Upper Columbia Spring Chinook and Steelhead Acclimation Project 2017 Summary Report

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1.0 Background

The Upper Columbia Salmon and Steelhead Acclimation (UCSCSA) Project is designed to provide additional acclimation opportunities for existing spring Chinook and steelhead hatchery mitigation programs in the Wenatchee and Methow basins. The Project uses natural ponds for short term acclimation to improve the efficacy of supplementation programs. Acclimation can improve the efficacy of supplementation programs by encouraging hatchery fish to return to available habitat where they may successfully spawn rather than returning to hatchery sites which often sees high densities of hatchery returns and reduced habitat quality.

The Tribal Restoration Plan (TRP) Wy-Kan-Ush-Mi Wa-Kish Wit (CRITFC 2014) is designed to 'put fish back in the rivers'. The TRP emphasizes strategies that rely on natural production and healthy river systems to restore anadromous fish production. For hatchery production programs this means releasing young salmon into areas where they can return as adults and help rebuild naturally spawning populations. The UCSCSA project helps support the goals of the TRP.

Acclimation can support supplementation programs through returning adult spawners to suitable habitat and through improved homing fidelity. Habitat where hatchery fish spawn has been shown to affect the reproductive success of the spawning hatchery fish (Williamson et al 2010). Hatchery spring Chinook in the Wenatchee Basin have been shown to have reproductive success equal to natural origin spawners when spawning in areas of high quality habitat and low spawner densities (Ford et al. 2013).

1.1 Project History

The Project receives funding under the Columbia River Basin Fish Accords (MOA). The project began in 2009 with the first releases in 2010. Much of the efforts under this project to date have been focused on identifying acclimation sites, obtaining permitting for acclimation sites, developing acclimation plans, and working with hatchery program operators and managers to reprogram some production to UCSCSA acclimation sites.

Many of acclimated releases done by this Project were intended to address questions identified by the local resource managers, such as:

1) How do hatchery smolts perform in natural ponds?

2) Is it possible to co-mingle more than one species?

3) Can the distribution of adult returns be affected by short term acclimation?

4) Does short term acclimation improve homing fidelity? And,

5) What is the appropriate number of fish to release from natural ponds based on the habitat capacity for adults?

This report documents project's spring Chinook acclimation activities in the Methow Basin between February 2017 and January 2018 and its continued project development efforts in both Wenatchee and Methow basins. There were no Project releases in the Wenatchee Basin in 2017, however future releases will occur pending agreements between the Habitat Compensation Plan Hatchery Committees (HCP HCs). This report also provides data to help address project objectives 3, 4, and 5. Data collection is underway to answer question 3 and an approved study plan is in place to evaluate 4 and 5 (Appendix A). Adult returns and distribution, as provided through mitigation M&E requirements, will be provided in future progress reports.

2.0 Site Description

Yakama Nation staff (YN) acclimated BY2015 juvenile spring Chinook at the Goat Wall Pond in the Methow Basin for short term rearing and release as part of the UCSCSA program in the spring of 2017.

The Goat Wall Pond is a new site utilized by the UCSCSA program. It is located on private property and within a disconnected side-channel (Cold Creek) to the Methow River at river kilometer (RKM) 0.0 -112.5, approximately 4.3 RKM downstream of the confluence with the Lost River. Water to the acclimation area is supplied through a diversion on Gate Creek and through natural groundwater seepage. Use of the site requires the installation of a barrier net to partition off a portion of the side-channel to keep acclimating hatchery juveniles separate from natural origin species, while maintaining unimpeded passage upstream and downstream. The site encompasses 0.08 acres (30' x 110') and is approximately 9500 cu ft., with the capacity to hold up to 30,000 fish at 16 fish per pound at densities less than 0.06 lbs/cu ft/in.

Prior to transfer, snorkel surveys confirmed the acclimation area was void of any fish species. A barrier net was installed subsequent to surveys. Shade covers were installed post- transfer to enhance the rearing environment and minimize stress. YN staff also installed three, pass-through PIT tag detection systems, in series, within the outlet of the side-channel to obtain data

for in-pond and migratory survival analysis. Details for this release location can be found on the PTAGIS website and can be viewed at: https://www.ptagis.org/sites/interrogation-site-metadata?IntSiteCode=GWP.

3.0 Methods

3.1 Acclimation

3.1.1 Source of Project Fish

Methow Composite stock, spring Chinook (BY2015) were obtained through the existing Douglas and Grant County Public Utility District's (PUDs) hatchery mitigation programs, and approved through Statement of Agreements (SOAs) between Rocky Reach and Wells HCP HCs, and Priest Rapids Coordinating Committee Hatchery Sub-Committee (PRCC HSC). The Rocky Reach HCP HC is comprised of representatives from Chelan County PUD, Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Colville Confederated Tribes (CCT) and YN. Wells Dam HCP HC is comprised of representatives from Douglas County PUD, USFWS, NMFS, WDFW, CCT, and YN. The PRCC HSC is comprised of representatives from Grant County PUD, USFWS, NMFS, WDFW, CCT, YN, and Columbia River Inter-tribal Fish Commission (CRITFC). The juveniles were reared full-term at the Methow Fish Hatchery (FH) prior to transfer to the Goat Wall site.

3.1.2 Fish Transportation Procedures

Approximately 25,978 spring Chinook pre-smolts were transferred by YN staff staff to the Goat Wall site on March 30, 2017. Transport procedures included crowding and loading into distribution trucks via a fish pump. Water was tempered to approximately 41.0° F prior to transfer. Loading densities ranged between 0.3 to 0.5 pounds of fish per gallon of water consistent with Integrated Hatchery Operations Team (IHOT) standards (IHOT 1995).

3.1.3 Fish Condition, Growth, and Health Monitoring

A pre-transfer health examination was conducted by WDFW Fish Health on February 28. A growth sample of 200 individuals was conducted by YN staff on March 29. Post-transfer, daily

activities at the Goat Wall pond included feeding, water quality monitoring (i.e., - temperature and dissolved oxygen measurements), and non-lethal predator hazing. Juveniles were monitored for signs of disease symptoms (lethargic behavior, skin coloration, visible lesions, caudal fungus, etc.) through observation of feeding behavior and monitoring of mortality trends. Weekly growth samples of 100 individuals were conducted for a general assessment of fish condition, visual assessment of smoltification, and collection of length and weight data to calculate growth rates and condition factors.

3.1.4 Release

A volitional release was initiated on the evening of April 17 and concurrent with a projected increase in river flow to optimize survival during out-migration (Figure 1). A pre-sample of 200 juveniles prior to release verified >90% of individuals displayed visual signs of smoltification (loss of parr marks, onset of silvery appearance, darkening dorsal surface, schooling behavior).

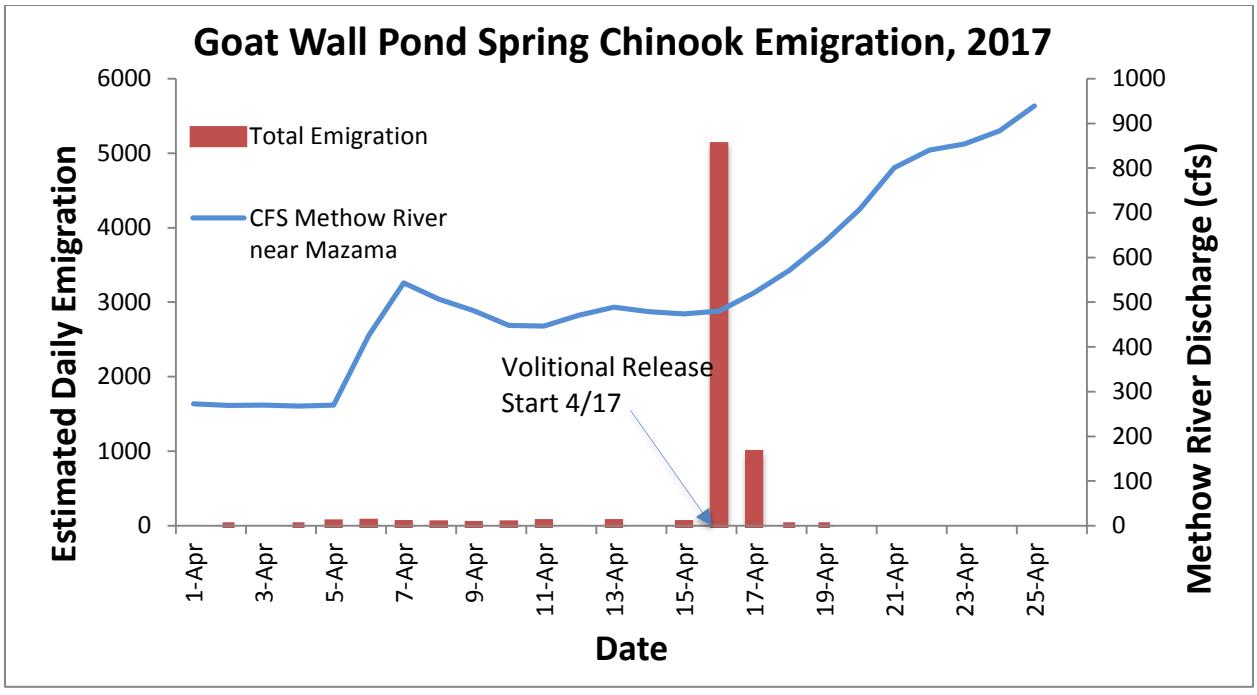

Figure 1. Emigration (numbers based on PIT tag detections) vs. flow at Goat Wall Pond, 2017.

3.2 Survival Metrics

3.2.1 Juvenile Survival

A total of 4,965 individuals were PIT tagged by YN staff on December 5, 2016. Tagged fish were used to measure various survival metrics; in-pond, release-to-McNary Dam, and tagging-to-McNary Dam. Because tagging occurred before transfer, tagging-to-McNary survival metric is inclusive of both in-pond and downstream migratory survivals. Therefore, we view the tagging-to-McNary metric the best overall gauge of juvenile survival and most appropriate for comparison between the acclimated releases and reference releases (e.g., on-station or direct plants).

In-pond survival was estimated by the following formula:

$$S_{ip} = \frac{(D_{outlet} / E_{detection})}{PIT_{total}}$$

Where S_{ip} = in-pond survival, D_{outlet} = unique detections at the pond outlet, $E_{detection}$ = estimated PIT detection efficiency at the outlet, and PIT_{total} = the total number of PIT tagged fish released into the pond.

