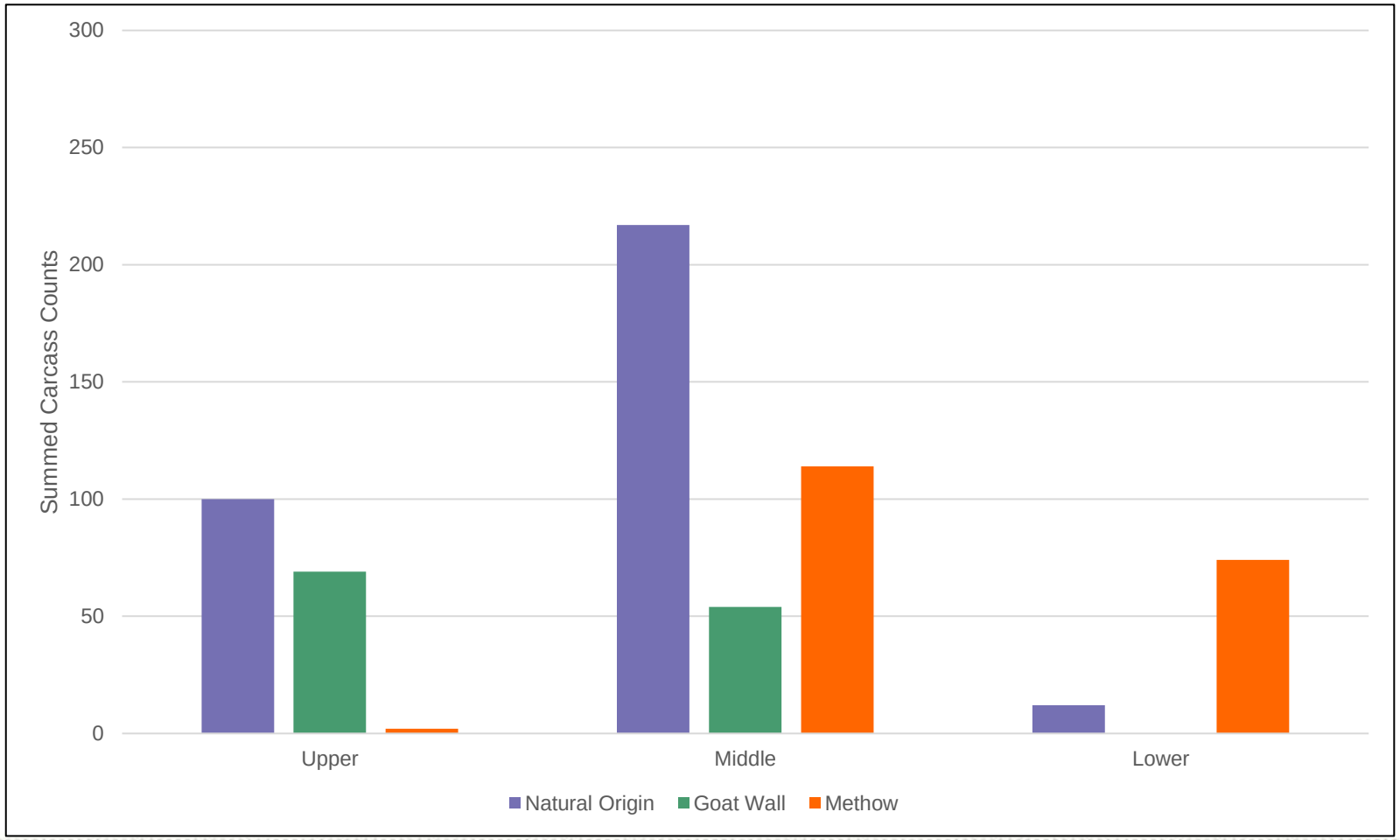


Project Objectives

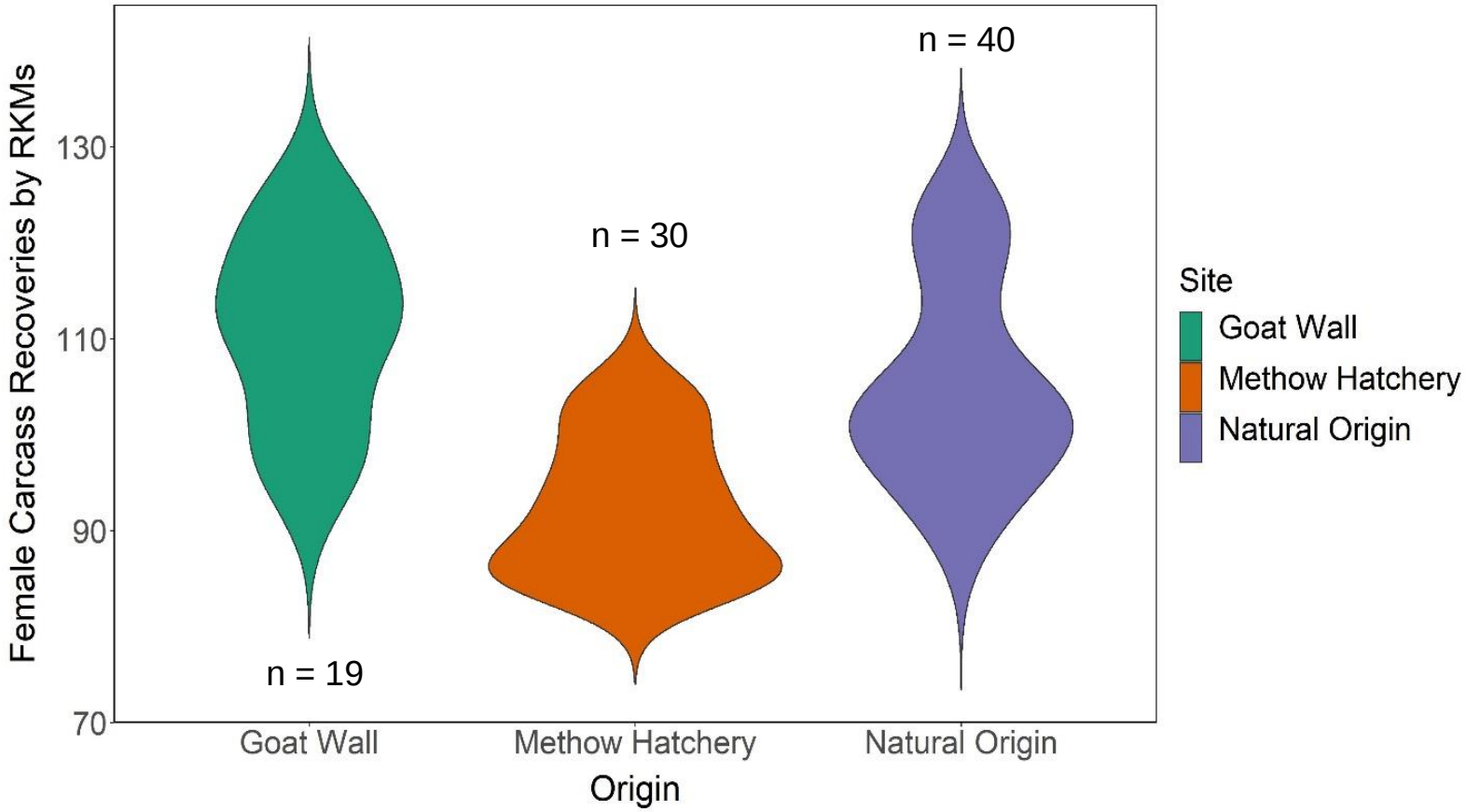
1. Determine if conservation hatchery fish spawner distribution can be altered through short-term spring acclimation
   - Success for objective 1 will be a measureable change in spawning location for acclimated hatchery fish compared to hatchery fish released from Methow FH
2.
   -
3.
   -


Goat Wall Pond
Upper Region
Early Winters Pond
Middle Region
Methow Fish Hatchery
WNFH
Lower Region
Google Earth
N
5 mi

Objective 1: Does acclimating at Goat Wall change spawning distribution?



Objective 1 continued…



Goat Wall Pond recoveries were found to be similar to natural origin female carc recoveries; whereas, Methow Hatchery was significantly different.