We estimated the efficiency of the PIT tag arrays installed at the outlets with the following formula.

$$E_{detection} = \frac{\text{\# unique outlet detections that were also detected downstream}}{\text{Total number of downstream detections}}$$

By querying the PTAGIS database for downstream PIT tag detections for fish released from the facility, we are able to estimate the efficiency of our antennas by determining the proportion of the fish detected downstream that were also detected exiting the pond.

Survival estimates for both tagging and release-to-McNary and travel time from point of release to downstream detection points use Cormack-Jolly Seber estimates with associated standard errors for both survival and detection probabilities (Columbia River DART).

3.2.1.1 Estimated Mortality-Predation Consumption Model

As standard practice of good fish husbandry and fish health, moribund and deceased juveniles were recovered from the site daily until the end of release to determine known mortality during the rearing period. Additionally, we assume loss occurs throughout the season resulting

from predation, and precluding enumeration of known mortalities. To estimate unaccounted for loss, we use a predation consumption model developed for the Mid-Columbia Coho Reintroduction program (MCCRP; Kamphaus et al. 2008, unpublished). YN staff regularly performed non-lethal predator hazing and documented predator behavior, to include species, number, time of sighting, and duration throughout the rearing period. Consumption rates were based both on previously-conducted studies, and anecdotal estimations based on size and feeding behavior relative to similar species (Beckel 1982, Stephenson et al. 2004). Daily documentation of predator abundance was used to estimate predation mortality using the following equation:

$$C_e = C_t * FPP * N_i * D_p$$

C_e= Estimated consumption for an individual predator

C_t= Consumption total per day (kg) for an individual predator

FPP= Fish per pound

N_i= Number of same species predators observed during time interval i

D_p= Duration of same species predators observed

At acclimation sites containing PIT tagged groups, results from the model are routinely used in conjunction with tag detections to estimate in-pond loss to predation. However, if data collected from PIT tag detections prove insufficient due to unforeseen events (e.g., equipment failure or loss, poor detection efficiency, etc.), or if a rearing group was not PIT tagged, results from the model may be combined with known mortality as an alternative method to estimate in-pond survival.

3.2.2 Adult Survival and Homing Fidelity

Data for analysis of smolt-to-adult survival rates (SARs) and spawner distribution/homing fidelity will be provided by Chelan PUD, as part of the Monitoring and Evaluation component of their mitigation program.

4.0 Results and Discussion

4.1 Acclimation

A total of 25,894 spring Chinook juveniles were successfully acclimated for a period of three weeks at the Goat Wall site. Volitional release was initiated on April 17 and concluded on April 26 after visual observation determined the pond was empty. A pre-release sample of 200 individuals demonstrated the group was 16.6 fpp with a mean fork length of 136.0mm. The group achieved a target size within established parameters (15 - 18 fpp) with no health or behavioral issues observed throughout the season. A total of 55 known mortalities were removed throughout the rearing period. Water temperature averaged 42.1° F, with a minimum of 39.2° F, and maximum of 46.6° F. For a summary of acclimation details, please refer to Table 1.

Table 1. Acclimation details for the Goat Wall Pond.

Release Year	Site	Program	# Acclimated	Transfer Date	Release Date	Size at Transfer (FPP)	Size at Release	PIT Tags transferred
2017	Goat Wall	DCPUD Spring Chinook	25,894	3/30/17	4/17/17	18.5	16.6	4,934

4.2 Survival Metrics

4.2.1 In-pond, Release-to-McNary, and Tagging-to-McNary Survival

Estimate of in-pond survival based on PIT tags could not be attained due to poor detection efficiency (24.4%) at the outlet arrays; resulting from a higher than expected rate of tag collision during emigration. Although three antennas were operational without interruption, rapid outmigration within the first few hours of release (83.0% of tags detected) inundated detection capabilities. Staff will continue to work to resolve this issue for 2018 (e.g., installation of additional antennas capable of minimizing tag collision between points of detection).

An alternative method for in-pond survival was used; combining known mortality (n = 55) and estimated predator consumption (n = 29). This release group had an in-pond survival of 99.7%. Predator species documented at Goat Wall Pond were limited to one American mink (*Neovison*

vision) and one mallard duck (*Anas platyrhynchos*) throughout the season.

Mean travel time between groups released from the Goat Wall Pond and Methow FH to downstream detection locations was similar (Table 2), and likely attributed to similar hydrological conditions experienced during emigration. Since observed detections at the lower Methow River PIT tag array continue to be too low (n ≤ 10 in most years) to confidently estimate travel time out-of-basin, the Rocky Reach Dam juvenile by-pass array was used as an alternate downstream detection point to better represent emigration timing.

Table 2. Mean Travel Times for Goat Wall Pond and Methow Fish Hatchery from release to downstream detection locations, 2017.

Release Location	To Rocky Reach Dam (RKM 763)			To McNary Dam (RKM 470)		
	Mean Travel Time (d)	n	SE (d)	Mean Travel Time (d)	n	SE (d)
Goat Wall Pond	13.1	*187*	*0.87*	29.7	*44*	*0.93*
Methow FH	12.2	*455*	*0.54*	28.7	*116*	*0.84*

There were no significant differences between in-pond, release-to-McNary, and tagging-to-McNary survival rates for the Goat Wall Pond and on-station Methow FH releases (Figure 2). Comparable results may be attributed to similar hydrologic conditions during emigration and detection rates observed at mainstem, Columbia River facilities. Releases from both locations were initiated on April 17.

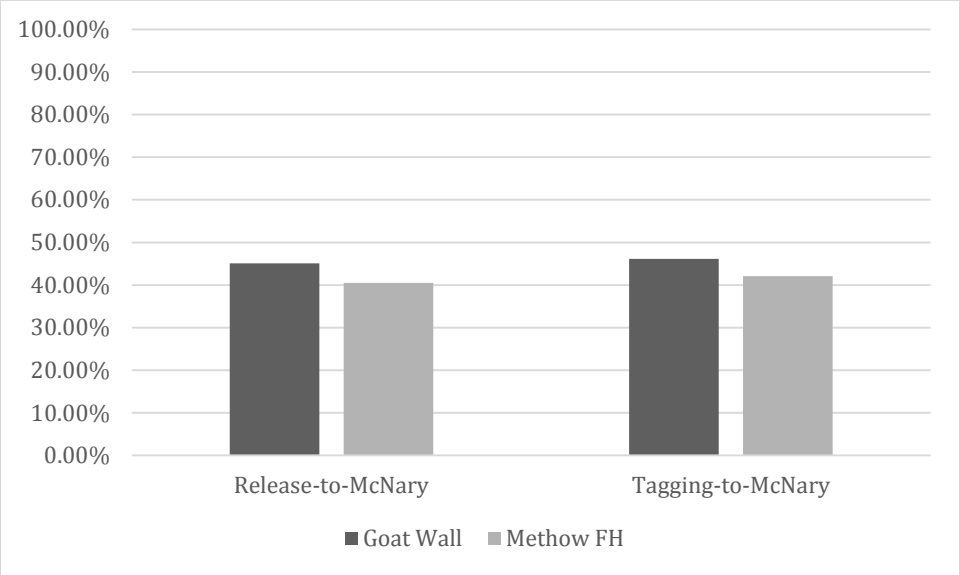

Figure 1. Juvenile survival metrics for the Goat Wall site, 2017. Survival rates for Methow FH spring Chinook releases are provided for reference. Release-to-McNary and tagging-to-McNary survivals for the Goat Wall Pond and Methow FH were 45.1% (*S.E. = 6.5%*) and 46.1% (*S.E. = 5.9%*), and 40.5% (*S.E. = 4.5%*) and 42.1% (*S.E. = 4.5%*), respectively.

4.2.2 Adult Survival and Homing Fidelity

At the time of this writing, the adult return data remains incomplete. Analysis of smolt-to-adult survival rates (SARs) and spawner distribution/homing fidelity will be provided in future, multiyear summary reports.

5.0 Project Development

For the 2017 calendar year, project development captured in PISCES Statement of Work (SoW) included the initiation/continuation of development of multiple sites to enhance the implementation of increased distribution of acclimated releases groups.

- Objective 1: Continue development of a steelhead acclimation site in the upper Wenatchee; primarily on Nason Creek to alleviate the need for direct plants currently being conducted.
- Objective 2: Continue development of a spring Chinook acclimation site in the upper

Wenatchee

- Objective 3: Continue development of a spring Chinook and/or steelhead acclimation release sites

5.1 General

NEPA compliance through the ongoing Environmental Assessment (EA) process was completed September 2017 with a Finding of No Significant Impact (FONSI) associated with the proposed project. Finalization of the EA/FONSI was reliant on final ESA consultations that were also in preparation through NOAA's National Marine Fisheries Service (NMFS) and USFWS Ecological Services (ES) offices. The SEPA lead; Washington Department of Fish & Wildlife concluded through a Determination of Non-significance (DNS) that the environmental analysis and conclusions outlined within the EA were adequately and appropriately covered and therefore adopted. The NOAA-NMFS informal consultation that was provided on October 12, 2016 for the proposed construction, maintenance, and operation of the Powerline Acclimation Pond and determined to not likely to adversely affect (NLAA) listed or threatened species as well as associated critical habitat was finalized in 2017. A Letter of Concurrence (LOC) was provided by NOAA-NMFS on January 26, 2017 stated those impacts would not adversely affect the species of concern during this consultation. For this project, NEPA, SEPA and ESA coverage have been obtained.

5.2 Powerline Acclimation Site (Upper Wenatchee; Nason Creek steelhead)

As detailed in the 2016 report, the proposed site would include construction of a 5,000 sft pond with an average rearing depth of 4 feet. The two roughen channels (3% slope preference) for both inlet and outlet to the pond site would allow for upstream/downstream access by fish of all life histories. Operations would occur as spring acclimation of up to 75,000 steelhead yearlings (currently direct planted into Nason Creek) that would be transported to the site mid-March from Chiwawa Acclimation Facility (overwintering location) and released late April/early May (Appendix D). Designs were updated in May 2017 by the selected engineer (FishEngineers, Inc.) to include a berm/wall structure in the pond itself that would provide sufficient water flow through the pond. Bird wiring for predation deterrence was also included into the final designs. In-pond, substrate structure (i.e. - broken logs, boulders, etc.) were included for habitat complexity to the final design. Subsequently, the cost estimate and construction procedures were updated and prepared for bidding process schedule to begin in early 2018.

Property ownership was identified after preliminary, environmental parameters were assessed

and reviewed (i.e. - suitable space, water availability, and non-sensitive working area) and permission was granted to allow the development of the project. A long term Land Use Agreement (LUA) will be produced as the process continued and is determined if a viable location to construct the acclimation pond in question. The creek, named as Upper Whitepine, is a year round spring fed water source able to produce between 1.5 and 2.0 cubic feet per second. Proposed construction location is within a current BPA powerline transmission easement. As previously mentioned in past reports, YN had secured a Land Use Agreement (LUA) for access/construction/use within the aforementioned easement. An addendum of the original agreement was required to extend the timelines for construction purposes and secured in 2017. Specific conditions for the term of the LUA are outlined within the agreement (Appendix E; TERR-3, BPA Case No. 20130431).

Landowner negotiations and legal review of a long term license agreement were ongoing throughout the year. A letter of consent was signed by all parties in February 2017 to reserve the right to continue negotiations with the landowner. Tentative completion date for a fully executed license agreement was set for early 2018 and duration/term of this agreement had been negotiated at 20 years from the time of signing.

Permitting for the site included preparation of the HPA for instream work during construction through Washington Department of Fish & Wildlife. The revegetation plan provided by Grette & Associated was modified and finalized in February 2017 after review from the landowner and agreement to what would be needed for mitigation purposes. A Substantial Shoreline Development Permit (SSSDP) and Riparian Variance Criteria Permit were required by Chelan County. Applications were prepared and submitted in 2017 for review and approval.

5.3 Trinity Acclimation Site (Upper Wenatchee; Chiwawa spring Chinook)

The proposed site is a shared site with Mid Columbia Coho Reintroduction Project (MCCRP) which would include pond creations/circular tanks for a proposed 100,000 coho juvenile smolt release. Specific to the UCSCSA project, use of an existing pond as well as one, 30’ fiber glass circular pond enclosed to overwinter up to 35,000 spring Chinook to the pre-smolt, release phase is being proposed. The existing pond measures at 60 feet wide by 90 feet long with an average of 4 feet depth. This pond will be enclosed with a seine/barrier net as used at other acclimation sites employed by YN FRM. Years of snorkel observations determined that ESA listed fish species do no reside in the pond. Operations would occur as overwintering within the enclosed circular (October/November through March) followed by a transfer to the existing

earthen pond for final acclimation and release (March through May). Water sources would be primarily Phelps Creek surface water with an anticipated back up well for emergency use. Existing spring Chinook production would be used (currently released at Chiwawa Acclimation Facility; Appendix F).

Water quality impacts, wetlands review, and cultural sources evaluations were prepared and concluded that the project could proceed as planned. Trinity design was placed out to bid prior and Pacific Engineer, PLLC was awarded the design/construction management for the site. Design was prepared based on provided specifications/scope during spring/summer 2016 with a first draft provided in September 2016 for YN and landowner review. Revisions to the design carried into 2017.

6.0 Conclusions

Overall, acclimation at the Goat Wall Pond in 2017 was successful. The group achieved a target size within established parameters with a low mortality rate, and minimal predation observed throughout the season. Staff will continue efforts to improve detection capabilities at this location in 2018. Acclimation activities in 2017 were intended to meet objectives outlined in UCSCSA Project and TRP by continuing efforts to maximize efficacy of the supplementation effort by acclimating and releasing smolts in locations where they will return to high quality spawning and rearing habitat.

7.0 Acknowledgements

We are thankful to the many people involved in the Upper Columbia Spring Chinook and Steelhead Acclimation Project. Bonneville Power Administration funded the project; Roy Beaty administered the funding and contracting. Tom Scribner, project manager, provided program oversight and direction. Kraig Mott provided oversight and management of the daily operation of the acclimation pond, data collection, and data management. We would also like to thank WDFW, USFWS, Chelan County PUD, Douglas County PUD, Grant County PUD, the HCP Hatchery Committees, and the PRCC Hatchery Sub-Committee for their willingness to use mitigation program hatchery fish in this Project.

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Appendix A

Upper Methow Spring Chinook Acclimation Plan

Upper Methow Spring Chinook Acclimation Proposal

Upper Columbia Spring Chinook and Steelhead Acclimation Project (BPA Project #200900100)

4 March 2015

Prepared by Keely Murdoch, Yakama Nation Fisheries Resource Management

1.0 Background

1.1 YN's Expanded Acclimation Project

YN's Upper Columbia Spring Chinook and Steelhead Acclimation Project (BPA Project #2009-00-001) 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.

The Columbia River Basin Fish Accords (MOA) recognize that hatchery actions can provide important benefits to ESA listed species. This Project seeks to improve the efficacy of current supplementation programs by providing additional short-term acclimation sites to enhance homing of adult salmon to identified reaches, which may contribute to improved productivity and survival.

The concept of acclimating salmon smolts in 'natural' ponds has been thoroughly tested over the last decade as part of YN's coho restoration project in the Wenatchee and Methow Rivers. The coho restoration project has demonstrated both high survival rates (juvenile and adults) as well as adult returns with SARs comparable or higher than established supplementation programs in the Upper Columbia (YN 2010). The success of YN's coho restoration project in the Wenatchee and Methow basins has also demonstrated that short-term acclimation will attract fish back to the areas where they were released rather than the hatchery facility where they were raised, effectively changing the spawner distribution (Kamphaus et al., 2013)

Beginning in 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.

1.2 Methow Spring Chinook

Spring Chinook that are released from the Methow FH and WNFH have a spawning distribution significantly different than that of natural origin fish (Figure 1; Murdoch et al., 2011).

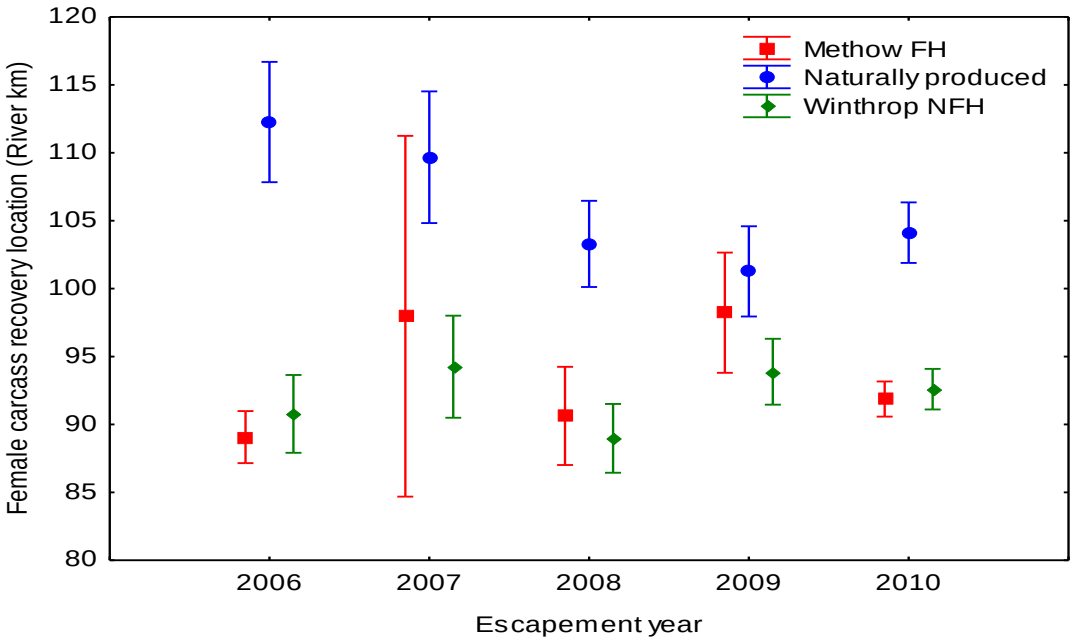


Figure 1. Mean spawner distribution based on female carcass recovery of hatchery and natural origin spring Chinook in the Methow River (Murdoch et al., 2011).

Similarly, the most recent data (2006-2013) indicates the average spawn distribution for Hatchery Origin fish released from the Methow Fish Hatchery is rkm 92 compared to rkm 104 for natural origin fish (Snow et al., 2014).

The difference in proportional spawner distribution (2005-2013) within each origin by upper, middle, and lower reaches for spring Chinook in the Methow River is further illustrated in Figure 2. Figure 2. does not depict spawner composition by reach, rather the proportional distribution of hatchery and natural origin spawners respectively. Figure 2 clearly illustrates that proportionately greater hatchery fish spawn in the lowermost reaches while proportionately greater natural origin fish spawn in the upper most reaches.