Project Objectives

1. Determine if conservation hatchery fish spawner distribution can be altered through short-term spring acclimation
   - Success for objective 1 will be a measureable change in spawning location for acclimated hatchery fish compared to hatchery fish released from Methow FH
2. Determine what proportion of acclimated hatchery fish home to spawning grounds and what proportion are collected during adult management activities
   - There is no success or failure metric for Objective 2.
3.
   -

Objective 2: Homing to Hatchery

Brood Year	Release Size		Escapement		Estimated Removal		Removal Rate	
	GW	Met	GW	MH	GW	MH	GW	MH
2015	25,792	58,705	33	45	1	115	0.03	0.72
2016	26,851	122,995	20	26	1	76	0.05	0.72
2017	28,429	120,654	78	118	4	125	0.05	0.50
Avg.	**25,632**	**102,047**	**44**	**63**	**2**	**105**	**0.04**	**0.65**

Project Objectives

1. Determine if conservation hatchery fish spawner distribution can be altered through short-term spring acclimation
   - Success for objective 1 will be a measureable change in spawning location for acclimated hatchery fish compared to hatchery fish released from Methow FH
2. Determine what proportion of acclimated hatchery fish home to spawning grounds and what proportion are collected during adult management activities
   - There is no success or failure metric for Objective 2.
3. Compare project performance indicators between acclimated and non-acclimated releases (tagging to Rocky Reach juvenile survival, travel time, SARs)
   - Success for Objective 3 can be either no change or an increase in survival rates for acclimated releases compared to non-acclimated releases.

Objective 3: Release Stats

Release Year	# Transferred	FPP @ Transfer	FPP @ Release		Avg Length (mm)		Avg Weight (g)		# Released		In-pond survival	
	GW	GW	GW	Methow	GW	Methow	GW	Methow	GW	Methow	GW	Methow
2017	25,978	18.5	16.6	16.2	136	133	28.0	28.0	25,894	59,260	99.7 %	73.7 %
2018	28,535	25.7	19.0	15.0	129	133	23.9	30.3	28,417	124,088	97.5 %	98.1 %
2019	29,810	16.5	16.1	16.7	137	134	28.2	27.2	29,777	124,514	99.9 %	98.4 %
2020	27,217	17.8	15.8	14.1	139	139	28.8	32.0	26,917	114,045	94.0 %	99.2 %
2021	24,598	19.0	14.9	14.2	136	139	27.9	32.0	24,440	106,942	99.1 %	94.4 %
2022	24,642	22.2	18.9	14.7	129	137	23.9	30.9	24,514	122,078	99.5 %	99.6 %
AVG	**26,797**	**20.0**	**16.9**	**15.2**	**134**	**136**	**26.8**	**30.1**	**27,089**	**105,770**	**98.2 %**	**93.9 %**

Objective 3 continued: Juvenile Indicators

Juvenile Indicators				
Release Year	Rate of Travel km/day		Survival to Rocky Reach (SE)	
	GW	MH	GW	MH
2017	14.8	13.5	0.497 (0.047)	0.706 (0.069)
2018	18.9	14.1	0.604 (0.066)	0.674 (0.078)
2019	13.4	16.0	0.694 (0.039)	0.731 (0.038)
2020	13.7	14.0	0.729 (0.060)	0.676 (0.041)
2021	16.1	14.6	0.699 (0.031)	0.753 (0.039)
2022	12.4	12.2	0.384 (0.046)	0.689 (0.048)
AVG	**14.9**	**14.1**	**0.601**	**0.705**

Rate of travel and survival is not significantly different between release sites

Objective 3 continued: SARs

Brood Year	Release Size		Return to Methow Basin		SARs to Methow Basin (%)	
	GW	Met	GW	MH	GW	MH
2015	25,792	58,705	34	160	0.13	0.27
2016	26,851	122,995	21	105	0.08	0.09
2017	28,429	120,654	82	248	0.29	0.21
Avg.	**25,632**	**102,047**	**46**	**171**	**0.17**	**0.19**

- Found to be similar between release methods
- Data incomplete for brood year 2017
- Data from return year 2021 is preliminary and subject to change

pHOS and PNI

Return Year	NORS		Goat Wall SAR	Goat Wall Esc.	Proportion of Escapement		PUD pHOS Methow Basin	PUD PNI Methow Basin
	Basin Total	Methow Subbasin			NORS	GW		
2019	114	40	0.13%	33	0.20	0.05	0.48	0.55
2020	165	75	0.08%	20	0.36	0.05	0.30	0.66
2021	454	223	0.29%	78	0.40	0.07	0.43	0.57