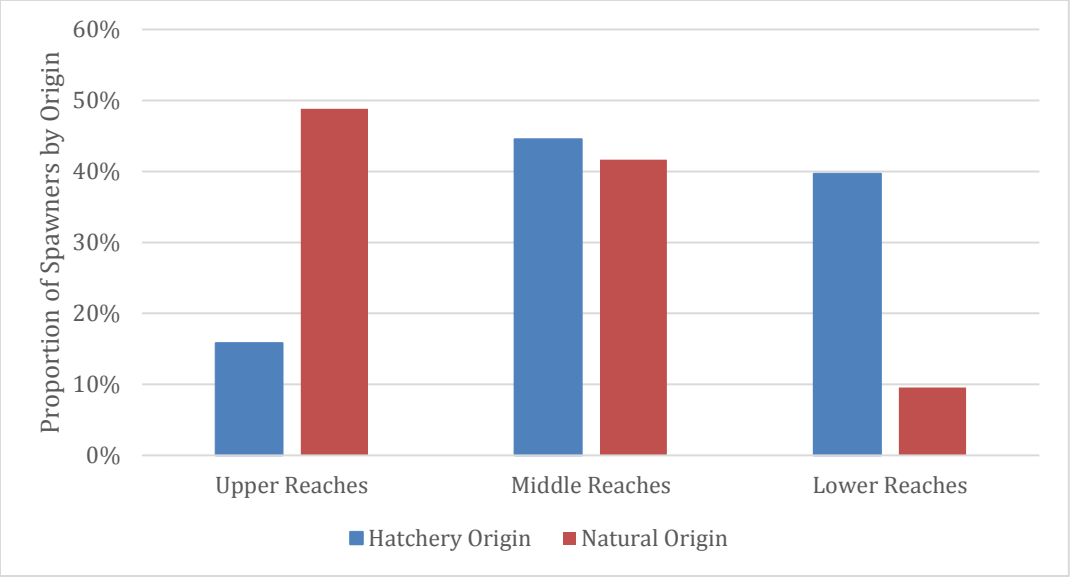
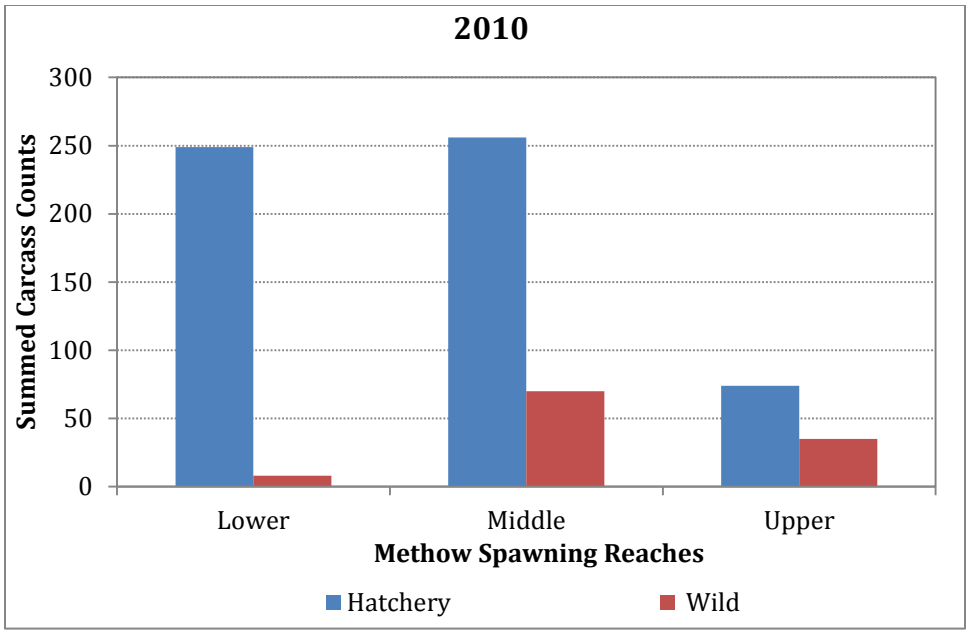


Figure 2. Spawning distribution of hatchery and natural origin spring Chinook in the Methow River as measured by female carcass recovery location (Upper Reaches = M11-M15 including the Lost River and Early Winters Creek, Middle Reaches = M8-M10 including Hancock Springs, Lower Reaches = M4-M7 including the hatchery outfalls and Wolf Creek; Data extracted 2005-2013 annual reports).

The skewed spawning distribution along with high densities of hatchery fish could be a contributing factor to the low productivity observed in the Methow River. We believe that the difference in spawner distribution can be directly attributed to hatchery spring Chinook imprinting and homing to Winthrop NFH (Rkm 81) and Methow FH (Rkm 85) from which the fish are reared and released. Figure 3 shows the numeric representation of hatchery and wild carcasses in each survey reach of the Methow River. Hatchery fish outnumber wild fish in each spawning reach. Moving forward in 2015 and beyond, densities of hatchery origin fish on the spawning grounds should be reduced through a significant reduction in release numbers and may be reduced by adult management; however without some method to attract adult returns to the uppermost reaches we do not expect the spawner distribution to change. Therefore, additional spawners may be desired in reaches that are underutilized by spawners.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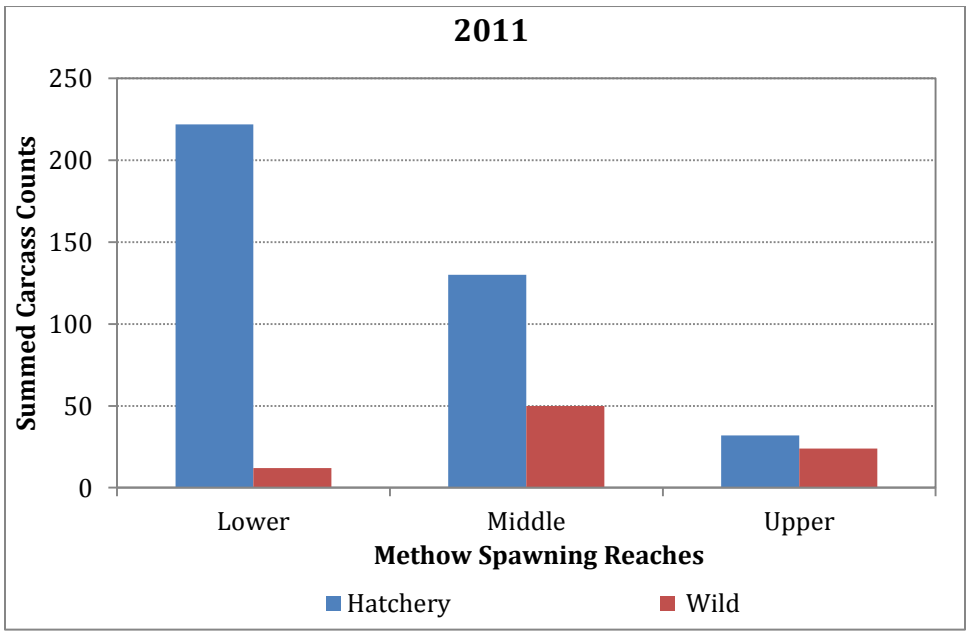
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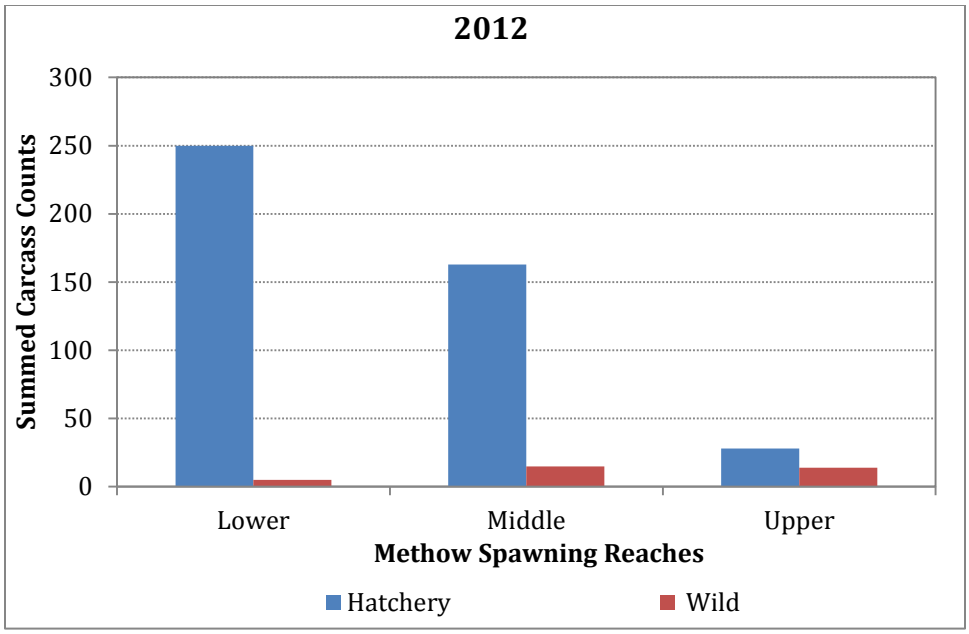

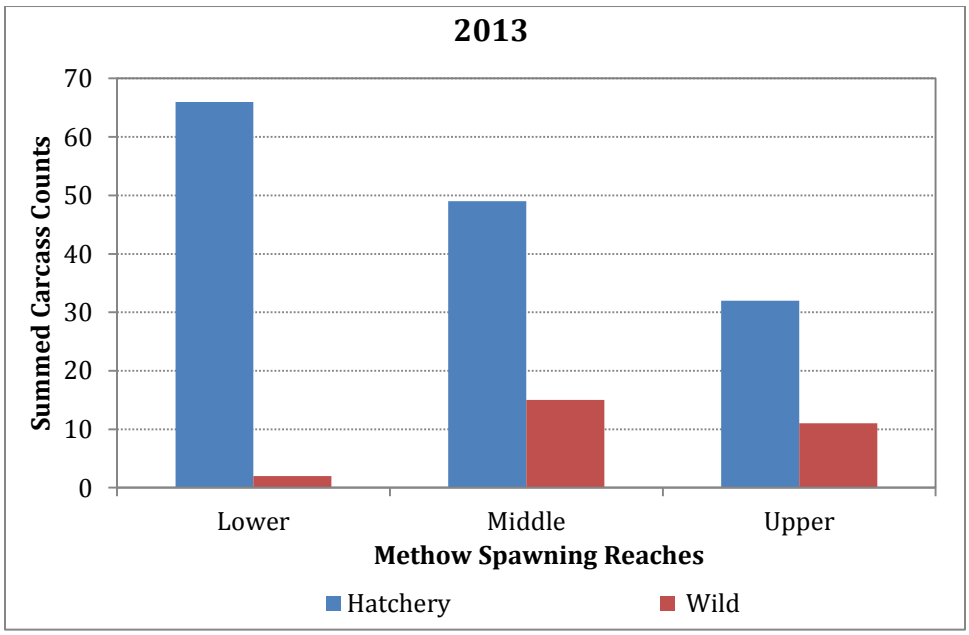

Figure 3. Number of hatchery and wild origin carcasses in Methow River survey reaches in 2010-2013. Reaches are different sizes and contain varying amounts of spawning habitat. (Upper Reaches = M11-M15 including the Lost River and Early Winters Creek, Middle Reaches = M8-M10 including Hancock Springs, Lower Reaches = M4-M7 including the hatchery outfalls and Wolf Creek)

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. 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.

Despite reductions in release numbers of spring Chinook and steelhead from CCPUD, DCPUD, and GCPUD supplementation programs (in 2014), we have no reason to expect a change in the distribution of hatchery origin spawners, only the number of spawners on the spawning grounds. We believe that the future spawning distribution of hatchery fish will not change unless changes under the forthcoming release reductions, but that incorporating a remote acclimation release strategy will enhance homing of hatchery fish to desired reaches.

2.0 Goals and Objectives

The long-term measure of success would be realizing similar spawning distributions of conservation hatchery origin spring Chinook and natural origin returns, as assessed by Objective 5 in the Monitoring and Evaluation Plan for PUD Hatchery Programs (Hillman et al., 2013).