Further Examination

- Last three returns are on the lower end of SARs
- Use most recent SAR data that we have on hand
- Applied Methow SAR to theoretical Goat Wall releases

Return Year	NORs		Methow Hatchery SAR (%)	Goat Wall Return	Removal Rate at Hatchery	Goat Wall Escapement	Proportion of Run		Target PUD Basinwide pHOS	PUD PNI (PNOB = 0.75)	PUD PNI (PNOB = 1.0)
	Basin Total	Methow Subbasin					Goat Wall	NOR			
2009	564	261	0.208	52		50	0.02	0.26	--	0.59	0.65
2010	601	290	0.717	179		172	0.08	0.28	--	0.57	0.63
2011	961	432	0.429	107		103	0.04	0.34	--	0.60	0.66
2012	261	103	0.524	131		126	0.10	0.20	0.46	0.51	0.57
2013	241	113	0.215	54		52	0.06	0.26	0.49	0.53	0.59
2014	508	250	0.545	136	4%	131	0.08	0.32	--	0.57	0.64
2015	398	154	0.872	218		209	0.14	0.27	--	0.55	0.61
2016	320	159	0.585	146		140	0.15	0.34	--	0.59	0.65
2017	176	94	0.119	30		29	0.06	0.38	0.57	0.62	0.68
2018	265	135	0.154	39		37	0.06	0.47	0.46	0.67	0.73
Mean	**430**	**199**	**0.437**	**109**		**105**	**0.07**	**0.30**	--	**0.57**	**0.63**

Theoretical Goat Wall Returns

Returns from 2011 - 2018						With Goat Wall Acclimation		
Region	Mean number of Spawners		pHOS	Estimated Minimum Spawner Abundance Needed	Additional Spawners Required for Min Abundance	Mean Number HOR Spawners	Percent change	pHOS
	NOR	HOR						
Upper Methow	67	87	0.56	405	251	108	14%	0.62
Middle Methow	93	276	0.75	436	67	370	25%	0.80
Lower Methow	15	271	0.95	79	-207	198	-26%	0.93
Combined	**175**	**634**	**0.78**	**920**	**111**	**676**	**5%**	**0.79**