However a release of 25,000 acclimated spring Chinook may be insufficient to shift the overall spawner distribution of hatchery fish in the Methow basin since most (81%) of the Methow FH conservation program smolts will be released directly from the hatchery.

Rather, we view this as a research proposal to answer critical uncertainties surrounding acclimation, and homing fidelity under the new management paradigm, which will operate under pHOS/PNI targets and is expected to incorporate removal of hatchery fish through adult management practices.

With this proposal we will address the following short term objectives:

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 measureable change in spawning location for acclimated hatchery fish compared to hatchery fish released from Methow FH (See Data Analysis for details).

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 in ability to attract fish back to the hatchery (See Adaptive Management for details).

3) To compare project performance indicators (tagging-Rocky Reach/McNary 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 (See Data Analysis and Adaptive Management for details).

3.0 Project Proposal

To encourage hatchery origin spring Chinook adults to distribute (and spawn) farther upstream than fish released from Methow Fish Hatchery the YN proposes to acclimate 25,000 Chinook pre-smolts from Methow Fish Hatchery at YN's Goat Wall acclimation site (Figure 4) beginning in spring 2016 and extended for five years.

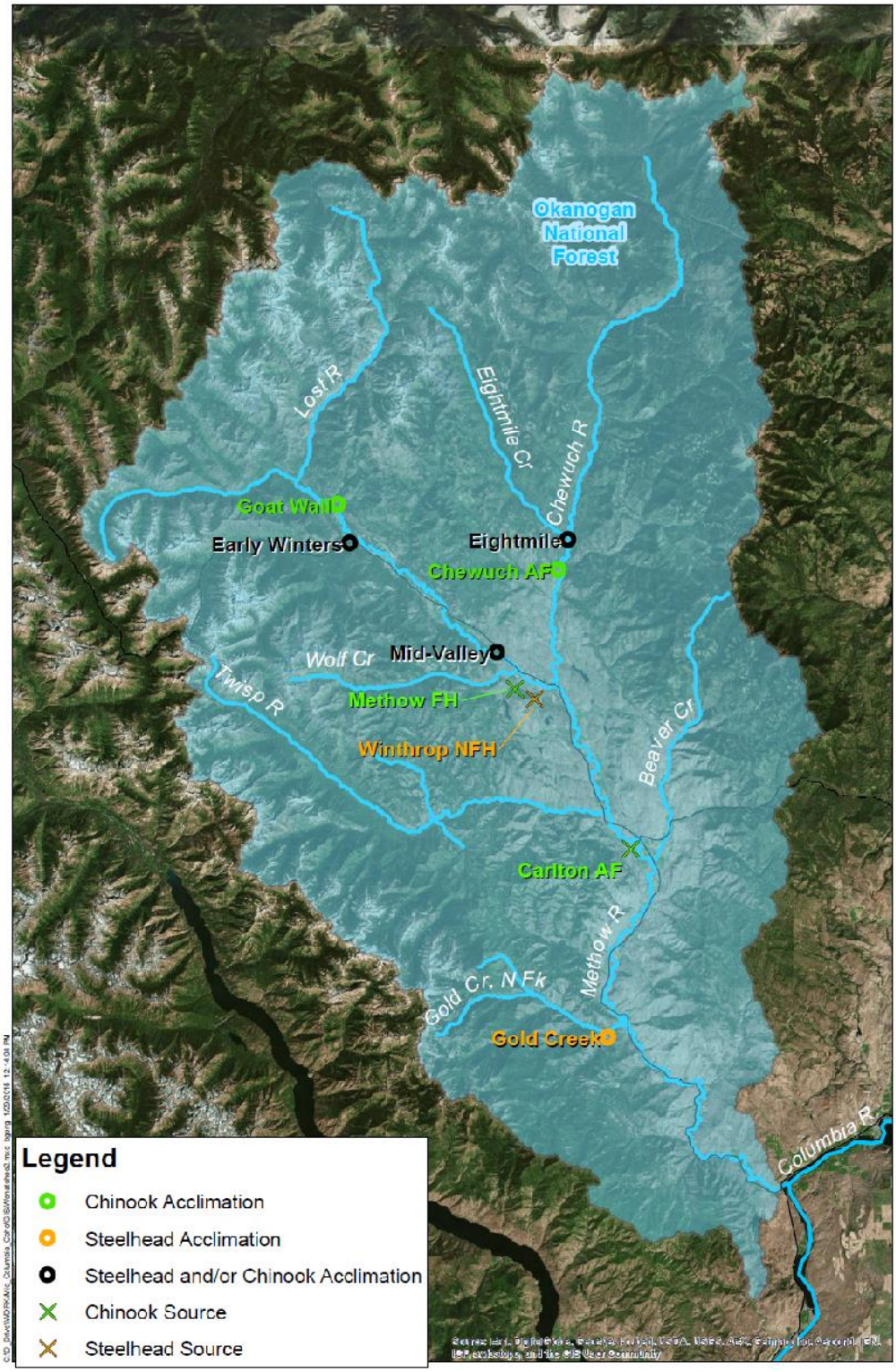

Figure 4. Locations of the Goat Wall Acclimation site relative to Methow Fish Hatchery, Winthrop NFH and other potential acclimations sites in the Methow Basin.

3.1 Upper Methow Release Numbers

Appropriate release numbers in the Upper Methow should be driven by spawner carrying capacity, estimated wild fish abundance, and available habitat. Reach based estimates of carrying capacity do not exist in the Methow basin, but could be estimated from basin-wide carrying capacity estimates. Mackey (2014), estimated the Methow Basin spawner Capacity (Ksp) to be either 2,962 spawners (Ricker S-R model 1992-2006) or 2,173 (Ricker S-R model 95th quantile; 1992-2006). Other estimates have ranged from a high of 4,077 (Fisher) to a low value of 782 (Mullen et al., 1992).

Recovery Criteria for spring Chinook in the Methow Basin requires a minimum abundance of 2,000 natural origin spawners (12-year geo-mean) for delisting. Using the delisting criteria as a minimum escapement target and the current distribution of NOR spawners in the Methow River, we can estimate a minimum number of spawners which may be appropriate for the Upper Methow River (Table 1; as defined as reaches M11-M15, including the Lost River and early Winters Creek). The mean NOR spawner abundance in the upper Methow River (reaches M11-M15, including the Lost River and Early Winters Creek) for years 2005-2013 has been 89 (Table 1). A minimum target number of hatchery origin spawners in the upper Methow River could then be 405 (minimum abundance goal based on delisting criteria– average NOR abundance; 837-185 =652) which is far greater than the expected return from this acclimated release, leading us to believe that spawner capacity exists in the reaches near the proposed acclimation site.

Table 1. Mean number of NOR spawners in Upper Methow River and minimum additional spawners required to reach abundance target.

Reaches	**Mean number NOR spawners (2005-2013)**	**Current Proportion of NOR spawners (2005-2013)**	**Estimated Minimum Spawner Abundance Needed**	**Additional Spawners Required for Minimum Abundance**
Upper Methow Reaches (M11-15, Lost River, Early Winters)	89	20.2%	405	316
Middle Methow Reaches (M8-10, Hancock Springs)	96	21.8%	436	340
Lower Methow Reaches (M4-M7, Wolf Creek, Hatchery Outfalls)	17	3.9%	79	62
Combined Methow River Reaches	203	45.9%	919	716
Chewuch River	164	36.6%	731	567
Twisp River	76	17.4%	349	273
Combined Methow Basin	**441**	**100%**	**2000**	**1559**

While suitable spawning space exists, this project will be implemented in such a manner as to increase the spawning escapement in the upper Methow River while working within the permit required sliding scale of pHOS or PNI. In a typical year, a release of 25,000 smolts from Goat Wall pond would yield 88 adult returns (Table 2) back to the basin (with no adult removal); with adult removal this number could be markedly reduced.

Table 2. Anticipated number of returning spring Chinook adults from a release size of 25,000 at the Goat Wall Site. Acclimation Pond based on minimum, mean, and maximum SARs observed at Methow FH for brood years 2000-2007 (Snow et al. 2014).

Target Number of Smolts	Anticipated Number of Adults Returned		
	Maximum SAR	Mean SAR	Minimum SAR
Upper Methow: Goat Wall Pond (25,000)	203 (0.81%)	88(0.35%)	28 (0.11%)

3.2 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 would be 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 9500 cu ft. We have observed the cfs ranging from 3.85 cfs (in May 2011) up to 11.6 cfs (July 2014). Regular flow monitoring is scheduled to occur during the spring of 2015. The site has a capacity to hold up to 30,000 fish at 16 fish per pound at densities less than 0.06 lbs/cu ft/in

3.2.1 Fish Transportation Procedures

Spring Chinook pre-smolts would be transported in March (preferably by WDFW tanker truck) 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 collect data from a random sample of approximately 100 fish on a weekly basis. Weekly sampling will include a general assessment of fish condition, stage of smoltification, fish length and fish weight so that growth rates and condition factors maybe be assessed. 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.

3.2.3Release

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 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 and releasing into favorable river conditions (high water events). The release will truly be volitional; no fish will be pushed out of the pond. Our experience with spring Chinook in natural ponds indicates that they leave the pond within 7-10 days of removing the barrier net.

4.0 Adult Return Rates and Adult Management

Historic adult return rates from the Methow Fish Hatchery can be found in Table 2 below.

Table 3. Brood year, number of smolts released, adult returns, and SAR (%) from the Methow Fish Hatchery (data source: Snow et al. 2012).

Brood Year	Smolt Released	Adult Returns	SAR (%)
1996	202,947	500	0.246
1997	332.,484	821	0.247
1998	435,670	2300	0.528
1999	180,775	145	0.080
2000	266,392	852	0.320
2001	130,787	508	0.388
2002	181,235	599	0.331
2003	48,831	57	0.117
2004	65,146	316	0.485
2005	156,633	328	0.209
2006	211,717	1,714	0.810
2007	119,407	515	0.431
Mean	**194,335**	**721**	**0.349**

Based on the mean SARs (%) from previous releases, we would expect an average of 88 adults to return to the Methow River from a release of 25,000 smolts (Table 3).