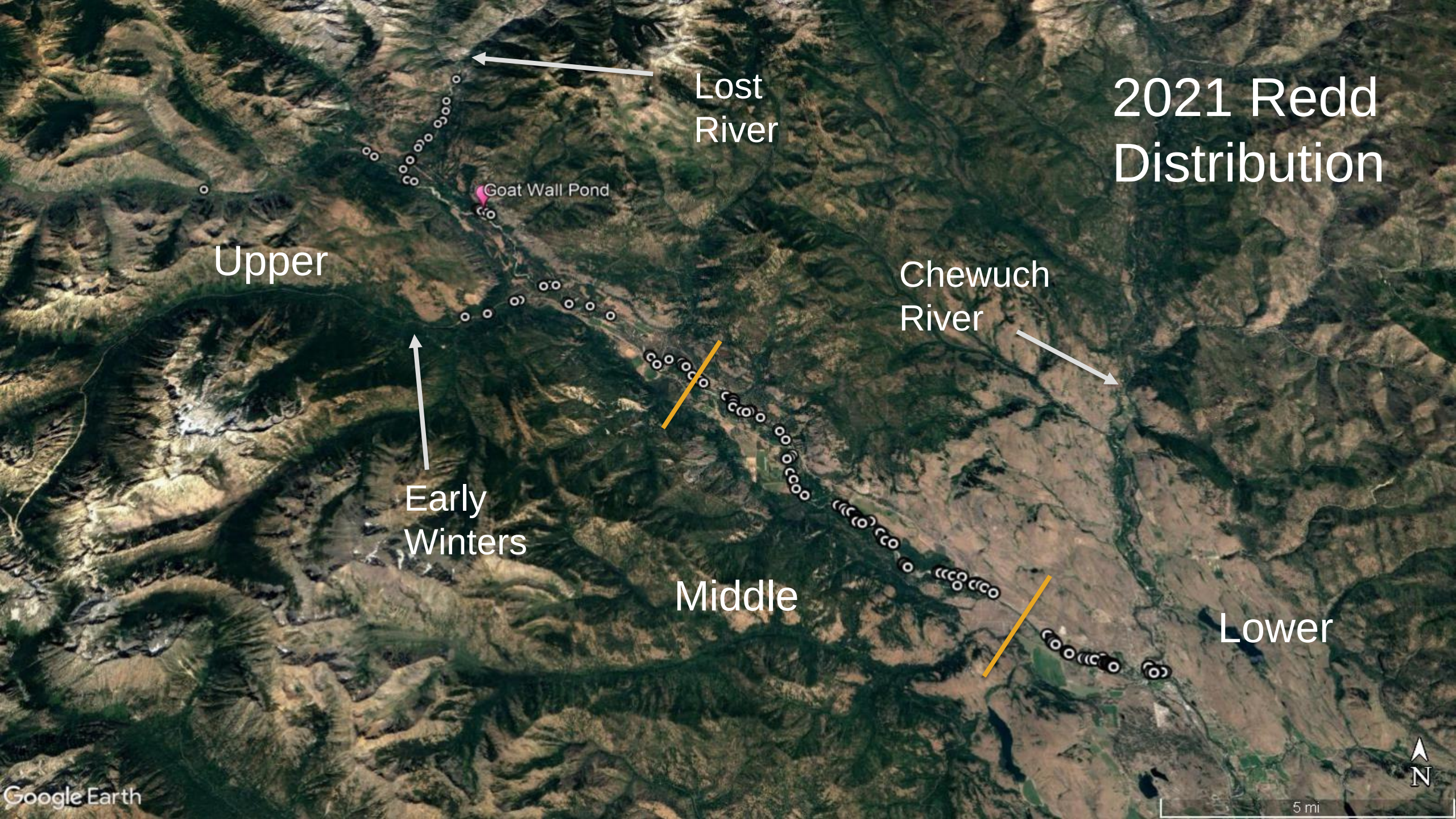
Summary of Results

- Spring Chinook from Goat Wall pond spawned consistently higher in the basin than their Methow Fish Hatchery counterparts
- Juvenile and adult survival between the two hatchery release groups was similar
- More data, releases, and time is needed to better inform on homing and pHOS/PNI effects

Proposed Next Steps

1) Continue with releases at Goat Wall pond
   - 2023 release group is marked with CWTs
   - In-pond and in-hatchery assessments would continue
   - Field assessments of adult return rates and spawning distribution would continue

2) For 2024 and beyond, request for additional juveniles (25K) to continue to build off of project successes and benchmarks, and help strengthen data sets and identify trends.
   - Acclimation is essential for conservation programs
   - Release of 25,000 fish is insufficient to shift overall spawning distribution
   - Early Winters was intended as a spring Chinook acclimation site


2021 Redd Distribution
Lost River
Goat Wall Pond
Upper
Chewuch River
Early Winters
Middle
Lower
N
5 mi
Google Earth

Potential Expansion: Early Winter Acclimation Site

- Constructed in 2017
- First acc. in 2019
- 2 Surface intakes
- 3 Surface water pumps
- 2 Wells pumps (backup)
- Backup Generator
- Staff on site 24/7
- Pond 1 = 13,100 cu. ft.
- Pond 2 = 9,100 cu. ft.
- 4.1 CFS (March 1st – June 15th)

Coho

16	*Size at release, (fish per lb)*	
5.95	*Length (inches)*	
Volume Density Criteria		
0.06	*DI (lbs/cft/in)*	
0.36	*Volume density (lbs/cft)*	
Flow Density Criteria		
1.50	*FI (lbs/gpm/in)*	
8.93	*Flow density (lbs/gpm)*	
Stocking Plan and Densities		
Number	75,000	
Volume	13,100	cft
Min. Flow	1.2	cfs

Spring Chinook

15	*Size at release, (fish per lb)*	
6.08	*Length (inches)*	
Volume Density Criteria		
0.06	*DI (lbs/cft/in)*	
0.37	*Volume density (lbs/cft)*	
Flow Density Criteria		
0.60	*FI (lbs/gpm/in)*	
3.65	*Flow density (lbs/gpm)*	
Stocking Plan and Densities		
Number	50,000	
Volume	9,100	cft
Min. Flow	2.0	cfs

Total

Volume	22,200	cft
Min. Flow	3.2	cfs
Safety factor	25%	
Design flow	4.0	cfs

Yakama Nation Fisheries

One more Note:
Desiccation of Redds in the Methow Subbasin

Complete Redds in the Methow Subbasin			
Year	Dry	Total Redds	Percent of redds
2019	5	153	3.3%
2020	0	123	0.0%
2021	11	222	5.0%
Total	16	498	3.2%

Adult Female Recoveries		
Origin	Near Dried Redd	Near Wetted Redd
Goat Wall	1	17
Methow	0	30
NOR	4	35
WNFH	0	9
Chewuch	0	16
Strays/Unk	0	29


Any Questions?

References

Murdoch, A., C. Snow, C. Frady, A Repp, M. Small, S. Blankenship, T. Hillman, M. Miller, G. Mackey, and T. Kahler. 2011. Evaluation of the hatchery programs funded by Douglas County PUD. Report to the Wells HCP Hatchery Committee, East Wenatchee, Wa.

Hillman, T., T. Kahler, G. Mackey, J. Murauskas, A. Murdoch, K. Murdoch, T. Pearsons, and M. Tonseth. 2013. Monitoring and Evaluation Plan for PUD Hatchery Programs: 2013 Update. Prepared for: HCP and PRCC Hatchery Committees.

Superimposition of Redds in the Methow Subbasin

Spawn Year	# redds superimposed	# of redds	%
2019	11	153	7 %
2020	5	123	4 %
2021	16	222	7 %
Total	32	498	6 %

Spawn Year	Upper	Middle	Lower
2019	1	10	0
2020	0	1	4
2021	4	11	1
Total	5	22	5

Attachment G

WDFW's Comments on Chelan PUD's Proposed Change to Wenatchee Steelhead Escapement Modeling

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
FISH PROGRAM -SCIENCE DIVISION
HATCHERY/WILD INTERACTIONS UNIT
3515 Chelan Hwy, Wenatchee, WA 98801
Voice (509) 664-3148 FAX (509) 662-6606

July 8, 2022

To: Rock Island HCP Hatchery Committee

From: Andrew Murdoch and Kevin See

Subject: Proposed changes in steelhead spawner escapement methodology

Background

Steelhead spawner escapement estimates are essential for status and trend monitoring, population viability analysis, and assessing progress towards recovery goals. Unbiased abundance estimates of wild and hatchery steelhead are important components for both hatchery management and estimating population productivity (recruits/spawner). Historically, spawning escapement estimates for the four independent populations in the Upper Columbia River (UCR) Distinct Population Segment (DPS) were derived from fish ladder counts at mainstem Columbia River dams, fixed values from a radio telemetry study (1999-2001) and an assumption of constant prespawn mortality (5%). This method used fixed values through time and space without incorporating any uncertainty from any parameters used to estimate abundance. More simply, the historical method was inaccurate and insensitive to any changes in migrations patterns, spawning distribution, and survival either positive or negative. Following a series of regional meetings (2008-2009) sponsored by NOAA throughout the Columbia Basin, WDFW and CCT submitted a proposal to BPA in 2010 with multiple objectives but with a common goal of improving spawning escapement estimates for ESA-listed populations in the UCR DPS.

Twelve years later, a fully integrated comprehensive adult steelhead monitoring program exists in the UCR that address required monitoring and management objectives. Specific applicable monitoring questions (Hillman et al. 2017) and special conditions of Section 10 Permit 18583 are provided in bold. The primary components of the program are listed below:

1. Unbiased and precise estimates of wild and hatchery spawners in all major and minor spawning tributaries upstream of Rock Island Dam (Waterhouse et al. 2020). WDFW and CCT constructed, installed, and maintain approximately 44 instream PIT tag detection systems (IPDS) to generate the detection data required for the patch occupancy model (Waterhouse et al. 2020). This infrastructure and statistical model allow for the simultaneous estimation of abundance at many spatial scales (DPS, population, spawning stream) using the same statistical model and the same group of fish tagged at Priest Rapids Dam (**Q1.1.1, 1.2.1, 2.1.1, 2.2.1, 3.2.1, 3.2.2, 4.1.1, 5.1.1,8.1.1, 8.2.1, 8.4.1**)

    a. A modified version of that model can be used to estimate reach-specific estimates of wild and hatchery fish abundance on a weekly time step. This model is used to inform broodstock

collection, hatchery fish management and prosecute sport fisheries with a goal of reducing hatchery fish abundance while minimizing wild fish impacts (**Q4.1.1; Special Condition 1 and 2)**

2. Lack of PIT detections within the mainstem Wenatchee, Methow and Okanogan rivers was identified as an issue early in the process as well as observation error associated with steelhead redd counts. Studies were initiated in the Wenatchee and Methow rivers to develop models that could account for observation error with respect to surveyor experience, river conditions, habitat complexity and redd density (Murdoch et al. 2018). Two models were developed based on historical redd count methods (Wenatchee = 1 observer; Methow = 2 observers). The 2-observer methodology and model were implemented in the Wenatchee because of a small difference in model performance, but either model is acceptable. Since 2014, Wenatchee steelhead spawning escapement estimates integrate unbiased PIT tag-based estimates of spring spawners from all spawning tributaries with an estimate of mainstem spawners generated from an unbiased estimate of redds and a fish per redd and pHOS value generated from PIT tagged fish not assigned to a spawning tributary (i.e., mainstem spawners) (**Q1.1.1, 1.2.1, 2.1.1, 2.2.1, 3.2.1, 3.2.2, 4.1.1, 5.2.1, 5.3.1, 8.1.1, 8.2.1, 8.4.1)**

   a. WDFW is currently using the 1-observer redd model to estimate Wenatchee spawner abundance for years (2004-2013) when PIT tag data is not available.

3. Important untested assumptions associated with these models were subsequently evaluated using a radio telemetry study (Fuchs et al. 2021). For example, fish that survived the winter and were detected migrating into a spawning tributary in the spring exhibited 100% survival to spawn. We also confirmed that while steelhead may enter the Entiat in the fall, they leave and do not overwinter in the Entiat. Hence, estimates of abundance from the patch occupancy model for the Entiat are all spawners. Estimates of overwinter survival within each population were also generated just in case mainstem redd surveys were not conducted due to poor environmental conditions or in the case of 2020, COVID restrictions. WDFW did not conduct steelhead spawning grounds surveys in 2020 and used estimates of overwinter survival to generate estimates of mainstem spawners (See 2021). We also confirmed PIT tag detection migration routes were consistent with radio telemetry data including the downstream migration of steelhead tagged at Priest Rapids Dam back to their natal downstream populations or overshoots.

4. The patch occupancy model was modified again to include downstream detection sites to estimate the abundance of overshoot fallbacks. Based on those data, we developed another model to estimate the abundance of overshoot fish at Priest Rapids Dam that, when combined with the estimates of upstream populations, provided a better accounting of all steelhead counted at Priest Rapids Dam (Murdoch et al. 2022). The model can now fully account for all steelhead that migrate past Priest Rapids Dam, both those that are destined for UCR populations and those from Snake River and Mid-Columbia populations. While not specifically related to the M & E Plan, this component of the model allows for the monitoring of previously unquantified mortality of adult steelhead from downstream populations and will be an important tool when additional measures are implemented to improve the downstream migration survival thereby improving the status of those populations.

5. More recently, we used the patch-occupancy model to estimate Priest Rapids ladder counts based on counts from other dams when errors in ladder counts were observed (e.g., more steelhead counted at

Rock Island than Priest Rapids). One beneficial feature of the patch occupancy model is that it can operate using abundance estimates at any detection location (See and Truscott 2022). In summary, WDFW asserts the current steelhead monitoring approach utilizes the best available science, conducted within the Upper Columbia, and provides the HCP HC a robust, dynamic, and flexible approach that does not exist anywhere else in the world. WDFW has developed the current monitoring approach to be consistent with guidance on monitoring the recovery of ESA listed salmon and steelhead populations including **unbiased** estimates of spawner abundance (Crawford and Rumsey 2011).