The historic SARs for hatchery fish (Table 3) along with historic estimates of natural origin spawners in the Methow River can be used to provide a retrospective analysis of what we may be able to expect for PNI and pHOS metrics given the release of 25,000 in the Upper Methow River and assuming no adult removal. This retrospective analysis provides insight into what PNI

values could be in the future (Table 4). Based on this analysis, it is clear that even in the absence of adult management, numbers of fish proposed for acclimation in the upper Methow River alone will not result in exceedance of the sliding scale of allowable pHOS presented in the DRAFT Methow Spring Chinook Section 10 Permit (NMFS, In Prep). However, it is unrealistic to expect that fish released as part of this project would be the only fish on the spawning grounds. Similarly, it is also unrealistic to expect that spring Chinook released from this project would not be attracted back to the Methow FH and would not be removed in adult management activities.

Table 4. Forecast of adult returns and PNI using a retrospective analysis of SARs and NOR spawning escapement. This analysis assumes ALL returning hatchery fish spawn in the Methow River and are NOT removed during adult management activities.

Return Year	NORS		Hatchery SAR[a]	Hypothetical Hatchery Return	Hypothetical Proportion of Run		Target Basin-wide PHOS[b]	PNI (pNOB = 1)	PNI (pNOB = 0.75)
	Basin Total	Methow			Hatchery	Natural			
2000	950	611	0.0032	80	0.12	0.91	0.2	0.89	0.87
2001	1832	594	0.0039	98	0.14	0.89	0.1	0.88	0.84
2002	345	86	0.0033	83	0.49	0.39	0.4	0.67	0.60
2003	58	8	0.0012	30	0.79	0.29	Anything	0.56	0.48
2004	488	199	0.0043	123	0.38	0.71	0.4	0.72	0.66
2005	527	221	0.0021	53	0.19	0.69	0.3	0.84	0.80
2006	328	128	0.0033	30	0.39	0.61	0.4	0.72	0.66
2007	266	152	0.0012	30	0.16	0.84	Anything	0.86	0.82
2008	298	172	0.0049	123	0.42	0.59	Anything	0.72	0.64
2009	564	261	0.0021	53	0.17	0.83	0.3	0.86	0.82
2010	601	290	0.0081	203	0.41	0.59	0.3	0.71	0.65
2011	961	432	0.0043	108	0.20	0.85	Anything	0.83	0.79
Mean	**602**	**262**	**0.0035**	**89**	**0.32**	**0.68**		**0.77**	**0.69**

a. For the purposes of this exercise hatchery SARs were matched with return year NORs based on a 4-year age class return

b. Green shading represents pHOS values with those allowed in the Draft Methow Spring Chinook BiOp. Red shading represents pHOS values exceeding those allowed in the Draft Methow Spring Chinook BiOp.

Data from spring Chinook reared at the Methow FH and short term acclimated in the Chewuch Acclimation Pond (AP) indicate that on average 43% will 'stray' back to the Methow River (Murdoch et al., 2011), presumably due to attraction back to the Methow FH where they were reared. In some years this figure has been as low as 0% for BY 1994 (which generated only 2 hatchery returns so straying could not really be evaluated) and as high as 88% for BY 2001. Table 5 presents the same data as Table 4 but assumes that 43% of the spring Chinook acclimated at the Goat Wall pond will be attracted back to the Methow FH and removed from the spawning population during adult management activities.

Based on the analysis presented in Table 5, we expect an acclimated release of 25,000 spring Chinook smolts from Goat Wall to result in an increase of spring Chinook spawners using habitat areas in the upper Methow while making anticipated pHOS and/or PNI targets achievable.

Table 5. Forecast of adult returns and PNI using a retrospective analysis of SARs and NOR spawning escapement. This analysis assumes 57% of returning hatchery fish spawn in the Methow River and 43% are removed during adult management activities.

Return Year	NORs		Hatchery SAR[a]	Hypothetical Hatchery Return	% HORs removed at MFH	Hypothetical HORS to spawn	Hypothetical Proportion of Run		Target Basin-wide PHOS[b]	PNI (pNOB = 1)	PNI (pNOB = 0.75)
	Basin Total	Methow					Hatchery	Natural			
2000	950	611	0.0025	80	43%	45.6	0.07	0.91	0.2	0.94	0.92
2001	1832	594	0.0028	97.5	43%	55.6	0.09	0.89	0.1	0.92	0.90
2002	345	86	0.0053	82.5	43%	47.0	0.35	0.39	0.4	0.74	0.68
2003	58	8	0.0008	30	43%	17.1	0.68	0.29	Anything	0.59	0.52
2004	488	199	0.0032	122.5	43%	69.8	0.26	0.71	0.4	0.79	0.74
2005	527	221	0.0039	52.5	43%	29.9	0.12	0.69	0.3	0.89	0.86
2006	328	128	0.0033	82.5	43%	47.0	0.27	0.61	0.4	0.79	0.74
2007	266	152	0.0012	30	43%	17.1	0.10	0.84	Anything	0.91	0.88
2008	298	172	0.0049	122.5	43%	69.8	0.29	0.59	Anything	0.78	0.72
2009	564	261	0.0021	52.5	43%	29.9	0.10	0.83	0.3	0.91	0.88
2010	601	290	0.0081	202.5	43%	115.4	0.28	0.59	0.3	0.78	0.72
2011	961	432	0.0032	107.5	43%	61.3	0.12	0.85	Anything	0.89	0.86
Mean	**602**	**262**	**0.0035**	**88**		**50**	**0.23**	**0.68**		**0.83**	**0.79**

a. For the purposes of this exercise hatchery SARs were matched with return year NORs based on a 4-year age class return

b.Green shading represents pHOS values with those allowed in the Draft Methow Spring Chinook BiOp. Red shading represents pHOS values exceeding those allowed in the Draft Methow Spring Chinook BiOp.

5.0 Sources of Uncertainty

Like most field research, uncertainties and unforeseen events may limit our ability to address the three objectives described above.

1) Because we are only proposing to acclimate and release 25,000 smolts, low return rates (below average) may result in an insufficient number of returning adults from which to fully address the three objectives and answer critical uncertainties.
2) There is some variability in performance of fish acclimated in natural ponds. We generally believe that natural ponds result in benefits to acclimated fish, including more natural coloration, exposure to natural food sources, and predator avoidance skills. However in the history of our use of natural ponds for acclimation, we have come to realize that fish perform better in some ponds than other ponds. On rare occasions this has caused us to recommend discontinuing use of a pond. Goat Wall is a new acclimation pond, and we have not acclimated fish at this location previously. However, smaller, protected acclimation sites (like Goat Wall) seem to work better than large open sites.
3) Adult Management (removal of hatchery adults from the spawning population) is a new strategy in the Methow River. It is unknown at what rates managers will be able to extract fish from the population. It is possible that over extraction of the acclimated fish could occur in which case we may not be able to address the three objectives outlined above. Similarly it is possible that an insufficient number of hatchery fish will be extracted, allowing the hatchery program to exceed pHOS/PNI goals. Additionally, if hatchery fish are not collected/removed evenly from throughout the run there is a possibility that some segments of the spawning population may be differently affected than other.

6.0 Monitoring and Evaluation

Being able to address near term objectives described in Section 2.0 is key to being able to adaptively manage this acclimation project. The following describes the monitoring and evaluation approach for this project.

Objective 1: To determine if spawner distribution can 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 hatcher 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 Yates' Chi-square analysis by reach.

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 are 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, condition and stage of smoltification a random sample of approximately 100 fish will be sampled weekly (for a total combined sample of 600-800 fish). Weekly sampling will include a general assessment of fish condition, visual assessment of smoltification, fish length and fish weight 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 are no success criterial for the fish condition (k-factor). Fish condition (k-factor) will be used to retrospectively understand any observed differences in survival rates.

Release Monitoring and In-Pond Survival

Up to 7,000 spring Chinook within the site 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 criteria 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 McNary Survival and Tagging to Rocky Reach Survival for metrics from which we plan to measure juvenile survival success)

Tagging-to-McNary Dam and Tagging-to-Rocky Reach Survival

Equal groups of approximately 7,000 PIT tags will be applied to both the acclimated hatchery fish and the on-station release. Tagging will occur during the winter prior to acclimation and release. Because tagging occurs prior to transfer, the Tagging-to-Rocky Reach/McNary survival metric is inclusive of in-pond survival, and downstream migratory survival. Theoretically, Release-to-Rocky Reach/McNary Survival could be greater for acclimated releases than non-acclimated releases, therefore a potentially higher in-pond mortality rate could be ameliorated and later life stages. Therefore comparing Tagging-to-Rocky Reach/McNary survival rates for both on station and acclimated releases is a better comparison of overall juvenile survival than a Release-to-Rocky Reach/McNary metric.

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

Measured Variables:

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

Derived Variables:

- Cormak-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/McNary 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 in 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.

7.0 Project Timeframe

Release would occur in 2016-2020. In-pond and in-hatchery assessment would also occur in those years. Field assessment of adult return rates and spawning distribution would occur in 2017-2023. Data collected from the spawning grounds and from the hatchery will occur during regular M&E activities described in Hillman et al. 2013.

The five year timeframe is designed to achieve the near-term objective described above, which address critical uncertainties. Pending results, the HCP HC and PRCC HSC may consider future opportunities to expand acclimation of Methow FH spring Chinook production. in 2019 based upon available information while the adult return data is collected through 2023.

8.0 Alternate Site: Early Winters Pond

As mentioned in 'Section 5.0 Sources of Uncertainty', the Goat Wall site is a new site that has not yet been used for acclimation. If it appears that in-pond survival at Goat Wall is lower than desired, or if for any other reason the site does not work well (such as difficult fish containment or changes in land owner agreement) we are also developing an alternate site. Early Winters Pond is also a potential site for future expansion of this project should the data generated in this 5-year plan warrant expansion and Early Winters Pond is officially accepted/incorporated into the Mid-Columbia Coho Program and/or as part of the Upper Columbia Salmon and Steelhead Acclimation Project. Early Winters Pond would be a constructed pond that is being evaluated as part of Mid-Columbia Coho BA Addendum, and the Upper Columbia Salmon and Steelhead Acclimation Project (in Prep). Site detail and development/construction plans for Early Winters Pond can be found in Appendix B.

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.