Proposed Model

WDFW has incorporated the best available science into a multi-faceted comprehensive steelhead monitoring program that address status and trend, hatchery management, harvest, and hydro-operation concerns. Spawner escapement estimates not only incorporate statistical uncertainty, but the interannual variability associated with changes in migrations patterns, spawning distribution, and pre-spawn mortality. This type of interannual variability is only expected to increase with climate change. While the proposed method presented to the HCP HC incorporated some of the very same statistical approaches and data from WDFW research, results presented were preliminary and it was unclear how the model would **improve** the current monitoring approach (i.e., accuracy or precision) or address any of the questions to those described above. Furthermore, the proposal only addressed the Wenatchee population, and it is unclear if or how spawner abundance estimates for the other three populations would be estimated.

Based on the information shared during the HCP HC meeting WDFW is also providing specific comments below:

- The proposed model is essentially a subset of the existing patch occupancy model, using the exact same PIT tagged fish but only focusing on detection sites within the Wenatchee. The only major difference is that the proposed method applies a fixed overwinter survival estimate to the number of steelhead in the mainstem Wenatchee, while the existing method utilizes redd counts to estimate spawners in the mainstem.

    - As demonstrated in 2020, when no redd counts were available, the existing method can also utilize the estimated overwinter survival from Fuchs et al. (2021) to estimate mainstem spawners (See 2021).

    - However, while this may be a suitable alternative in the face of missing redd data (e.g., extreme environmental conditions or pandemic) it is doubtful that it provides more accurate estimates, especially as we move farther away from when that radio telemetry study was conducted (2015-2016). Assuming that overwinter survival remains fixed and constant through time is similar to the historical method of assuming movement rates and prespawn mortality were constant (i.e., biased estimates). WDFW has made great advances in moving away from such assumptions in our current methods.

- The proposed model does not separate hatchery and wild spawners, which is a potential issue for two reasons. The first is that hatchery and wild fish may move through and survive within reaches differently. For example, once above Tumwater, hatchery fish may be much more likely to move to

the Chiwawa because that is where the hatchery is while wild fish may have a different distribution across the various tributaries in the upper Wenatchee. The second issue is that reporting on wild and hatchery spawners is a key component of monitoring the wild population. Merely reporting total spawners will not satisfy the requirements for status and trend monitoring, population viability analysis and assessment of progress towards recovery goals.

- The proposed model groups hatchery and wild fish together across two years from the Fuchs et al. (2021) study to generate an estimate of overwinter survival. This assumes that hatchery and wild fish suffer the same overwinter mortality. Although Fuchs et al. (2021) found no statistically significant differences in overwinter survival in the mainstem Wenatchee between hatchery and wild fish, or between two years, the sample size was limited.

- Both models assume that fish are on a one-way journey to their spawning grounds, which means that for fish detected in multiple tributaries their detection histories must be "cleaned" before running the model. WDFW has developed a software package to help identify which detection histories must be cleaned and provide the biologist all the information necessary (e.g., dates and locations of observations) to determine where that fish spawned, as well as a suggestion based on the last upstream detection of that fish. The proposed model essentially assigns a fish to the first spawning tributary it is detected in after March 14, regardless of movements detected before or after that date.

- The proposed model excludes repeat spawners. While repeat spawners may be a small percentage of the run, excluding them may violate some of the mark-recapture assumptions in the proposed model (not a completely representative sample), providing biased results. The patch occupancy model currently in use does not exclude repeat spawners, but only uses their detections if they were caught in the trap at Priest Rapids during that year's migration, becoming part of the valid list of tags for that year.

- The proposed model does not fully account for known removals at Dryden dam or Tumwater dam. Although there has not been a sport fishery on steelhead in the Wenatchee for several years, that is another potential source of known removals that are not accounted for in the proposed model. This omission will lead to biased results.

- The current monitoring approach only requires redd surveys in the Wenatchee River are also used to monitor spawn timing (**Q5.2.1**). While spawning timing data is not currently collected by origin, redd surveys provide a method for detecting shifts in spawning timing that could warrant a more detailed examination based on origin. The proposed method would create a data gap and because spawning timing in the hatchery environment is so different from the natural environment and often require hormones to accelerate maturation these data would likely be inadequate for monitoring purposes through time.

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