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Appendix B

Rock Island/Rocky Reach HCP HC

Chewuch Acclimation Facility SOA

Rock Island and Rocky Reach HCP Hatchery Committee

Statement of Agreement

Chewuch Acclimation Plan

November 20, 2013

Statement

The Rock Island and Rocky Reach HCP Hatchery Committees agree to acclimate Chelan PUD's Methow spring Chinook mitigation obligation (60,516 smolts) in the Chewuch Acclimation Pond as part of YN's Expanded Acclimation Project beginning with the 2015 release (BY2013) contingent upon the YN and Douglas PUD arriving at a lease agreement and subsequent approval by the HC for the use of the pond for coho and Chelan PUD spring Chinook. The smolts would be short-term acclimated between March and May. Starting in 2016 spring Chinook may be co-acclimated with coho salmon pre-smolts. Annual reports and monthly updates will be provided to the HCP HC.

Background

YN's Expanded 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. YN intends to lease the Chewuch Acclimation Pond from DCPUD for the purpose of acclimating coho and spring Chinook salmon. Continued releases of spring Chinook in the Chewuch are an important part of salmon recovery in the Methow Basin. Additional details can be found in Attachment 1 (Chewuch Acclimation Plan). This SOA is contingent upon approval of an SOA from the Wells HCP HC allowing the use of the facility.

Chewuch Acclimation Plan

9 October 2013

1.0 Background

1.1 YN's Expanded Acclimation Project

YN's Expanded Acclimation Project (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 and can be used to improve the Viable Salmonid Population (VSP) status of ESA listed spring Chinook and steelhead.

The Columbia River Basin Fish Accords (MOA) recognize that hatchery actions can provide important benefits to ESA listed species and to the Tribes, supporting treaty fishing rights. This Project seeks to improve the efficacy of current supplementation programs by providing additional short-term acclimation sites with the purpose of improving the spawning distribution of adult returns and/or homing fidelity, which may contribute to improved productivity and survival.

The concept of acclimating salmon smolts in 'natural' ponds has been thoroughly tested over the last decade as part of YN's coho restoration project in the Wenatchee and Methow Rivers. The coho restoration project has demonstrated both high survival rates (juvenile and adults) as well as adult returns with SARs comparable or higher than established supplementation programs in the Upper Columbia (YN 2010). More recently YN has demonstrated that the technique of short term acclimation and co-mingling species is a viable method of acclimating smolts (Kamphaus 2011). However adult return data (SARs, etc.) from the comingled releases are still being collected and are not yet available.

Beginning in 2014, as a result of the HCP No-Net-Impact (NNI) recalculation, smolt release numbers from most conservation hatchery programs in the Methow and Wenatchee basins will be significantly reduced. Because of this reduction, we believe it is crucially important that each program be operated in a manner which maximizes efficacy of the supplementation effort.

1.2 Chewuch Acclimation Pond

The Chewuch Acclimation Pond (Chewuch AP) is owned by Douglas County PUD and has been operated by the Washington Department of Fish and Wildlife (WDFW) since 1994 (Brood Year 1992). In 2014, recalculated hatchery mitigation objectives for DCPUD, CCPUD and GCPUD will take effect. Recalculated values have significantly reduced the number of spring Chinook

reared for conservation purposes and as a result, 2014 will mark the first year that no spring Chinook will be released from the Chewuch AP.

YN believes that continued releases in the Chewuch are an important part of salmon recovery in the Methow Basin. YN is seeking to lease the facility from DCPUD for the acclimation of coho salmon (Coho Reintroduction Project) and spring Chinook (Expanded Acclimation Project). This lease would begin in 2015.

2.0 Chewuch Acclimation Plan

YN proposes to acclimate approximately 60,516 spring Chinook in the Chewuch AP beginning in 2015. These fish would represent CCPUD's Methow Spring Chinook production.

2.1 Fish Transportation Procedures

Spring Chinook pre-smolts would be transported in March (by WDFW tanker truck) from the Carlton over-winter site to the Chewuch AP for final acclimation . 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 into the ponds. Loading densities may range from 0.3 to 0.5 pounds of fish per gallon of water.

2.2 Acclimation Procedures

Density Criteria

The following table represents current density criteria for HCP spring Chinook rearing and acclimation. The HCP Hatchery Committee may adjust criteria as necessary

Table 2. Density criteria for spring Chinook.

Acclimation Criteria	ELISA≤0.119[a]	ELISA≥0.12
Density Index (lbs/cf-in)	0.10	0.06
Flow Index (lbs/gpm-in)	1.00	0.60

[a]The 0.119 threshold was developed jointly by the USFWS and WDFW. Fish with an ELISA>0.19 would be culled.

In 2015, only Chinook would be present in- pond with a density index well below the limits described in Table 1. In 2016, the pond may be shared with coho smolts but density criteria described above would not be exceeded (Table 1).

Co-acclimation with Coho Salmon

Beginning in 2016, it is likely that spring Chinook pre-smolts could be co-acclimated alongside coho salmon pre-smolts in the Chewuch AP. Numbers of coho salmon acclimated would depend on the densities chosen for any given year (Table 1) and would likely be between 66,000 to 151,000 coho pre-smolts. Coho could be co-mingled with, or separated from Chinook with a barrier net depending upon similarities in fish size at transfer.

Fish Condition, Growth, and Health Monitoring

A pre-transfer fish health examination will be conducted by WDFW fish health specialists. Once in the pond, fish will be monitored daily by staff for signs of disease symptoms (lethargic behavior, skin coloration, visible lesions, caudal fungus, etc.) through observation of feeding behavior and monitoring of daily mortality trends. Additionally staff will collect data from a random sample of approximately 100 fish (of each species when applicable) on a weekly basis. Weekly sampling will include a general assessment of fish condition, stage of smoltification, fish length, and fish weight so that growth rates and condition factors maybe be assessed. 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.

Release

Spring Chinook would be released as close as possible to the agreed upon size target (15-18 fpp). Targets are subject to change at the discretion of the HCP Hatchery Committees. Spring Chinook will be volitionally released from the acclimation site into the Chewuch River (RKM 12.9) in mid-to-late April. If necessary, any remaining fish will be force released by May 1st.

3.0 Adult Return Rates and Adult Management

Historic adult return rates from the Chewuch Pond can be found in Table 2 below.

Table 3. Brood year, number of smolts released, adult returns, and SAR (%) from the Chewuch Acclimation Pond 1992-2010 (data source: Snow et al. 2012).

Brood Year	Smolt Released	Adult Returns	SAR (%)
1992	40881	39	0.001
1993	284165	116	0.0004
1994	11854	2	0.0002
1996	91,672	37	0.0004
1997	132,759	295	0.0022
2001	261,284	738	0.0028
2002	254,238	699	0.0027
2003	127,614	61	0.0005
2004	204,906	194	0.0009
2005	232,811	308	0.0013

Mean	**164,218**	**289**	**0.0012**

Based on the minimum, mean, and maximum SARs (%) from previous releases, we would expect an average of 73 adults to return to the Chewuch River from a release of 60,516 smolts (Table 3).

Table 4. Anticipated number of returning spring Chinook adults from a release size of 60,516 at the Chewuch Acclimation Pond.

Target Number of Smolts	Anticipated Number of Adults Returned		
	Maximum SAR	Mean SAR	Minimum SAR
Chewuch (60,516)	169 (0.28%)	73 (0.12%)	12 (0.02%)

The historic SARs for hatchery fish (Table 2) along with historic estimates of natural origin spawners in the Chewuch can be used to provide a retrospective analysis of what PNI would have been had 60,516 had been released annually and SARs remained the same. This retrospective analysis provides insight into what PNI values could be in the future (Table 4). Based on this analysis, it is unlikely that adult management will be needed to achieve a PNI of 0.67 in the Chewuch River. Additionally, pHOS in the retrospective analysis averages 0.25 (Table 4). Should future SAR rates exceed historic SARs and adult management becomes advisable in the future, uniquely marked hatchery fish (PIT tag, body tag, etc) could be removed at Rocky Reach Dam Trap , Wells Dam, or another location as determined by the Co-managers.

Table 5. Forecast of adult returns and PNI using a retrospective analysis of SARs and NOR spawning escapement.

Return Year[a]	Chewuch NOR spawning Escapement	Hatchery SAR[b]	Hypothetical Hatchery Return	Hypothetical Proportion of Run		PNI (pNOB = 1)	PNI (pNOB =0.5)	PNI (pNOB = 0.25)
				Hatchery	Natural			
1997	123	0.0004	24	0.16	0.84	0.86	0.75	0.60
2000	83	0.0004	24	0.23	0.77	0.82	0.69	0.53
2001	732	0.0022	133	0.15	0.85	0.87	0.76	0.62
2005	289	0.0028	169	0.37	0.63	0.73	0.57	0.40
2006	378	0.0027	163	0.30	0.70	0.70	0.62	0.45
2007	203	0.0005	30	0.13	0.87	0.89	0.79	0.66
2008	86	0.0009	54	0.39	0.61	0.72	0.56	0.39
2009	271	0.0013	79	0.22	0.78	0.82	0.69	0.53
Mean	**271**		**86**	**0.25**	**0.75**	**0.75**	**0.68**	**0.52**

a. Years not included in this analysis either had no NOR spawners data (1996, 1998) or had no Chewuch hatchery release SAR data (BY 1995, 1998, 1999, 2000).

b. For the purposes of this exercise hatchery SARs were matched with return year NORs based on a 4-year age class return

4.0 Monitoring and Evaluation

With the exception of fish condition and growth sampling conducted in-pond, Chelan PUD will be responsible for all M&E associated with the proposed release of spring Chinook from their mitigation program. M&E objectives and metrics applicable to this release can be found in the Monitoring and Evaluation Plan for PUD Hatchery Programs: 2013 Update.

Appendix C

Wells HCP HC Chewuch Acclimation Facility SOA

Wells HCP Hatchery Committee

Statement of Agreement

Chewuch Acclimation Pond Use

November 20, 2013

Statement

The Wells HCP Hatchery Committee agree to change the use of the Chewuch Acclimation Pond to allow YN to acclimate Chelan PUD's Methow spring Chinook mitigation obligation (60,516 smolts) as part of YN's Salmon and Steelhead Acclimation Project beginning with the 2015 release. The acclimation pond would be used annually between March and May. Starting in 2016 spring Chinook may be co-acclimated with coho salmon pre-smolts. Annual reports and monthly updates will be provided to the HCP HC.

Background

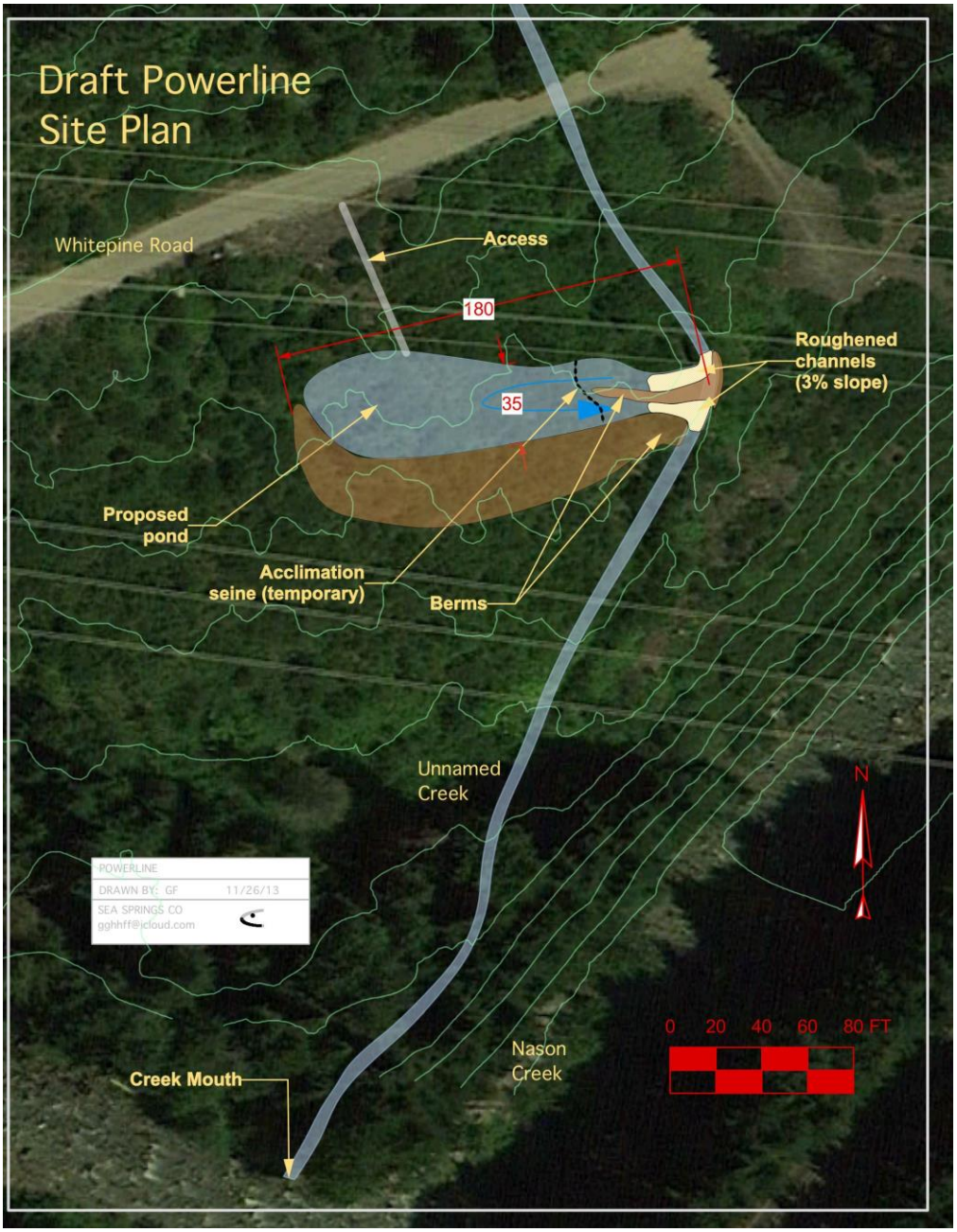
YN's Expanded Acclimation Project is based on the premise that acclimating and releasing salmon and steelhead smolts in select locations can increase the effectiveness of integrated (conservation) programs. YN has reached a lease agreement for the use of the Chewuch Acclimation Pond from DCPUD for the purpose of acclimating coho and spring Chinook salmon. Continued releases of spring Chinook in the Chewuch are an important part of salmon recovery in the Methow Basin. Additional details can be found in Attachment 1 (Chewuch Acclimation Plan). This SOA fulfills the contingences identified in the Final Chewuch Acclimation SOA agreed to by the Rock Island and Rocky Reach HCP Hatchery Committee on Novemer 20 2013.

Appendix D

Proposed Powerline Site Design; Photos

Upper White Pine source water; Powerline Acclimation Site

Powerline Acclimation Site (1st- surface water source; 2nd- proposed pond location)



Proposed Acclimation Site Plan; Powerline Acclimation Site

Appendix E

Land Use Agreement for Powerline Access/Construction

Department of Energy
Bonneville Power Administration
PO Box 3621
Portland, OR 97208-3621

April 28, 2017

In reply to: TERR-3
BPA Case No. 20130431

Tract No. FC-S-68-A-171; FC-S-68-A-171R1
Line Name: Chief Joseph - Monroe No. 1;
Grand Coulee - Snohomish No. 1 & 2;
Chief Joseph - Snohomish No. 3 & 4
ADNO# 8408; 8410; 8412; Structure # 67/6 - 68/1

Mr. Harry Smiskin
Chairman, Yakama Tribal Council
Yakama Nation
PO Box 151
Toppenish, WA 98948

LAND USE AGREEMENT
AMENDMENT NO. 1

Bonneville Power Administration (BPA) has amended Land Use Agreement (Case 20130431) dated February 26, 2014 as follows:

2. The construction/installation of your approved use must be completed by December 31, 2018. If you have not completed your project by the above date, you must inform BPA five working days in advance to receive an extension.

All other terms and conditions of Land Use Agreement No. 20140431 remain the same.

If you have any questions or concerns, please notify this BPA Realty Office. You may direct any communication to Bonneville Power Administration, Real Property Field Services (TERR-3), P.O. Box 3621, Portland, OR 97208 or by telephone to Miroslava Rivera at (503) 230-5611.

A copy of this agreement shall be physically located at the project during construction activities.

THIS LAND USE AGREEMENT, AMENDMENT NO. 1 BECOMES EFFECTIVE UPON THE SIGNATURE OF ALL PARTIES.

I HAVE READ, UNDERSTAND, AND CONCUR WITH THE TERMS OF THIS AGREEMENT:

JoDe Goudy
Chairman, Yakama Tribal Council

5/19/17
Date

THIS AGREEMENT IS HEREBY AUTHORIZED BY BONNEVILLE POWER ADMINISTRATION:

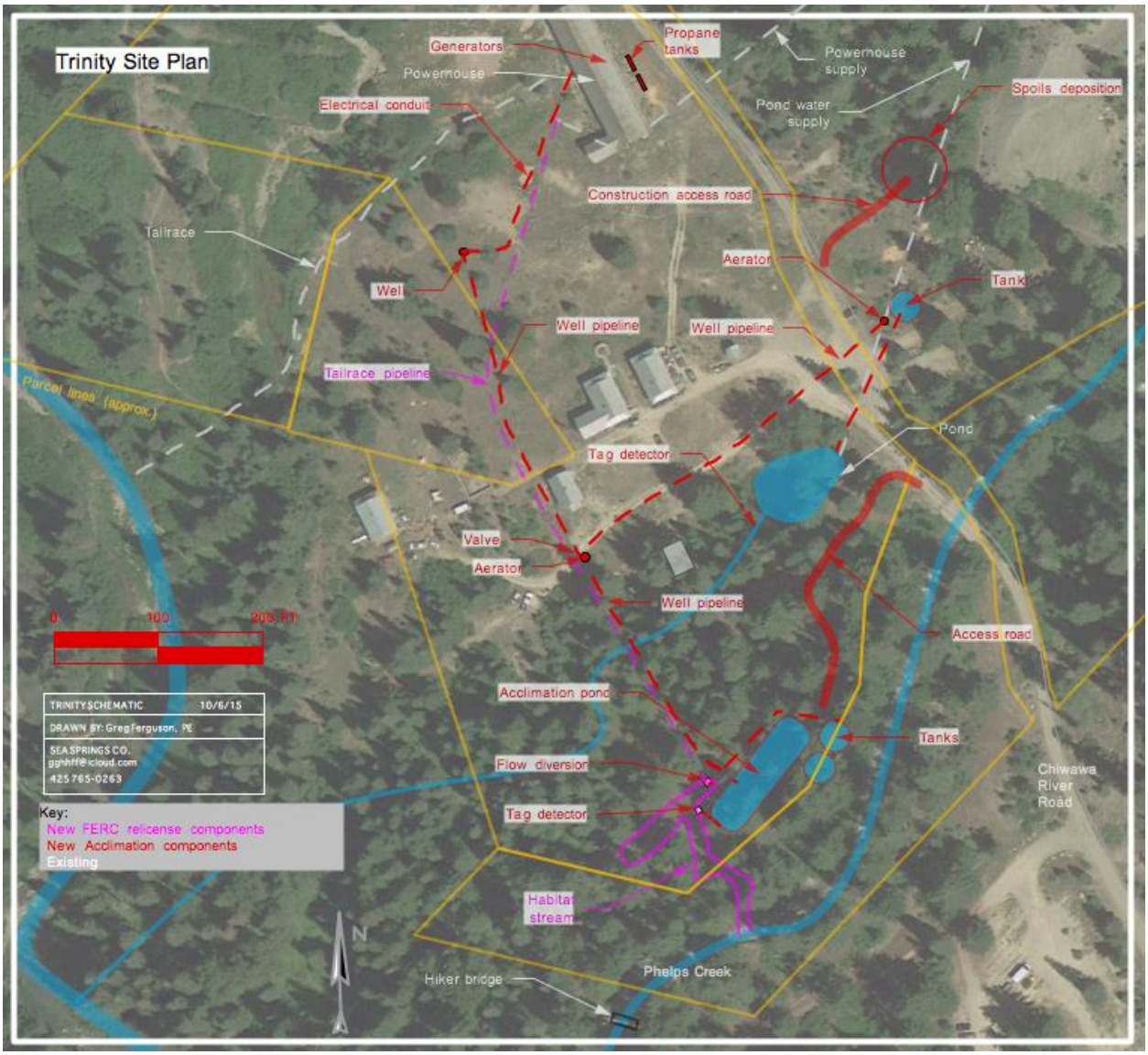
Miroslava Rivera
Realty Specialist

6/5/17
Date

Appendix F

Proposed Trinity Site Design; Photos

Existing pond located at the Trinity Site (2nd picture arrow showing outlet).



Proposed Site Design for spring Chinook & coho production at Trinity Acclimation Site

Appendix G

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 H

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.